

SESSION 1: TENDON

A0330	TEMPORAL DISTRIBUTION OF DONOR TENOCYTES IN TISSUE ENGINEERING OF FLEXOR TENDONS I.K. Angelidis, J. Thorfinn, S. Saber, S.H. Ki, A. Zhang, A.K. Chong, H. Pham, J. Chang (USA, Sweden)	3
A0266	TENDON TISSUE ENGINEERING: THE EFFECT OF A TISSUE BIOREACTOR ON ADIPOSE-DERIVED STEM CELL SEEDED CONSTRUCTS I.K. Angelidis, J. Thorfinn, I.D. Connolly, D. Lindsey, H.M. Pham, J. Chang (USA)	3
A0242	MECHANICAL TRACTION ENHANCES CELL PROLIFERATION AND TENOCYTES LONGITUDINAL ALIGNMENT IN VITRO F. Bassetto, V. Vindigni, C. Tonello, B. Zavan, A.D. Vedova, G. Abatangelo, F. Mazzoleni (Italy)	4
A0024	MECHANICAL STRENGTH OF LOOP-TENDON SUTURES DURING THE HEALING PERIOD H.S. Gong, M.S. Chung, G.H. Baek, S.T. Kwon, S.H. Rhee, S.H. Jeon (Korea)	4
A0239	ACCURATE TENDON GLIDING MEASUREMENT USING ULTRASOUND IMAGING N.A. Noordzij, J.W.H. Korstanje, J.G. Bosch, G.J. Kleinrensink, S.E.R. Hovius, R.W. Selles (The Netherlands)	5
A0159	SONOGRAPHIC EVALUATION OF THE FIRST EXTENSOR COMPARTMENT IN DE QUERVAIN'S DISEASE B.C. Kwon, S.-J. Choi, S.H. Koh, (South Korea)	5
A0345	NEW INTERNAL REABSORBABLE DEVICE IN REPAIR OF RUPTURED FLEXOR TENDONS B. Battiston, G. Vasario, A. Georgescu, S. Artiaco, F.Z. Puntaroni, I.I. Papalois, S. Geuna, P. Tos (Italy, Romania, Greece)	6
A0112	NO-KNOT FLEXOR TENDON REPAIR: A BIOMECHANICAL CADAVER STUDY AND CLINICAL EXPERIENCE H. Seradge, J. Frazier, W. Tian, W. Parker, C. Baer, W. Owen	6
A0198	BRUNELLI PULL-OUT TECHNIQUE IN FLEXOR TENDONS REPAIR A. Georgescu, I. Capota, I. Matei, F. Ardelean, O. Olariu (Romania)	7

A0067	RECONSTRUCTION OF THE EXTENSOR POLLICIS LONGUS TENDON BY TENDON GRAFT OR TENDON TRANSPOSITION J. Oh, Y. Yoon, D. Kim, H. Yu (<i>Korea</i>)	7
A0039	USE OF TOE EXTENSOR AUTOGRAFTS IN SINGLE-STAGE FLEXOR TENDON RECONSTRUCTION I. Miguleva, V. Okhotsky, I. Klukvin (<i>Russia</i>)	8
A0296	TREATMENT OF BONY Mallet FINGER USING MODIFIED PULL-OUT WIRE SUTURE TECHNIQUE S.-J. Cheon, J.-M. Lim, S.-H. Cha (<i>Korea</i>)	8
A0030	MEDIAN NERVE MISTAKENLY TAKEN AS FREE TENDON GRAFT: CASE REPORTS AND LITERATURE REVIEW S. Alhadidi, A.A.R Altamimi (<i>Jordan</i>)	9
A0085	TREATMENT OF INJURIS TO DIGITAL FLEXOR TENDONS IN CHILDREN R. Polozov, D. Kupatadze (<i>Russia</i>)	9
A0122	EARLY RESULTS OF FLEXOR TENDON REPAIR IN ZONE II WITH MODIFIED, FOUR-STRAND STRICKLAND TECHNIQUE I. Walaszek, A. Żyluk, B. Piotuch (<i>Poland</i>)	10

A0330 TEMPORAL DISTRIBUTION OF DONOR TENOCYTES IN TISSUE ENGINEERING OF FLEXOR TENDONS

I.K. Angelidis, J. Thorfinn, S. Saber, S.H. Ki, A. Zhang, A.K. Chong, H. Pham, J. Chang

1. Division of Plastic Surgery, Stanford University Medical Center, Stanford, California, USA
2. Section of Plastic Surgery, VA Palo Alto Health Care System, Palo Alto, California, USA
3. Department of Plastic Surgery, Hand Surgery and Burns, University Hospital, Linköping, Sweden

Introduction: Tissue engineered tendon material may address tendon shortages in cases of mutilating hand injuries. Tenocytes from rabbit flexor tendon can be successfully seeded onto acellularized tendons that are then used as tendon constructs. These tissue engineered constructs in vivo exhibit a population of tenocyte-like cells, however it is not known to what extent these cells are of donor or recipient origin. Furthermore, the temporal distribution is also not known.

Material and methods: In this study, tenocytes were extracted from male rabbits (New Zealand, 7–8 lbs., Harlan), cultured in vitro, and seeded onto acellularized rabbit forepaw flexor tendons. These tendons were then transplanted to a zone II-defect in female recipients. Tendons were examined after 3, 6, 12, and 30 weeks ($n=3$ for each group) using fluorescent in situ hybridization (FISH) to detect the Y-chromosome in the male donor cells.

Results: The donor male tenocytes populate the epi- and endotenon of the grafts to a larger extent than the recipient female tenocytes at 3 and 6 weeks. The donor and recipient tenocytes are present jointly in the grafts until 12 weeks. At 30 weeks no donor tenocytes were visible in the grafts; all cells were recipient tenocyte-like cells.

Conclusions: The presence of cells in tissue engineered tendon grafts has been shown to add to the strength of the constructs in vitro. Donor male cells survive in the tendon construct until 12 weeks post transplantation. This finding underlines the importance of seeding flexor tendon constructs with viable cells so that the graft can withstand the in vivo forces during early healing. In addition, this study shows that recipient cells can migrate into and re-populate the tendon construct. In the future, stronger constructs may allow the initiation of motion earlier in order to lessen adhesion formation.

10.1177/1753193409105924

A0266 TENDON TISSUE ENGINEERING: THE EFFECT OF A TISSUE BIOREACTOR ON ADIPOSE-DERIVED STEM CELL SEEDED CONSTRUCTS

I.K. Angelidis, J. Thorfinn, I.D. Connolly, D. Lindsey, H.M. Pham, J. Chang

1. VA Palo Alto Health Care System, Palo Alto, California, USA
2. Division of Plastic Surgery, Stanford University Medical Center, Stanford, California, USA
3. Department of Plastic Surgery, Hand Surgery, and Burns, University Hospital, Linköping, Sweden
4. Bone & Joint Rehabilitation R&D Center, VA Palo Alto Health Care System, Palo Alto, California, USA

Purpose: In cases of mutilating hand injuries, large amounts of tendon grafts may be needed for reconstruction. Tissue engineered flexor tendons may address this need. In this study, we examined the effect of a custom bioreactor on adipose-derived stem cell-seeded tendon constructs.

Materials and methods: Flexor tendons were harvested from the rear paw of New Zealand white rabbits. The tendons were acellularized and seeded with adipose-derived stem cells (2×10^6 cells per construct). A custom bioreactor (Ligagen L30-4C, DynaGen systems, Tissue Growth Technologies, Minnetonka, MN) was used to apply a cyclic mechanical load onto the tendon constructs with a stretch force of 1.25N over five days ($n=16$). Two additional groups were used as controls: fresh tendons ($n=15$) and acellularized tendons that were seeded with adipose-derived stem cells and then incubated for 5 days (without stretch, unloaded control tendons, $n=22$). Comparison across groups was assessed using one-way ANOVA followed by pairwise comparisons of means using the Scheffe test with the significance level set at $p < 0.05$.

Results: We compared the ultimate tensile stress (UTS) and the elastic modulus (E) of the bioreactor-treated tendons to the unloaded control tendons and the fresh control tendons. UTS and E values of bioreactor-treated tendons that were exposed to 1 cycle/min load [mean UTS: 66.74 MPa, mean E: 906.68 MPa] were significantly higher than those of unloaded control tendons [mean UTS: 47.90 MPa, E: 715.57 MPa, $p(\text{UTS}) = 0.0008$ and $p(\text{E}) = 2.25 \times 10^{-6}$]. The bioreactor-treated tendons approached the values of UTS and E of fresh tendons [mean UTS: 63.15 MPa, mean E: 974.54 MPa]. Histologically, cyclic strain caused the cells and their actin cytoskeleton to reorient themselves parallel to the direction of strain.

Conclusions: The application of cyclic strain on seeded tendon constructs increased their biomechanical

properties, achieving values comparable to fresh intact tendons. The bioreactor may therefore contribute to the in vitro production of strong tendon material that could have clinical applications in hand reconstruction.

10.1177/1753193409105921

A0242 MECHANICAL TRACTION ENHANCES CELL PROLIFERATION AND TENOCYTES LONGITUDINAL ALIGNMENT IN VITRO

F. Bassetto¹, V. Vindigni¹, C. Tonello², B. Zavan², A.D. Vedova¹, G. Abatangelo², F. Mazzoleni¹

¹*Clinic of Plastic Surgery and*

²*Department of Histology and Medical Biotechnology, University of Padova, Italy*

Introduction/Purpose: The field of tendon tissue engineering is extremely recent due to the difficulty in preservation of tenocyte phenotype in vitro, and, only recently, mechanobiology has allowed us to better understand the fundamental role of in vitro mechanical stimuli to maintain their phenotype. The goal of this study was to investigate the effect of cyclic mechanical stimulation on tenocytes seeded onto hyaluronic acid based scaffold, and to determine the potential of the engineered constructs to function as tendon tissue replacement models.

Methods: We studied human tenocytes isolated from tendon explants obtained after hand traumas. Tenocytes were seeded onto hyaluronic acid based scaffold. Tissue constructs were placed into bioreactor able to reproduce mechanical traction normally present in vivo. Controls were left untensioned. Histological, immunohistochemical, biomolecular, transmission and scanning microscopic analyses were used to evaluate the results after 7, 14, and 21 days.

Results: After 3 weeks of culture an increase in cell number was measured for both tensioned and untensioned constructs. Microscopically, cyclically tensioned samples showed parallel orientation of collagen fibers and spindle-shaped cell nuclei mimicking the morphology of native tendons. Moreover, mechanostimulation resulted in significantly stronger and stiffer constructs compared to untensioned samples. Higher expression of matrix proteins such as collagen I and adhesion proteins such as integrin $\beta 1$ and scleraxis (tendon-specific marker) were found in cyclically tensioned samples.

Conclusions: Mechanical traction enhances cell proliferation and tenocytes longitudinal alignment. The model reproduces condition tendon healing in vivo preventing

differentiation of tenocytes in fibroblasts. Duration, frequencies and amplitude of loading directly influence cellular response and behaviour in vitro. Understanding the physiological window for these parameters is critical and represents future challenges of research in tendon tissue engineering.

10.1177/1753193409105919

A0024 MECHANICAL STRENGTH OF LOOP-TENDON SUTURES DURING THE HEALING PERIOD

H.S. Gong, M.S. Chung, G.H. Baek, S.T. Kwon, S.H. Rhee, S.H. Jeon

Department of Orthopaedic Surgery, Seoul National University College of Medicine, Seoul, Korea

Purpose: Loop-tendon sutures have been previously shown to be stronger than end-weave sutures in terms of initial tensile strength. However, their strengths over the healing period have not been determined. Furthermore, their healing process through the epitendinous contact may differ from that of end-weave sutures due to different constructs of the loop and the weave. The purpose of this study was to compare the mechanical strengths of loop-tendon sutures and end-weave sutures during the healing period in rabbit hind limb tendons.

Methods: In bilateral hind limbs of 30 New Zealand white rabbits of average weight 3.5 kg, a distally cut gastrocnemius Achilles tendon and a proximally cut flexor digitorum longus tendon were connected to each other by using the looped-tendon suture technique in one limb and the end-weave suture technique in the contralateral limb. Six rabbits were sacrificed at the following time points, immediately after surgery (baseline) and at 1, 2, 3, and 4 weeks postoperatively. Repaired tendons were harvested, and then were subjected to linear loading in a tensile load-testing machine.

Results: Ultimate tensile loads were significantly higher in the loop-tendon suture group than in the end-weave group from baseline to 3 weeks postoperatively ($p < 0.05$), but were comparable in the two study groups at 4 weeks postoperatively. During the healing period, the ultimate tensile load and absorbed energy decreased over the first 2 weeks postoperatively, and then increased to reach baseline strengths at 3 weeks postoperatively in both groups.

Conclusions: The loop-tendon suture technique provided greater strength than the end-weave technique during the early healing period. Tendon reconstruction by the loop-tendon suture method can be safer during the early

postoperative rehabilitation than tendon reconstruction by the end-weave method.

10.1177/1753193409105910

A0239 ACCURATE TENDON GLIDING MEASUREMENT USING ULTRASOUND IMAGING

N.A. Noordzij^{1,2}, J.W.H. Korstanje^{1,2,3}, J.G. Bosch³, G.J. Kleinrensink⁴, S.E.R. Hovius¹, R.W. Selles^{1,2}

¹*Department of Plastic and Reconstructive Surgery, Erasmus MC*

²*Department of Rehabilitation Medicine, Erasmus MC*

³*Department of Biomedical Engineering, Thoraxcenter, Erasmus MC*

⁴*Department of Neurosciences and Anatomy s-Gravendijkwal 230, 3015 CE Rotterdam, The Netherlands*

Background: Hand function is to a large extent determined by the movement of the long flexor tendons. Quantification of this tendon movement could provide important insight into normal and pathological function since it can be used to determine possible adhesion formation, tendon moment arm, or actual tendon gliding during different rehabilitation protocols. At present, however, tools are lacking to quantify tendon movement in the hand and forearm. Ultrasound can be used to study muscle and tendon movement. Still, until today, quantification is mostly based on manual tracking of anatomical landmarks such as the musculotendinous junction, limiting the applicability to a small number of muscle-tendon units. In this study, we introduce a new technique to quantify tendon gliding objectively without the use of anatomical landmarks, using two-dimensional speckle tracking in high-frequency B-mode images.

Aims: The aim of this study was to quantify the accuracy of a new ultrasound technique to evaluate tendon gliding in human flexor tendons of the hand using inserted markers as a reference.

Methods: Measurements were performed with a standard clinical ultrasound scanner (Philips iE33). B-mode images were recorded at 59 Hz using a 7 MHz linear array and exported for post-processing. Frame-to-frame speckle tracking was performed in Matlab using a normalized cross-correlation algorithm to obtain displacement estimations as a function of time. The flexor digitorum superficialis of the third finger of a cadaver arm was displaced externally with a draw bench over 3 distances (2–11 millimetre). As a reference measure, a 5 by 5 millimetre aluminium marker was surgically implanted in the tendon. Tendon parts with the marker as well as without the marker were tracked fully

automatically and results were compared with the marker displacement as the golden standard. The experiment was repeated on the same tendon as a re-test.

Results: Results of the automated speckle tracking of gliding of the tendon indicated that repeatable and highly accurate measurements can be obtained with this technique. For the tendon of the flexor digitorum superficialis, known excursions of 10.46 and 9.73 millimetre were underestimated by less than 0.18 millimetre (1.3% and 1.1% respectively). Displacements of 6.23 and 6.16 millimetre excursion were underestimated by less than 0.18 millimetre as well (1.6% and 2.5% respectively). Displacements of 3.58 and 1.58 millimetre excursion were underestimated less than 0.06 millimetre (0.8% and 1.1% respectively).

Discussion: This study presents a technique to study and quantify in vivo tendon measurements. This study using a human cadaver tendon indicated a high accuracy and repeatability. Underestimation of tendon excursion was never more than 3 pixels (0.18 millimetre) for all measurements. This new technique presents the possibility of obtaining objective pre- and post-operative quantification of flexor tendon gliding. In addition, objective monitoring of the tendon repair site and tendon function during the rehabilitation process may allow early detection of adhesion formation and potential tendon re-ruptures.

10.1177/1753193409105918

A0159 SONOGRAPHIC EVALUATION OF THE FIRST EXTENSOR COMPARTMENT IN DE QUERVAIN'S DISEASE

B.C. Kwon, S.-J. Choi, S.H. Koh*

Department of Orthopedic Surgery, Hallym University Sacred Heart Hospital, Kyeonggi-do, South Korea.

**Department of Radiology, Hallym University Sacred Heart Hospital, Kyeonggi-do, South Korea*

Background: The presence of the septum within the first extensor compartment is important regarding the development and prognosis of De Quervain's disease. Patients with De Quervain's disease are more likely to have the septum in the first extensor compartment. When a septum is present, steroid injection may be less successful because accurate injection into each sub-compartment is less likely. Therefore, knowing the presence of the septum in the first extensor compartment is important in predicting the outcome after steroid injection for the treatment of De Quervain's disease. However, studies on detecting the septum have been rare.

Purpose: The purpose of this study is to evaluate the value of sonography in identifying the septum in the first

extensor compartment in patients with De Quervain's disease.

Materials and methods: From August 2003 to November 2008, 35 wrists of 33 patients underwent surgical release of first extensor compartment for the treatment of De Quervain's disease after the failure of conservative management. There were 7 males and 26 females with an average age of 49.5 years. Right wrists were involved in 13 patients, left in 18, and both in 2. Before the operation, a musculoskeletal radiologist, using a 12-5 MHz linear array transducer, determined the presence of a septum based on the presence of hypoechoic area between EPB and APL on cross sectional scanning. Surgical findings were correlated with the sonographic findings.

Results: Sonographic examination revealed a positive finding in 17 of 17 wrists with the septum and negative in 17 of 18 wrists without the septum. The sensitivity, specificity, accuracy, positive predictive value, and negative predictive value of sonography for detecting the septum in the first extensor compartment was 100%, 94.4%, 97.1%, 94.4%, and 100%, respectively.

Conclusion: Sonography is highly accurate in detecting the septum in the first extensor compartment. Sonographic examination may be of help in the management of De Quervain's disease.

10.1177/1753193409105916

A0345 NEW INTERNAL REABSORBABLE DEVICE IN REPAIR OF RUPTURED FLEXOR TENDONS

B. Battiston, G. Vasario, A. Georgescu, S. Artiaco, F.Z. Puntaroni, I.I. Papalois, S. Geuna, P. Tos
Interdisciplinary Microsurgery Group, Azienda Ospedaliera C.T.O.-CRF-MARIA ADELAIDE, Turin, Italy

Clinic of Plastic Surgery and Reconstructive Microsurgery, University of Medicine Iuliu Hatieganu, Cluj-Napoca, Romania

Department of Upper Limb and Hand Surgery and Microsurgery, KAT Hospital, Kifissia, Athens, Greece

Objective: After flexor tendon repair there are often problems in tendon gliding while the initial resistance of the suture remains a critical point. The authors present a biomechanical model of a new internal resorbable device for tendon suture to improve suture strength allowing early active mobilization.

Material and methods: We considered the possibility of utilizing an internal device for tendon suture in different resorbable materials and designs in the repair of ruptured flexor tendons. The authors present a biomechanical study of tendon behaviour after primary

suturing with internal resorbable device (made of different mix of poly lactic acid and poly-caprolactone) for tendon suture studying five biomechanical parameters: the load at rupture (R), Young's modulus of elasticity (E), gapping (RG), cycling loading (RCL), pulley loading (Rpl). Different tendon-device sutures are also compared and tested, for a total of 320 suine flexor tendons sutured.

Results: Different types of sutures models are compared using different resorbable biomaterials and shapes to accomplish internal resorbable device technique best-match. The results are compared with the most common tendon suture used in clinical practice. Our device showed an average peak load of 52.6 N with the best performance achieved by the PLA 20%/PCL 80% mix (73.26 N, SD 3.95, p value < 0.05). The same mixture showed the best performance also in cycling load tests (Medium Gap 1.7 mm, SD 0.11), while in pulley loading the PLA 100% showed slightly better results (61.56 N, SD 3.38).

Conclusions: The effectiveness of the repair of ruptured tendons utilizing internal resorbable devices showed mean load at rupture values statistically superior to the most common used techniques in the literature and comparable to the other market-available devices which are bulky and non resorbable with secondary problems of tolerance. Further investigation with a larger testing sample, in vivo and in human cadaveric model, is needed in order to assess usability. This could open new frontiers in hand surgery and address new solutions for tendon repair.

10.1177/1753193409105925

A0112 NO-KNOT FLEXOR TENDON REPAIR: A BIOMECHANICAL CADAVER STUDY AND CLINICAL EXPERIENCE

H. Seradge, J. Frazier, W. Tian, W. Parker, C. Baer, W. Owen
Orthopedic Institute

Background: Active range of motion after flexor tendon repair is associated with decreased scar formation, faster healing and stronger healed tendons.

A strong flexor tendon repair is required to achieve the above goal with relative safety. The strength of the repair site depends on the tensile strength of the suture material (to resist suture breakage) and the weave technique (to prevent suture pullout or gap formation). Therefore, a stronger suture material and a repair technique which is more resistant to gap formation is desirable.

The strength of the suture material can be improved using a larger caliber suture material. However, the thicker suture material will have a larger knot. A bigger knot in the flexor fibro-osseous tunnel can cause triggering and increase friction, leading to adhesion formation.

Purpose: To design a flexor tendon repair technique that will not require a knot but has superior grasping power (resistant to gap formation) and would not fail by pullout from the tendon.

Material and method: An interlocking repair technique was designed. Forty fresh frozen flexor digitorum profundus of the index, long and ring fingers of fresh, frozen male cadavers aged 18–50 at the time of death were harvested. The tendons were divided into four groups. Ten tendons were sharply cut perpendicular to the long axis and repaired using the Modified Kessler Technique with a #0 coated polyester suture. The second group was repaired the same with addition of the Epitenon repair. The third and fourth groups were repaired using no knot technique with and without an Epitenon suture.

Results: SUTURE SIZE #0 KESSLER NO KNOT w/EPI w/EPI

LOAD AT GAP INITIATION (N) 28.3 ± 2.5 66.5 ± 3.9

LOAD AT 2MM GAP (N) 41.6 ± 3.5 83.8 ± 3.5

LOAD AT FAILURE (N) 65.8 ± 3.0 92.2 ± 5.5

FAILURE MODE P = 10 F = 10

Clinical trial: The no-knot technique has been used in 30 flexor tendon lacerations in zone II. Immediate active range of motion started first day post-op. The overall result was scored excellent based on Strickland criteria.

10.1177/1753193409105914

A0198 BRUNELLI PULL-OUT TECHNIQUE IN FLEXOR TENDONS REPAIR

A. Georgescu, I. Capota, I. Matei, F. Ardelean, O. Olariu
University of Medicine "Iuliu Hatieganu" Cluj-Napoca, Romania

Introduction: The Brunelli pull-out technique is one surgical procedure for zone II flexor tendons repair which allows early mobilization of fingers without important tension on suture line. The paper will present the modifications proposed by us for this technique and also the extension of the indication for zone III.

Material and method: The study refers to 70 cases involving flexor tendons lesions in zone II and III admitted in our service since 1999. We modified the initial technique by starting from the proximal towards

the distal area and using 2 straight needles continuous threads. The digital skin is incised until near the insertion area of FDP and the suture thread was passed through the tendon in one or more steps to reach the distal end of the tendon. In 75% of cases, non absorbable sutures were used (removed after 21 days), but also absorbable sutures (only cut after 21 days) were used. The surgical procedure took place under regional anesthesia in 62 cases. The recovery started from the first post-operative day with passive fingers mobilization and 48 hours after surgery the active mobilization started.

Results: The patients were followed for 3–24 months after surgery. Full flexion was achieved in 36 patients. A flexion deficit of 5–10 degrees was noticed in 8 patients, of 10–20 degrees in 19, of 20–30 degrees in 7. All the patients were able to resume social life and work in the same place after maximum 45 days. No tendon rupture was noticed, and tenolysis was performed in only 5 cases (patients with complex traumas)

Conclusion: We consider the Brunelli technique a very good method for zone II flexor tendon lesions and the modification proposed by us allow a broadening of its indication field.

10.1177/1753193409105917

A0067 RECONSTRUCTION OF THE EXTENSOR POLLICIS LONGUS TENDON BY TENDON GRAFT OR TENDON TRANSPOSITION

J. Oh, Y. Yoon, D. Kim, H. Yu
Department of Orthopedic Surgery, Yonsei University, Wonju College of Medicine, Wonju, Korea

Purpose: The purpose of this study is to compare the clinical results of chronic extensor pollicis longus tendon treated by palmaris longus tendon graft (group I) versus extensor indicis proprius tendon transposition (group II).

Materials and methods: Out of twenty-five patients who suffer from chronic extensor pollicis longus tendon rupture, twelve patients were treated by palmaris longus tendon graft and thirteen patients were treated by extensor indicis proprius tendon transposition randomly. Postoperatively thumbs were immobilized with thumb spica splint for three weeks. Active and passive movement was allowed subsequently for six weeks. The functions of the thumbs were assessed by the Geldmacher criteria and statistically compared.

Results: The overall outcome was excellent in 5 (20%) of patients and good in 17 (68%) of patients and satisfactory in 3 (12%) of patients. The mean scores using the Geldmacher criteria were 18.50 for palmaris

longus tendon graft and 19.69 for extensor indicis proprius tendon transposition. There was no significant difference between two groups.

Conclusion: Although both methods establish equally good clinical results in treatment of chronic extensor pollicis longus tendon, extensor indicis proprius tendon transposition could be more available methods in consideration of simplicity of technique and morbidity on donor site after tendon harvest.

10.1177/1753193409105912

A0039 USE OF TOE EXTENSOR AUTOGRAFTS IN SINGLE-STAGE FLEXOR TENDON RECONSTRUCTION

I. Miguleva, V. Okhotsky, I. Klukvin
SKlifosovsky Research Institute for Emergency Medicine, Russia

Introduction: Intrasynovial flexor and extrasynovial extensor tendons have often been used as donor autogenous grafts for reconstruction of digital flexor tendons. The well-known experimental studies in a canine model have demonstrated that grafted intrasynovial tendons healed with minimal adhesions, whereas extrasynovial tendons healed by early ingrowth of peripheral adhesions. However, there are no published results of the direct comparison of the functional outcomes after flexor tendon grafting in humans according to the type of donor tendon.

Aims: To compare the functional results of digital flexor tendon reconstruction with the use of autografts of the intrasynovial and extrasynovial origin.

Materials and methods: Two hundred and twenty-two patients with zone II flexor tendon injury who underwent single-stage free flexor tendon grafting at the time from 3 to 11 weeks after laceration. In 132 fingers (43 index, 29 long, 28 ring, 32 little) the extrasynovial second toe extensor graft and in 90 fingers (22 index, 14 long, 16 ring, 38 little) the intrasynovial flexor digitorum superficialis graft obtained from the damaged finger was used. The patients' age, gender, time from injury to operation distribution, and the early active motion rehabilitation programme in both groups was the identical. All patients were treated by the same hand surgeon. An intention to use a superficialis tendon graft principle was followed, and toe extensor graft was used only when lacerated superficialis tendon condition was poor. The functional outcomes were clinically evaluated at follow-up examination 6 months after surgery.

Results: In the toe extensor graft group the higher rate of excellent results (full finger flexion and full extension

recovery without any deficit) was obtained: 59.1% versus 36.7% in superficialis graft group ($P < 0.01$). The rate of good results (full finger flexion with no more than 15° extension) was almost the same in the two groups: 22% in the toe extensor graft group versus 15.5% in superficialis graft group ($P > 0.05$). The rate of fair results (cases with any finger flexion deficit regardless of the extension recovery) in the toe extensor graft group was significantly lower: 7.5% versus 32.3% ($P < 0.01$). There was no significant difference between the contracture rate in both groups: 2.6% and 3.3% respectively and the rupture rate: 9.7% and 12.2% ($P > 0.05$).

Conclusion: The toe extensors are a good choice for the source of autografts in single-stage flexor-tendon grafting.

10.1177/1753193409105911

A0296 TREATMENT OF BONY Mallet FINGER USING MODIFIED PULL-OUT WIRE SUTURE TECHNIQUE

S.-J. Cheon, J.-M. Lim, S.-H. Cha
Department of Orthopaedic Surgery, College of Medicine, Pusan National University, Pusan, Korea

Purpose: To report the new surgical treatment of bony mallet finger deformity using modified pull-out suture technique and evaluation of functional outcome, subjective patient satisfaction and radiographic findings.

Materials and methods: Sixteen bony mallet fingers treated by modified pull-out wire suture technique were included in this study. Mallet fractures were classified by the Wehbe and Schneider method; 6 Type IB, 8 Type IIB, 1 Type IIC and 1 Type IIIB. The assessment consists of clinical symptoms, active range of motion of the distal interphalangeal joint, patient satisfaction, bony healing using radiographs of distal interphalangeal joint and complications. Objective results and subjective patients satisfaction were evaluated by the Crawford system and the visual analog scale(VAS), respectively.

Results: As to objective results, six were graded as excellent and eight had good results and two had fair results. Subjectively five were excellent, ten were good and one was fair. Radiographs obtained at follow-up showed bone union in all cases. Slight degenerative changes occurred in three cases, an intra-articular step off of less than 1 mm was present in two cases. One patient was reoperated because of wire cut-out, but the objective result was good. A minimal ridging of nail

occurred in two cases but other complications were not observed.

Conclusion: Modified pull-out wire suture technique is considered useful procedure in bony mallet finger because it can achieve not only anatomical reduction and solid fixation but also rapid fracture union and excellent range of motion with relatively low complication rates.

10.1177/1753193409105922

A0030 MEDIAN NERVE MISTAKENLY TAKEN AS FREE TENDON GRAFT: CASE REPORTS AND LITERATURE REVIEW

S. Alhadidi, A.A.R. Altamimi
Department of Orthopedic Surgery, Jordan University Hospital, Amman, Jordan

The anatomy of the wrist and hand is complex and crowded. The median nerve emerges from between the flexor digitorum superficialis and profundus and becomes superficial just above the flexor retinaculum and comes closer to the tendon of the palmaris longus muscle; a place that makes it vulnerable to injury. The tendon of palmaris longus is frequently used in tendon repair as a free graft or as a spacer in excisional arthroplasty of the first carpometacarpal joint. The close proximity of the nerve and the tendon makes the nerve susceptible for injury during surgery especially if surgery was performed by an inexperienced surgeon. We are reporting two cases of median nerve being harvested as a graft instead of the free tendon graft. A review of the literature is presented and the consequences of this iatrogenic nerve injury and recommendations to avoid it are discussed.

10.1177/1753193409105928

A0085 TREATMENT OF INJURIS TO DIGITAL FLEXOR TENDONS IN CHILDREN

R. Polozov, D. Kupatadze
The Clinic of Saint-Petersburg State's Pediatric Medical Academy, Saint-Petersburg, Russia.

343 patients with traumatic injuries to digital flexor tendons aged from ten months to 18 years were treated surgically from 1987 to 2008 in the Clinic for Pediatric Surgery in St-Petersburg.

In most of the patients, in 311 (90.7%), a primary suture (up to 14 days) was performed, an early suture (up to

24 hours) in 259 (75.5%), a late one in 52 (15.2%). A delayed tendon suture was carried out in 16 (4.7%) patients, in 11 (3.2%) up to 30 days, in 5 (1.5%) a month after an injury or later. The tendon plasty was needed in 16 (4.7%), in 10 (2.9%) of the patients it was early one (up to 30 days), in 6 (1.7%) a late one (a month after the injury or later).

If there were accompanying damages to arteries and nerves, we performed a reconstruction of all these damaged structures simultaneously with tendons. The type of the tendon damage (flexion or extension) was necessarily taken into consideration. In injuries caused by grasping a sharp object, as a rule, a dissection of tendons of flexed fingers had taken place, and it was the flexion injury. If the child had fallen down with the stretched hand on a sharp object laying on the ground, mostly a dissection of stretched tendons took place, it was the extension injury.

In tendon injuries at first and second hand areas, the prevention of adhesions was attained by microsurgical techniques. At the second hand area, in addition, the superficial flexor tendon was excised. Besides, the autoplasty of fibrous synovial sheath by the tissue "paratenon" taken from the radial flexor tendon of the hand was applied.

In children up to ten years old, to immobilize the limb, a dorsal plaster cast was applied in flexion at the wrist up to 60 degrees and flexion at all metacarpophalangeal joints up to 60–70 degrees. Such immobilization allows us to perform early dosated active movements of damaged finger, and it lowers the risk of the tendon suture rupture. 5–7 days after operation we started dosated active movements of the damaged finger.

Follow-up was from 6 months to 8 years after operation. In children older than 7 years there were more excellent and good results than in younger ones. Most of the poor results were observed in patients aged up to seven years. In our opinion, the main reason for poor functional results in children up to seven years is a negative behaviour of the child during postoperative rehabilitation.

Early dosated active movements carried out after operation have improved the functional outcome. In injuries of flexor tendons in the area of fibrous and synovial sheaths (first, second and fourth hand areas), excellent and good results have depended on early rehabilitation more than in injurues in third and fifth hand areas. Thus, the results of treatment of injuries to digital flexor tendons in children depend on age, area of the damage, surgical techniques and early dosated active movements of damaged finger.

10.1177/1753193409105913

A0122 EARLY RESULTS OF FLEXOR TENDON REPAIR IN ZONE II WITH MODIFIED, FOUR-STRAND STRICKLAND TECHNIQUE

I. Walaszek, A. Żyłuk, B. Piotuch

Department of General and Hand Surgery, Pomeranian Medical University in Szczecin, Poland

Introduction: New materials, techniques of tendon suture and methods of post-operative rehabilitation offer surgeons perspective of effective repair and excellent outcomes. Results of experimental studies show that multistrand tendon suture provides better mechanical properties than two-strand technique, however, clinical use in only two studies did not confirm its superiority to traditional method of the repair. The objective of this study was the assessment of the outcomes of the treatment of flexor tendon repair by a modified, four-strand Strickland technique.

Materials and methods: Flexor tendons lacerations in 60 patients, all in Verdan's zone II, without associated bone fractures and impaired blood supply were repaired by a modified, four-strand Strickland technique. An active flexion and extension of the fingers in the range restricted by a splint was recommended immediately after operation. Early results were evaluated in

51 patients, 41 men and 10 women, in a mean age of 31 years, in whom 69 tendons were repaired in 69 digits. Follow-up at 2 and 6 weeks included examination of total active range of motion (AROM) of involved fingers, rupture rate and complications.

Results: Failure of the repair occurred in 3 cases (6%), including one thumb, index and little finger, all between 2nd and 6th week after the operation. A mean AROM at 2 and 6 weeks was 38% and 58% of the normal value (270° for the finger and for 170° the thumb), respectively. In 13 digits (28%) AROM at 6 weeks was excellent, greater than 80%, but in 5 digits was poor, less than 20% of the normal value. The main cause of reduced AROM was incomplete extension of the digits, due to splint employment up to 6 weeks post-operatively.

Conclusion: Early results obtained in the study fail to confirm greater endurance of four-strand repair over two-strand, which suggests rupture rate close to that given in the literature. An active range of motion achieved in the group was poorer than that obtained after two-strand repair in other studies, but one can expect its improvement in the longer perspective.

10.1177/1753193409105915

SESSION 2: PHALANGES

A0036	SURGICAL RELEASE FOR CHRONIC AND SEVERE FLEXION CONTRACTURE OF PIP JOINTS S.B. Hahn, Y.R. Choi, H.J. Kang (Korea)	13
A0048	AVULSION FRACTURES OF THE DISTAL PHALANX E. Gudemez, Y. Ataker, S. Comert, O. Cerezci, A. Gulgonen (Turkey)	13
A0210	PIP- DENERVATION – A VALID TREATMENT OPTION IN PAINFUL ARTHRITIS I. Mertz, N. Buschmeier, M. Haerle (Germany)	14
A0041	MODIFIED PULL-OUT WIRE SUTURE TECHNIQUE FOR THE TREATMENT OF CHRONIC BONY Mallet FINGER DEFORMITY S.K. Lee, W.S. Choy, W.J. Kim, K.J. Kim (Korea)	14
A0054	DISTAL INTERPHALANGEAL JOINT ARTHODESIS: A REPORT OF 100 CASES USING A SHAPE-MEMORY INTRAMEDULLARY STAPLE B. Amara, R. Matasa (France)	15
A0326	BUTTRESS PLATING FOR UNSTABLE COMMUNUTED FRACTURE-DISLOCATIONS OF THE PROXIMAL INTERPHALANGEAL JOINT T. Singh, A. Lakdawala, V. Rajaratnam, D. Power, M. Craigen (England)	15
A0329	THE SUZUKI EXTERNAL FIXATOR IN THE TREATMENT OF CHRONICALLY DISPLACED PIP JOINT FRACTURES A. Decramer, C. Leclercq, P. Valenti (France)	16
A0070	OSTEOSYNTHESIS OF METACARPAL FRACTURE BY PLATE USING LOCKING SCREWS: PRELIMINARY STUDY S. Facca, R. Ramdhian, A. Pélissier, S. Gouzou, M. Diaconu, P. Liverneux (France)	16
A0038	MODIFIED STEP-CUT OSTEOTOMY FOR METACARPAL AND PHALANGEAL ROTATIONAL DEFORMITY G. Lauri, M. Zucchini, A. Jawa, J.B. Juppiter, M. Ceruso	17
A0026	THE COMPARISON OF TWO METHODS OF TREATMENT OF V METACARPAL BONE FRACTURE J. Strychar, Ł. Nagraba, T. Mitek, J. Deszczyński, A. Stolarczyk (Poland)	17
A0126	VASCULARIZED TOE PHALANGES FOR SMALL COMPLEX BONY DEFECTS F. del Pinal, F. Garcia-Bernal, L. Cagigal, A. Studer, H. Ayala, J. Regalado (Spain)	18

A0127	THE ISCHEMIC TOE AT THE FOOT: MANAGEMENT OF THE IMPEDING FAILING TOE DURING HARVESTING F. del Pinal, F. Garcia-Bernal, A. Studer, H. Ayala, L. Cagigal, J. Regalado <i>(Spain)</i>	18
A0203	TREATMENT OF RECURRENT DISLOCATION OF THE METACARPOPHALANGIAL JOINT OF THE THUMB USING FLEXOR POLLICIS BREVIS REINFORCEMENT R.H. Milner, C.S. Milner <i>(United Kingdom)</i>	19
A0240	COMPUTER-ASSISTED COSTOSTEOCHONDRAL GRAFT FOR THE RECONSTRUCTION OF FINGER JOINTS H. Gotani, Y. Yamano, K. Sasaki <i>(Japan)</i>	19
A0349	INFLUENCE OF THE INITIAL POSITION AND THE SIZE OF PYROCARBON PIP PROSTHESIS ON THE CLINIC AND RADIOLOGICAL MID-TERM RESULTS B. Kolbe, M. Schulz, S. Fodor, K.-J. Prommersberger, J. van Schoonhoven <i>(Germany)</i>	20

A0036 SURGICAL RELEASE FOR CHRONIC AND SEVERE FLEXION CONTRACTURE OF PIP JOINTS

S.B. Hahn, Y.R. Choi, H.J. Kang
*Department of Orthopaedic Surgery, Yonsei University
 College of Medicine, Korea*

The long-standing and severe flexion contracture of the proximal interphalangeal (PIP) joint of the fingers impairs hand function significantly. In the condition, several anatomical structures around the joint shorten, such as the skin, the subcutaneous tissues, the tendon sheath, the flexor tendons, the volar plate, the check-rein ligament, and the collateral ligaments.

The purpose of this study was to evaluate the clinical results after surgical release of long-standing and severe flexion contracture in the PIP joint.

Between June of 2005 and December of 2007, 10 flexion contractures in PIP joint were operatively released and retrospectively reviewed. The median age was 34.0 years (range, 5–59 years) and there were 4 men and 6 women. The average interval between initial injuries to the operation was 11.6 years (range, 6 months - 50 years). The mean follow-up period was 30.6 months (range, 12–71 months). The middle finger was involved in 1, the ring finger in 5, and the little finger in 4. The cause of injury was burn in 2, trauma dislocation in 3, crushing injury in 2, and previous operation in 3.

In patients without severe scarring, the contracted soft tissue was released sequentially from check-rein ligament, volar plate to collateral ligaments with Bruner incision or longitudinal incision with Z-plasty lengthening. And then, the joint was extended forcefully to achieve maximal joint extension. After meticulous hemostasis, skin was closed. In 4 patients with severe scarring, the skin defect after scar release was covered with cross-finger flap. In all patients, the joints were immobilized in full extension using trans-articular fixation with one K-wire. After removal of the Kirshner wire 2 or 3 weeks postoperatively, aggressive active and passive range of motion (ROM) exercise was continued until three months after surgery.

The average preoperative angle of the flexion contracture and further flexion in the PIP joints were 64.0° (range, 25–95°) and 81.6° (range, 50–90°). At the final follow up, the average angle of the flexion contracture and further flexion in the joints were 10.2° (range, 0–30°) and 95.9° (range, 77–110°). The average gain in flexion extension arc was 68.1° (range, 30–105°). The median value of subjective satisfaction was 85.3 (range, 74–98). Nearly full range of motion was obtained in 4 cases in which the cross-finger flaps were combined. All patients were satisfied with the final results.

There were no major complications such as neurovascular injury, infection, or skin necrosis. Marginal skin necrosis was observed in one patient, which was spontaneously healed with no intervention in 5 weeks postoperatively.

In this study, we included the patients with scar contracture and they gained satisfactory motion of the joint after sufficient release of scar and contracted tissue and adequate skin coverage. As a result, in long-standing and severe flexion contracture of the PIP joints in the fingers, surgical release of the contracted tissue combined with appropriate skin coverage seems to be a reasonable option to obtain satisfactory range of motion.

10.1177/1753193409105985

A0048 AVULSION FRACTURES OF THE DISTAL PHALANX

E. Gudemez, Y. Ataker, S. Comert, O. Cerezci, A. Gulgonen
*VKF American Hospital, Department of Hand and
 Microsurgery, Turkey
 VKF American Hospital, Department of Physical Therapy
 and Rehabilitation, Turkey*

Introduction: Exposed trauma to the tip of the fingers and extreme positions of the distal phalanx may make it prone to flexor and extensor tendon avulsion fractures. In this study, the authors presented various aspects of these injuries including mechanism of injury, classification, treatment, and possible complications and problems based on their experiences of surgically treated patients.

Materials and methods: Between August 1999 and April 2008, 38 avulsion fractures of the distal phalanx were surgically treated and evaluated retrospectively for this study. There were 30 men and 8 women, with an average age of 37.8 years (range, 12–62 years). Of the 38 fractures, 16 involved the small finger, 14 ring finger, 5 long finger, and 3 index finger. Thirty injuries occurred in the dominant hand. Falling down was detected as causing the majority of the etiology in 20 patients. The others were sporting activities in 8, household activities in 4, fighting in 4, and traffic accident in 2. There were extensor tendon avulsion fractures in 30 patients, flexor tendon fractures in 8. The average joint surface involvement was 30.5% (range, 15%–50%). All of these fractures showed displacement and/or rotation of the fragments. Every fracture was treated with the same surgical technique which included open reduction and internal fixation using micro bone anchor with

its sutures. Four weeks postoperative immobilization was used and rehabilitation program was followed afterwards and continued 5 days a week initially which was reduced to 3 times per week after 11 sessions.

Results: The average follow-up period was 16.6 months (range, 6–50 months). VAS score was 0 in 29 patients, 1 in 3, 2 in 2, 3 in 3, 4 in 1. The average DASH score was 3.18 (range, 0–7.89). The follow-up radiographs showed complete union with congruous joint surface in every fracture. The average range of motion of the distal interphalangeal joint was 79.4° (range, 40°–90°). The average distance between the tip of the fingers and the distal palmar crease was 1.2 mm (0–12 mm). No patients had instability or osteoarthritis.

Discussion: Surgical treatment is generally recommended when the avulsed fragments are displaced and rotated to prevent joint deformities, secondary arthritis, and stiffness. However, the anatomical reduction and the internal fixation of these fractures may be technically difficult and potentially hazardous because of the small size of the fragment. The subjective and objective results of the open reduction and internal fixation with micro bone anchor fixation in avulsion fractures of the distal phalanx showed satisfactory functional outcome.

10.1177/1753193409105988

A0210 PIP- DENERVATION – A VALID TREATMENT OPTION IN PAINFUL ARTHRITIS

I. Mertz, N. Buschmeier, M. Haerle
*Hand- and Plastic Surgery, Orthopedic Clinic
Markgröningen, Kurt-Lindemann Weg 10, 71706
Markgröningen, Germany*

Background: Joint-denervation was first performed in the hip by Tavernier in 1942.

Wilhelm described in 1966 the anatomic basis and techniques for the denervation of the wrist and digital joints. The indication for this operation of the digital joints is painful arthrosis with good mobility. Therefore, this surgery does not aim to restore the joint-surface or congruity but is performed as palliative surgery and based on patient's complaints.

The denervation aims to interrupt the small sensitive afferent fibres coming from the digital joints and reaching nerves laying in the superficial cutaneous layer.

Patients and methods: Between 2005 and 2008 we have operated 24 patients in our institution. The pain-level of our patients was established by a visual analogue scale and DASH-score. The median follow-up until today is about 13.2 months, the mean age is 68.5 years.

Results: Our preliminary results show that 53.3% of all patients were without any complaints (VAS 0). 26.6% reported that they were almost free of complaints (VAS 1). 13.3% reported that complaints did never stop completely (VAS 4) but anyway reduced by 39%. Only one patient (6.6%) reported a significant pain-level on the visual analogue scale (VAS 7) which was anyway reduced by 22%.

Regarding the range of motion of our patients, we found no loosening in terms of mobility.

Only in one case was an arthrodesis necessary.

We will report about the complications.

Conclusion: We found very good results after denervation of the PIP-joints. This surgery is technically easy to perform, inexpensive and low risk and does not require any kind of immobilization. This operation offers a valuable alternative to arthrodesis.

10.1177/1753193409105998

A0041 MODIFIED PULL-OUT WIRE SUTURE TECHNIQUE FOR THE TREATMENT OF CHRONIC BONY Mallet FINGER DEFORMITY

S.K. Lee, W.S. Choy, W.J. Kim, K.J. Kim
*Departments of Orthopedic Surgery, Eulji University
College of Medicine, Daejeon, Korea*

Background: Bony mallet injuries are generally treated non-operatively, but when the fragment involves a significant percentage of the articular surface, it causes articular incongruity, instability, discomfort, and inconvenience to the patient. Although various surgical procedures are advocated for the treatment of the chronic bony mallet finger deformity, surgical management remains controversial.

Method: Sixteen patients with chronic bony mallet finger deformity (>2 months after the injury) were treated using modified pull-out wire suture technique between March 2005 and May 2008. The patients did not undergo non-operative treatment such as splinting or an unsuccessful splinting regimen history. All patients presented with mallet fractures involving more than 30 percent of the articular surface. Open reduction with “modified pull-out wire suture” method and distal interphalangeal joint immobilization with Kirschner wire was accomplished. Active motions of the proximal interphalangeal and metacarpophalangeal joints were not restricted. The Kirschner wire was removed 6 weeks after the operation, and then protected by immobilization with a mallet splint for a further 3 weeks. Goniometric measurement, radiographs, and patient satisfaction were evaluated during the follow-up period.

Results: Follow-up ranged from 6 to 28 months (average, 16.5 months). The average active extensor lag at the DIP joint was 40.3° before the operation and was 4.6° after the operation. The improvement in extension varied from 28 to 45° (average, 38°). According to Patel's evaluation criteria, we had 12 patients with excellent results, 3 with good results, and 1 with fair results. Radiologically, 2 patients had mild degenerative changes or joint narrowing. None of the patients had any decrease in range of flexion of the DIP joint or had pain at final follow-up.

Conclusion: The modified pull-out wire suture technique is a reliable alternative for the treatment of chronic bony mallet finger deformity without proximal interphalangeal hyperextension.

10.1177/1753193409105987

A0054 DISTAL INTERPHALANGEAL JOINT ARTHRODESIS: A REPORT OF 100 CASES USING A SHAPE-MEMORY INTRAMEDULLARY STAPLE

B. Amara, R. Matasa

Institut Montpelliérain de la Main, Clinique Clémentville, 25 rue de Clémentville, 34070 Montpellier, France

Introduction: The purpose of this study is to assess the contribution of a new technique of the distal interphalangeal (DIP) joint arthrodesis, using an intramedullary staple (ADS) made of a shape-memory alloy, nitinol. The staple is H-shaped at ambient temperature and X-shaped at 37°C. This property is used in order to assure the stability of the arthrodesis and to increase the chances of consolidation. The other important characteristic of this type of staple is the ability to perform the arthrodesis in a variable position of DIP joint flexion (from 0 to 45°), depending of patient's wishes, profession and the type of finger: usually 0° of flexion for F2 and 25–35° for F5.

Material and methods: One hundred DIP arthrodesis were performed in 80 patients (65 women, 15 men). The mean age was 58 years; 55 were retired, 15 were sedentary, and 10 were manual labourers. The fingers involved were: F2 (40%), F3 (25%), F4 (5%), F5 (30%). The mean follow-up was 24 months (6–60 months). Via dorsal access to the DIPJ, the staple was introduced into the base of P3 and the head of P2 after cutting the joint surfaces. Pre- and postoperative assessments were made, concerning the clinical results (pain, finger aspect) and radiographic findings at one, three and six months.

Results: Absence of pain at rest: 90% (90/100), absence of pain at mobilisation: 90% (90/100), pain at thermal variations: 20% (20/100). Absence of infection, superficial cutaneous necrosis: 90% (90/100). Hypersensitivity of scar tissue: 25% (25/100). Improved use of finger

with fine prehension: 30% (30/100) and with the grip force: 70% (70/100). Realignment and improved aspect of finger nodosities was obtained in 80% (80/100). Outcome was considered satisfactory or very satisfactory in 80% (80/100), fair in 10% (10/100) and mediocre in 10% (10/100). Radiographic healing was acquired between third and sixth month in 80% (80/100), with six cases of nonunion at six months 6% (6/100).

Discussion: Arthrodesis of the DIPJ using a pin requires osteosynthesis via a pulp incision with subcutaneous burial of the material. The pins may cause painful pulp ulcerations, which impose the second operation for material removal. The method is complicated by nonunion in 12–30% of cases. Arthrodesis with an intramedullary material is designed to overcome these problems. This study analyses the advantages and complications of this new technique.

Conclusion: The staple enables stable reproducible osteosynthesis without a pulp incision and without material in the pulp. It enables early mobilisation without secondary material removal. On the other hand, the intramedullary device allows performing the arthrodesis in the desired position of DIPJ flexion (0 to 45°) in order to respond to the esthetical and functional demands of the patient. The present results prompt us to propose this technique while emphasising the need for very rigorous surgical procedure.

10.1177/1753193409105990

A0326 BUTTRESS PLATING FOR UNSTABLE COMMUNED FRACTURE-DISLOCATIONS OF THE PROXIMAL INTERPHALANGEAL JOINT

T. Singh, A. Lakdawala, V. Rajaratnam, D. Power, M. Craigen

The Birmingham Hand Centre, Selly Oak Hospital, Birmingham, England

Introduction: Dorsal fracture-dislocation of the proximal interphalangeal joint (PIPJ) is usually a result of hyperextension and axial compression. These injuries can be difficult to treat and often result in long term pain, functional deficit and stiffness. We have used 1.3 mm cage plate for fixation of these fractures via a volar approach following an open reduction.

Methods: We reviewed 11 patients who had buttress plating for PIPJ fracture-dislocations. Clinical assessment was made using the Quick-DASH score. We measured range of movement of the MCPJ, PIPJ and DIPJ and documented any post-operative complication. Post-operative x-rays were obtained to assess joint

congruency and the presence articular step-off deformity. Post-operative patients were seen every two weeks in a combined hand and therapist clinic.

Results: There were 9 males and 2 females who were treated acutely. The mean age was 35.6 years and the mean follow-up was 15.1 months. The mean MCPJ flexion was 86.9 degrees. The mean PIPJ flexion was 80.3 degrees. The mean flexion of the DIPJ was 69.4 degrees. All fractures had united on final follow-up. Congruent articular surfaces were achieved. The mean quick-DASH score was 12.9. Five out of 11 (45%) had metalwork removed and tenolysis carried out for stiffness. One patient had superficial infection that settled with oral antibiotics.

Discussion: The major advantage of this technique is that the plate produces a buttressing effect of the fracture fragment and helps maintain joint congruity in order to achieve early protected mobilisation. Open reduction and internal fixation using a 1.3 mm cage plate can be considered even in small volar avulsion fracture of the middle phalanx that leads to PIPJ instability. Post-operatively, some patients do develop adhesions of the flexor tendon leading to joint stiffness. This often warrants arthrolysis, flexor tenolysis and removal of metal work as a second stage procedure.

Keywords: buttress plating, unstable, dorsal fracture-dislocations, proximal interphalangeal joint, 1.3 mm cage plate.

10.1177/1753193409106002

A0329 THE SUZUKI EXTERNAL FIXATOR IN THE TREATMENT OF CHRONICALLY DISPLACED PIP JOINT FRACTURES

A. Decramer, C. Leclercq, P. Valenti
Institut de la Main, Clinique Jouvenet, 6 Square Jouvenet, 75016 PARIS, France

The use of a dynamic external fixator system in the treatment of acute unstable proximal interphalangeal joint fractures and fracture-dislocations is well-known. However the same treatment for chronic lesions is restricted to few cases or single-case reports in the literature.

Treatment options are limited in these painful and stiff joints. Open reduction followed by internal fixation, volar plate arthroplasty, joint replacement, and free vascularised joint transfers have been described, with suboptimal results in the majority of cases.

We have expanded the indications of a closed treatment with application of the Pins and Rubber Traction System

(PRTS) described by Suzuki et al. (1994) to chronically displaced PIP joint fractures and fracture-dislocations. A consecutive cohort of 10 patients (8 male, 2 female) is presented in our study. Mean age was 34.67 years. Mean delay to our treatment was 3.75 months (1.5–15 months). Two patients had initial surgery in acute circumstances in other centres, seven had received conservative treatment and one patient did not have any initial treatment. The external PRTS was applied percutaneously, and only two patients had a simultaneous open procedure: one to remove two screws positioned intra-articularly in the first procedure, the other to optimize the position of two irreducible fragments. Active and passive mobilization was initiated immediately then after, under supervision of a physical therapist. Removal of the hardware was done after an average of 7 weeks (6–12 weeks). Mean clinical follow-up was 22.22 months (6–84 months). Range of motion recovered to 72.14 degrees in the proximal interphalangeal joint (0–100°).

All patients had a clear decrease of pain (seven patients had no residual pain, one patient had pain related to weather conditions only, and two had moderate pain with forceful movements).

Complications included three residual clinodactylies, already present preoperatively and which relapsed after removal of the external fixator, and three superficial pin-tract infections which healed well with local therapy and antibiotics. One patient required two additional procedures, one osteotomy to correct the clinodactyly, and one teno-arthrolysis to improve the range of motion.

Long term radiological follow-up showed an obvious remodelling of the articular surfaces in all cases, stable with time, but which in most cases did not reach normal joint architecture, supporting earlier literature that anatomical articular congruency is not mandatory (Kiefhaber and Stern 1998, Viegas 1992).

We also concluded that initially dislocated joints were corrected only partially at final follow-up.

Encouraging clinical and radiological results have been obtained in this group of chronically displaced PIP joint fractures. Moreover, the use of a dynamic external fixator at this stage does not burn bridges, and complementary procedures can still be considered, as was the case in one of our patients.

10.1177/1753193409106003

A0070 OSTEOSYNTHESIS OF METACARPAL FRACTURE BY PLATE USING LOCKING SCREWS: PRELIMINARY STUDY

S. Facca, R. Ramdhian, A. Pélissier, S. Gouzou, M. Diaconu, P. Liverneaux

Department of hand surgery, Strasbourg University hospital, Illkirch, France

Metacarpal fractures are frequent and arise frequently in young men; the usual treatment is K-wire either centromedular or intermetacarpal. However, this treatment has some inconveniences: instability of the fracture, displacement, migration of the pins, infections, lesions of the cutaneous dorsal branch of the ulnar nerve, but most important, immobilisation during several weeks, which is not well tolerated by active young patients. In this context, we tested the interest of using locking miniplates.

Our series contained 12 fractures of metacarpals of 10 young men with a mean age of 28. Among these fractures, two of them were treated by an orthopaedics treatment and ten were treated by a locking plate Médartis (5 diaphysis fractures and 5 cervical fractures). These fractures concerned 9 times the fifth metacarpal and only once the fourth one.

Nine fractures were closed and only one was open.

The fracture was approached by using a dorsal method, respecting the dorsal cutaneous branch of the ulnar nerve. Our technique consisted of first implanting the distal locking screws, which allowed an easy reduction of the fracture on the plate. One or two proximal screws were systematically locked, sometimes completed with non locking screws. No post operative immobilisation was recommended and mobilisation was moreover encouraged.

Evaluation of the results were entrusted to objective (strength by Jamar, articular range of motion, the duration of sick leave) and subjective criteria (global function by DASH, pain by VAS).

According to the fractures, plates of different design (2 rights, 3 T, 2 L, 1 in frame and of different lengths (5 to 8 holes) were used.

According to the latest evaluation, the results are comparable to classical techniques, but however with a faster recovery. No secondary displacement or complications have been noted.

Our preliminary results seem better than the classic pinning, with a decrease of complications and with an earlier resumption of work. The additional cost of this material can be counterbalanced by the decrease of the daily allowances, the number of outcomes, radiographic controls, as well as absence of material removal. However, it remains now to demonstrate the efficiency of this technique by comparative prospective randomised study.

10.1177/1753193409105991

A0038 MODIFIED STEP-CUT OSTEOTOMY FOR METACARPAL AND PHALANGEAL ROTATIONAL DEFORMITY

G. Lauri, M. Zucchini, A. Jawa, J.B. Juppiter, M. Ceruso
C.T.O. Firenze, Massachusetts General Hospital

Background: Rotational deformity of metacarpal and phalangeal fractures can jeopardize normal hand function and cause aesthetic problems for patients. We have found the “Z-cut” metacarpal osteotomy, initially described by Manktelow, to prove predictable and provide excellent restoration of anatomy and function.

Methods: Twelve patients treated with rotational step-cut osteotomies by the senior authors for digital rotatory deformities were identified. Their cases were reviewed retrospectively. Seven had metacarpal and five had phalangeal malunions.

Results: All twelve patients had correction of their deformities, obtained union of the osteotomy and maintained or improved their motion. There were no perioperative complications.

Conclusions: Metacarpal step-cut osteotomies are technically simple and an effective method for correction of digital rotational deformities due to fracture malunions.

10.1177/1753193409105986

A0026 THE COMPARISON OF TWO METHODS OF TREATMENT OF V METACARPAL BONE FRACTURE

J. Strychar, Ł. Nagraba, T. Mitek, J. Deszczyński, A. Stolarczyk
Orthopaedics and Rehabilitation Department of II Medical Faculty of Medical University of Warsaw, Poland

Introduction: The term “boxer’s fracture” concerns a common damage of the distal part of V metacarpal bone. It is usually a result of a closed fist strike against a hard object. The majority of such injuries are treated conservatively, with a plaster cast. However, intraarticular, angular, displaced and unstable fractures are managed by operative means. Despite correct qualification to conservative treatment of patients with boxer’s fracture, the results are not always satisfactory.

The aim of the study was to evaluate the efficacy of operative treatment in patients with V metacarpal bone fracture.

Materials and methods: 43 patients with a V metacarpal bone fracture (<48 hours from the injury) were selected among patients treated in Orthopedics and

Rehabilitation Department from February to June 2008. Finally, 39 patients met the inclusion criteria (33 men, 6 women). Mean age of patients was 35 years. Patients were divided into two groups. Study group included 23 and control group 16 patients. In the study group (A) an operative treatment with two K-wires inserted from the base of metacarpal bone under Rtg control was introduced. In control group (B) the fracture was managed conservatively by reposition followed by immobilization with a plaster cast.

In order to assess the results of treatment, a questionnaire including Visual Analog Scale (VAS) and EQ-5D health related quality of life form was used. Each patient underwent physical examination with passive Range of Motion in V MCP joint measurement and muscle strength of grip measurement. Questionnaire as well as physical examination took place in the 1st, 3rd and 6th month of treatment period.

Results and conclusions: Preliminary results of the study suggest that operative treatment of patients with V metacarpal bone fracture ensures not only better functional outcome (more extensive passive range of motion and greater muscle strength) but also higher health related quality of life. The results so far point out too low rate of classification of patients suffering from V metacarpal bone fracture to operative treatment.

10.1177/1753193409105984

A0126 VASCULARIZED TOE PHALANGES FOR SMALL COMPLEX BONY DEFECTS

F. del Pinal, F. Garcia-Bernal, L. Cagigal, A. Studer, H. Ayala, J. Regalado
Private Practice and Hospital Mutua Montañesa, Santander, Spain

Purpose: Vascularized bone transplants resist infection and allow rapid healing but keeping small bony segments vascularized, as needed for a finger defect, is a challenge. We present a cohort of patients with intercalated compound bony defects in the fingers or carpus that were reconstructed by a vascularized toe phalanx (or part of a phalanx) in a single stage.

Methods: Seventeen patients were treated with an intercalary vascularized bone graft that included a part of the proximal phalanx (8 patients), most of the middle phalanx (8 patients), or a portion of each phalanx (1 patient) of a second toe (totaling 18 bone blocks). There was an associated soft-tissue defect in all finger defects (14 cases), an infection in 6, and cartilage loss in 7 of them. Three middle phalanges were used for

difficult scaphoid nonunions. The toes were pedicled on the proper digital artery (12 patients) or a segment of the first dorsal or second plantar metatarsal artery (5 patients). A mean length of 13 mm of vascularized bone was transferred. Bleeding from all of the bone surfaces was evidenced once the clamps were released. No toe was amputated. The homolateral digital nerve and the contralateral neurovascular pedicle of the toe were kept in place. The toe defect was treated by soft-tissue arthroplasty or arthrodesis.

Results: Radiologic bony union was evident at 4 to 6 weeks in all fingers, except in 1 patient with an acute infection whose distal union failed to unite at 6 weeks because the infection recurred. Finger length loss averaged 3 mm. All 3 scaphoid nonunions united in less than 8 weeks. All returned to their preoperative occupation.

Conclusions: The toe phalanx reliably maintained its vascularization, allowing us to solve compound osteocutaneous defects in the fingers or carpus in a single stage. Donor site morbidity was minimal.

10.1177/1753193409105992

A0127 THE ISCHEMIC TOE AT THE FOOT: MANAGEMENT OF THE IMPEDING FAILING TOE DURING HARVESTING

F. del Pinal, F. Garcia-Bernal, A. Studer, H. Ayala, L. Cagigal, J. Regalado
Private Practice and Hospital Mutua Montañesa, Santander, Spain

Purpose: Local vessel disease causing lack of arterial inflow at the time of toe harvesting represents a surgical emergency, and has not been discussed in the literature.

Methods: Out of a personal experience of 194 toe transfers, 6 cases (in 4 patients) were found to have diseased vessels at the first web to the point that acute ischemia of the toe occurred when the tourniquet was released at the foot. There were 4 second toes, 1 hallux trimmed toe, and a hemipulp. Average age was 53y-o (range 47 to 59). Apart from the age 2 suffered comorbidities known to affect blood vessels: both were formerly heavy smokers, and 1 of them was also obese and hypertensive without treatment. All suffered severe mutilating injuries: 1 bilateral and 1 unilateral metacarpal hand, 1 four finger amputations, and 1 a severe burn with avulsion.

Results: The first 2 cases had atherosclerotic changes in the first web vessels, while occlusion of the tibial digital artery was found in the other 2 patients (4 cases).

The atherosclerotic patients were managed by redoing the anastomosis in a healthier area in one, and by extracting an embolus in the other. Salvage was achieved by using an alternative inflow pathway in the 4 with obstruction of the tibial digital artery. All toes survived. Two patients had toe transfer from the other foot that coursed uneventfully.

Conclusions: An ischemic toe at the foot is a surgical emergency. Immediate transfer to the hand is recommended when other common causes of spasm are ruled out. A high success rate can be expected as long as one is prepared to deal with small and fragile vessels. If arterial disease is suspected at the time of toe harvesting, alternative inflow pathways should be dissected and preserved as a back-up.

10.1177/1753193409105994

A0203 TREATMENT OF RECURRENT DISLOCATION OF THE METACARPOPHALANGIAL JOINT OF THE THUMB USING FLEXOR POLLICIS BREVIS REINFORCEMENT

R.H. Milner, C.S. Milner
Department of Plastic & Reconstructive Surgery, Royal Victoria Infirmary, Queen Victoria Road, Newcastle, NE1 4LP, United Kingdom

Injuries to the volar plate of the metacarpophalangeal joint of the thumb are reported with some frequency in the literature and typically follow a dorsally applied force that tears the proximal attachment of the volar plate. Such injuries are often associated with dorsal dislocation of the thumb and may subsequently progress to an unstable joint subject to recurrent dislocation. Many techniques have been described to deal with this difficult problem ranging from simple volar plate reattachment, through to volar plate reinforcement by sesamoid arthrodesis or tendon transfer techniques using extensor pollicis brevis. We describe a new technique to treat recurrent dorsal dislocations of the thumb MCPJ through transposition of the tendon of flexor pollicis brevis to reinforce the deficient volar plate and joint capsule. Data from the use of this technique has been collected over the course of the last 15 years. All cases were performed following initial traumatic dorsal dislocation of the thumb at the metacarpophalangeal joint, without significant disruption of either collateral ligament, and were reduced under anaesthesia followed by a period of post-injury splintage for up to 6 weeks. All patients experienced chronic complications of joint

instability including pain and recurrent subluxation or complete dislocation. The key operative steps include a volar incision to reveal the thumb MCPJ, elevation of the fibrous flexor sheath, mobilization of the distal portion of the flexor pollicis brevis muscle and finally its transposition to the periosteum on the ulnar side of the volar aspect of the proximal phalanx. This muscle transposition serves to reinforce the volar joint surface of the thumb MCPJ, after which the intact flexor mechanism is replaced and wound closure achieved. The joint is immobilised with a trans-articular Kirschner wire and a plaster of Paris splint for 6 weeks. In all cases, there was rapid return of joint motion with physiotherapy which was complete by ten weeks. This technique does not involve excision of the collateral ligaments as has been suggested for proximal interphalangeal joint arthroplasty, thus preserving the lateral joint stability and the function of flexor pollicis brevis as a short flexor, medial rotator and abductor to the thumb. This technique is technically straightforward, carries low associated morbidity and results in a stable, pain free joint with a full range of movement.

10.1177/1753193409105996

A0240 COMPUTER-ASSISTED COSTOSTEOCHONDRAL GRAFT FOR THE RECONSTRUCTION OF FINGER JOINTS

H. Gotani, Y. Yamano, K. Sasaki
Seikeikai Osaka Trauma and Microsurgery center, Japan

Purpose: Joint reconstruction of finger joint after severe hand trauma is a recent theme in the field of hand surgery. We used osteochondral graft from the rib to reconstruct the joint surface of PIP joints. Normally in this surgery, it was difficult to make the shape of the graft as an anatomical shape of the PIP joints. Recently we have utilized the robotic modeling machine to solve this problem.

Materials and methods: We have treated 3 PIP joints destruction by computer-assisted method. There were two cases in which graft was done in proximal phalanx and in one case PIP joint was replaced totally by the osteochondral graft. The patients ranged in age from 18 to 55 years old (mean: 36 years). Osteochondral graft was taken from the 5th rib through the small skin incision made on the anterior chest wall. Osteochondral portion of the rib was identified easily by the change of its color. Graft was then harvested according to the volume needed. We acquired 3D data of the joint surface by using the industrial 3D scanner. The data was

transferred to the modeling machine through host PC. After placing the osteochondral portion of the rib on the machine, milling of the bone was done automatically. Finally we cut the margin of the graft

Results: Postoperative follow up period ranged from 6 to 22 months. In all three cases, bone union was obtained. Postoperative ROM was 32 degree on average and all joint were stabilized.

Discussion: Osteochondral graft from the rib is the useful technique for reconstruction of the finger joints. Our computer-assisted method enabled automatic milling of the graft. Anatomical surface of the joint avoids the irregular movement between the proximal and distal joint surface which leads to the osteoarthritis change. Also careful reconstruction of the soft tissue is indispensable.

10.1177/1753193409106001

A0349 INFLUENCE OF THE INITIAL POSITION AND THE SIZE OF PYROCARBON PIP PROSTHESIS ON THE CLINIC AND RADIOLOGICAL MID-TERM RESULTS

B. Kolbe, M. Schulz, S. Fodor*, K.-J. Prommersberger, J. van Schoonhoven

Klinik für Handchirurgie, and Radiology
Bad Neustadt an der Saale, Germany*

Purpose: To investigate the influence of the initial position and the size of a pyrocarbon PIP prosthesis on the clinical and radiological outcome.

Material and methods: 16 patients who had replacement of 19 PIP joints with a pyrocarbon prosthesis were followed on average for 40 months. The position and the size of the prosthesis in relation to the proximal respectively the middle phalanx was determined on plain radiographs of the finger. Initial position was graded as excellent, good, fair, and poor. The size of the prosthesis in relation to the diameter of the phalanx was deemed as correct or too small. Examination included range of motion, grip strength, assessment of joint stability, pain measurement, and the DASH score. The input of the primary position and the size of the prosthesis on the clinical and radiological outcome was calculated with the use of statistical analysis.

Results: The position of the PIP prosthesis was deemed to be excellent in 7 patients, good, fair, and poor each in 4 patients. 11 of the 19 prosthesis were assessed to be too small. 4 of the 7 excellent positioned prosthesis showed a migration at the last follow-up. 3 of them were deemed too small. From the 3 excellent positioned prosthesis without a migration one prosthesis was deemed too small. Half of the initially good and fair positioned prosthesis showed a migration. All 4 poor positioned prosthesis showed a migration at the follow-up. There was no correlation between the initial position of the prosthesis and the clinical outcome at the last follow-up.

Conclusion: Primary position of PIP prosthesis effects the radiological but not the clinical outcome after PIP replacement. Mismatching of the size of the prosthesis with the size of the proximal or middle phalanx influences the migration rate of a PIP prosthesis.

10.1177/1753193409106004

SESSION 3: NERVE 1

- A0173 ADIPOSE STEM CELLS FOR PERIPHERAL NERVE REGENERATION 23
D.F. Kalbermatten, P.G. di Summa, P.J. Kingham, M. Wiberg, G. Terenghi,
D.V. Egloff, W. Raffoul
(United Kingdom, Sweden)
- A0286 THE INFLUENCE OF BFGF AND/OR NGF IN THE OUTCOME OF END-TO-SIDE 23
NEURORRHAPHY IN THE RAT-SCIATIC-NERVE EXPERIMENTAL MODEL
E. Ntouvali, S. Deftereos, T. Filippidis, M. Sideris, G. Panagopoulos, A. Papalois,
P.A. Kinnas
(Greece)
- A0289 THE ROLE OF BFGF AND NGF IN THE TREATMENT OF A COMMON-PERONEAL- 24
NERVE GAP BY MEANS OF AUTOLOGOUS NERVE GRAFTING IN RATS
E. Ntouvali, S. Deftereos, T. Filippidis, M. Sideris, G. Panagopoulos, A. Papalois, P.A. Kinnas
(Greece)
- A0154 IMPROVING NERVE REGENERATION OF ALLOGENIC EPINEURIUM WITH 24
DONOR DERIVED BONE MARROW STROMAL CELLS BRIDGING PERIPHERAL
NERVE DEFECT
A. Jundzill, G. Brzezicki, A. Klimczak, J. Gatherwright, M. Siemionow
- A0226 PERONEAL NERVE REGENERATION AFTER END-TO-SIDE REPAIR IN RAT 25
P. Czarnecki, L. Romanowski, A. Szukala, J. Huber, A. Astapov
(Poland)
- A0068 NERVE REPAIR WITH ROBOT: EXPERIMENTAL STUDY 25
C. Taleb, E. Nectoux, P. Liverneaux
(France)
- A0116 SENSORY RECOVERY AFTER DIGITAL NERVE REPAIR: WITH AND WITHOUT 26
ARTERIAL REPAIR
B. Hohendorff, U. von Wartburg
(Switzerland)
- A0256 HOW OFTEN IS SYMPTOMATIC NEUROMA LEADING TO ADDITIONAL 26
SURGERY IN FINGER AMPUTATION? A RETROSPECTIVE STUDY
D.-J. van der Avoort, J.W. van Neck, R.W. Selles, S.E.R. Hovius, J.H. Coert
(The Netherlands)
- A0328 MEDIAN NERVE SLIDING BEFORE AND AFTER SURGICAL RELEASE 27
A. Fibir, R. Cap, L. Ungermann, R. Kebrle
(Czech Republic)
- A0120 RANDOMIZED TRIAL OF LOCAL VERSUS BRACHIAL PLEXUS BLOCK 27
ANAESTHESIA FOR CARPAL TUNNEL RELEASE
A. Żyluk, P. Puchalski, I. Walaszek, P. Janowski
(Poland)

A0230	CORRELATION BETWEEN SYMPTOMS AND NEUROPHYSIOLOGICALLY DIAGNOSED MOTOR BRANCH COMPRESSION IN CARPAL TUNNEL SYNDROME R. Boer, C.S. Modi, K. Ho, V. Hegde, S.M. Turner (UK)	28
A0121	INABILITY TO WORK BEFORE AND AFTER OPERATION FOR CARPAL TUNNEL SYNDROME A. Żyluk, P. Puchalski (Poland)	28
A0313	NERVE CONDUCTION STUDIES AND THEIR SIGNIFICANCE IN CUBITAL TUNNEL SYNDROME M. Anderton, F. Shah, I. Harvey, M. Webb (UK)	29
A0361	RESULTS OF SURGICAL TREATMENT FOR THE CUBITAL TUNNEL SYNDROME USING THE ANTERIOR SUBCUTANEOUS TRANSPOSITION AND SIMPLE DECOMPRESSION IN A 7 YEAR PERIOD (2001–2007) – 356 PATIENTS I. Humhej, A. Hejěl, R. Bartoš, P. Vachata, M. Bolcha, A. Vlasák, K. Saur, I. Fílová, M. Sameš (Czech Republic)	29
A0376	CUBITAL TUNNEL RELEASE SUPPORTED BY ENDOSCOPY T. Matuszewski (Poland)	30

A0173 ADIPOSE STEM CELLS FOR PERIPHERAL NERVE REGENERATION

D.F. Kalbermatten¹, P.G. di Summa^{1,2}, P.J. Kingham², M. Wiberg³, G. Terenghi², D.V. Egloff¹, W. Raffoul¹

¹Chirurgie Plastique et Reconstructive CHUV, Université de Lausanne, CH

²Blond McIndoe Research Laboratories. The University of Manchester, Manchester, United Kingdom

³Departments of Surgical & Perioperative Science (Hand surgery) and Integrative Medical Biology (Anatomy), Umea University, Umea, Sweden

Traumatic injuries resulting in peripheral nerve lesions often require a graft to bridge the gap. Although autologous nerve auto-graft is still the first choice strategy in reconstructions, it has the severe disadvantage of the sacrifice of a functional nerve. Cell transplantation in a bioartificial conduit is an alternative strategy to create a favorable environment for nerve regeneration. We decided to test fibrin as a new conduit material after injury of the sciatic nerve. Conduits were tested both empty and in combination with different kind of regenerative cells such as Schwann cells (SC), mesenchymal (MSC) and adipose-derived stem cells (ASC), differentiated into a Schwann cell phenotype. Each group was composed by 5 animals for a total of 4 different groups ($n=20$). At 2 weeks after implantation, conduits were explanted and examined by immunohistochemistry: axonal sprouting was evaluated by PGP 9.5 marker and Schwann cell presence was detected proximally and distally by S100 marker.

The results show a significant increase in axonal regeneration in the group fibrin seeded with SC compared with the empty fibrin conduit. Differentiated ASC showed a positive tendency in regeneration distance, comparable with the differentiated MSC.

These observations seem to strengthen the argument that SC can help in enhancing nerve regeneration when seeded in a conduit. Similarly, the interesting outcomes obtained from the dASC, which appear comparable to the dMSC, underline the effectiveness of this cell population and their promising applications in nerve regeneration.

10.1177/1753193409105934

A0286 THE INFLUENCE OF BFGF AND/OR NGF IN THE OUTCOME OF END-TO-SIDE NEURORRHAPHY IN THE RAT-SCIATIC-NERVE EXPERIMENTAL MODEL

E. Ntouvali¹, S. Deftereos³, T. Filippidis⁴, M. Sideris², G. Panagopoulos³, A. Papalois², P.A. Kinnas¹

¹5th Orthopaedic Department – Hand Surgery Unit, General Hospital “Asclepeion Voulas”, Athens, Greece

²Experimental – Research Center, ELPEN Pharmaceuticals, Athens, Greece

³Department of Neurology, General Hospital “G. Gennimatas”, Athens, Greece

⁴Department of Pathology, MICROMEDICA Laboratories, Athens, Greece

Purpose: The aim of this study was to investigate the short-term results of end-to-side neurorrhaphy of the common peroneal nerve (CPN) to the tibial nerve (TN) in rats, after intraoperative subepineurial administration of bFGF and/or NGF.

Materials: Five(5) groups of adult male Wistar rats, each comprising 25 animals, were studied: I. End-to-side neurorrhaphy[4 groups: A(bFGF 20 ng), B(NGF 25 ng), C(normal saline), X(bFGF 20 ng + NGF 25 ng)] and II. Negative control group(G).

Methods: In groups A, B and X, the right CPN was sharply divided at a distance of 7 mm distal to its origin from the rat sciatic nerve; the proximal CPN stump was then sutured into the thigh muscles, whereas the distal CPN stump was sutured terminolaterally to the ipsilateral TN. Subsequently, a total volume of 50 μ l of the corresponding solution of growth factor(s) was administered in each case to the TN subepineurially, proximal to the CPN/TN coaptation site. The same surgical procedure was carried out in group C, but an equal volume of normal saline was administered instead. Finally, in each of the animals of group G, both the proximal and distal CPN stumps were sutured into the neighbouring muscles. All surgical procedures took place with the animals under dissociative anaesthesia and were performed under sterile conditions, using the operating microscope and applying microsurgical techniques. In each case, the intact left CPN served as intraanimal control.

Results: The evaluation of the outcome four(4) months postoperatively was based on clinical examination, walking-track analysis, in situ electromyographic (EMG) studies, Tib. Cranialis “wet muscle mass” measurement and histomorphometric studies. According to the latter, bFGF alone and NGF alone were better than placebo. BFGF was also superior to NGF with respect to muscle histomorphometry. Finally, bFGF, NGF and their combination were better than placebo regarding the EMG-parameters. All of the aforementioned differences were statistically significant ($p < 0.05$).

Conclusions: In rats, CPN repair via end-to-side neurorrhaphy to the TN can be enhanced by the subepineurial administration of bFGF and/or NGF, with an apparent advantage of the former.

10.1177/1753193409105938

A0289 THE ROLE OF BFGF AND NGF IN THE TREATMENT OF A COMMON-PERONEAL-NERVE GAP BY MEANS OF AUTOLOGOUS NERVE GRAFTING IN RATS

E. Ntouvali¹, S. Deftereos³, T. Filippidis⁴, M. Sideris², G. Panagopoulos³, A. Papalois², P.A. Kinnas¹

¹5th Orthopaedic Department – Hand Surgery Unit, General Hospital “Asclepeion Voulas”, Athens, Greece

²Experimental – Research Center, ELPEN Pharmaceuticals, Athens, Greece

³Department of Neurology, General Hospital “G. Gennimatas”, Athens, Greece

⁴Department of Pathology, MICROMEDICA Laboratories, Athens, Greece

Purpose: This study aimed to investigate the results of autologous nerve grafting of a 10mm common-peroneal-nerve (CPN) gap in rats, after intraoperative subepineurial administration of bFGF and/or NGF.

Material: Five(5) groups of adult male Wistar rats were studied, according to the following protocol: I. Autologous nerve grafting [4 groups: D(bFGF 20 ng), E(NGF 25 ng), F(normal saline), Y(bFGF 20 ng + NGF 25 ng)] and II. Negative control group(G).

Methods: In groups D, E and Y, a 10 mm-long segment was sharply cut off from the CPN, at a distance of 7 mm distal to its origin from the rat sciatic nerve, then sutured back in place in order to serve as a nerve autograft. Subsequently, 50 µl of the corresponding solution of growth factor(s) were administered subepineurially to the CPN proximal to the proximal autograft suture site. The same surgical procedure was carried out in group F, but an equal volume of normal saline was administered instead. Finally, in group G, after sharp division of the CPN 7 mm distal to its origin, both its proximal and distal stumps were sutured into the neighbouring muscles. All surgical procedures took place with the animals under dissociative anaesthesia and were performed under sterile conditions, using the operating microscope and applying microsurgical techniques. In each case, the intact left CPN served as intraanimal control.

Results: The evaluation of the outcome four(4) months postoperatively was based on clinical examination, walking-track analysis, in situ electromyographic studies, Tib. cranialis “wet muscle mass” measurement and histomorphometric studies. Statistical analysis of the data regarding nerve histomorphometry revealed the following: bFGF alone was better than placebo. NGF alone was superior not only to placebo, but also to bFGF alone. On the other hand, the combination of (bFGF + NGF) was inferior to either growth factor

alone as well as to placebo. All of the aforementioned differences were statistically significant ($p < 0.05$).

Conclusions: In rats, intraoperative administration of bFGF or NGF once subepineurially enhanced the results of CPN autologous nerve grafting 4 months postoperatively, with an apparent advantage of NGF.

10.1177/1753193409105939

A0154 IMPROVING NERVE REGENERATION OF ALLOGENIC EPINEURIUM WITH DONOR DERIVED BONE MARROW STROMAL CELLS BRIDGING PERIPHERAL NERVE DEFECT

A. Jundzill, G. Brzezicki, A. Klimczak, J. Gatherwright, M. Siemionow

Cleveland Clinic, Department of Plastic Surgery

Background: Long peripheral nerve gaps are immensely challenging injuries encountered by hand surgeons. Numerous surgical techniques with varying degrees of success have been reported to reconstruct this injury. The most widely used technique for bridging defects in peripheral nerves is the autologous nerve graft. However this technique possesses the inherent disadvantages of limited availability and donor site morbidity. We have previously reported that epineurial graft has unique properties that make it an ideal neural conduit between two nerve stumps. This study was performed to assess the effects of allogenic epineurial sheath (AES) transplantation supported with isogenic and allogenic bone marrow stromal cells (BMSC).

Methods: A 20 mm nerve defect was created in the sciatic nerve of 18 rats. 20 mm AES was transplanted across MHC barrier from ACI (RT1a) donor to LEW (RT11) recipient. The epineurial gap was supported with BMSCs as follow: Group 1 saline control, Group 2 isogenic BMSC [LEW (RT11)], Group 3 allogenic BMSC [ACI (RT1a)]. Before transplantation BMSCs into AES they were stained with PKH dye to evaluate engraftment and nerve regeneration. After staining $3.5-4 \times 10^6$ BMSC were delivered directly into the biological chamber created by the AES. Assessment methods included clinical examination of sensory-(pinprick) and motor-(toe spread) tests at 3, 6, 12, 18 and 24 weeks post-transplant. At 24 weeks the animals were evaluated for sensory and motor recoveries by Somato-Sensory Evoked Potentials (SSEP) and Gastrocnemius Muscle Index (GMI). The regenerative potential of BMSCs was assessed by immunofluorescence staining for NGF and Laminin B2.

Results: 6 weeks after post-transplantation, Group 2 scored 3 on pin-prick, however Group 1 and Group 2

achieved the same values at 18 weeks. Group 2 obtained the highest toe-spread after 24 weeks (0.75) compared to Group 1 and 3 respectively (0 vs 0.25). GMIs were comparable in Groups 1 and 2 (0.49 vs 0.48) and the lowest in Group 3 (0.43). SSEP P-1 and N-2 latencies in groups 1, 2 and 3 were respectively (16.4 vs 11.7 vs 15.7), (17.4 vs 16.2 vs 20) and (22.6 vs 16.5 vs 22.2), (24 vs 25.9 vs 30.2). SSEP amplitudes evaluation in Group 1, 2 and 3 were 33%, 48% and 99% and demonstrated improvement in groups with BMSC.

Histology demonstrated axonal regeneration at 24 weeks. In group 2 and 3 PKH positive stained cells were found in the AES. Co-expression of NGF and PKH staining supports the differentiation of BMSC into neural tissues. Moreover, upregulation of Laminin-B2 expression in Group 2 and 3 confirmed the feasibility of nerve regeneration and corresponded with better outcome in SSEP evaluation.

Conclusion: AES has the potential to be an unlimited graft source without the limitations associated with autologous epineurium transplant. This study shows the synergistic effect of allogenic epineural tubes filled with BMSC on nerve regeneration as demonstrated by functional recovery and axonal regeneration, as a step towards bridging critical nerve gaps. The interaction between neurotrophic factors expression (Laminin, NGF) in the epineurium and ingrowing axons provides an optimal environment for neural regeneration.

10.1177/1753193409105933

A0226 PERONEAL NERVE REGENERATION AFTER END-TO-SIDE REPAIR IN RAT

P. Czarnecki, L. Romanowski, A. Szukala, J. Huber, A. Astapov

Hand Surgery Department, Department of Neuropathology of Locomotor Organ, Poznan University of Medical Sciences, Poland

Background: A large number of clinical problems with nerve reconstruction can be found despite the long history of nerve research. One of the possibilities in specific situations is end-to-side neurorrhaphy (ETS), described at the beginning of the 20th century and then rediscovered in the 90s. There is no solid data on quality of recipient nerve regeneration, possible donor nerve damage and epineural window necessity.

Materials: The aim of the research was to evaluate possible regeneration after end-to-side neurorrhaphy, its quality, possible donor nerve damage and influence of epineural window on regeneration. 45 female Wistar rats

were divided into 3 equal groups: A – ETS without epineural window, B – ETS with epineural window, C – free graft reconstruction. Right peroneal nerve was operated and tibial nerve was selected for donor. Follow-up period was 24 weeks.

Methods: Regeneration was evaluated by:

1. Foot print analysis every 2 weeks with PFI, TFI, SFI calculations.
2. Electroneurography with direct sciatic nerve stimulation and indirect magnetic stimulation, amplitude and latency was recorded on peroneal and tibial nerves on both sides.
3. Histomorphometry with digital conversion of semi-thin section, axon count, diameter and area calculations with semiautomated method.

Results: There was no statistical significant difference between groups investigated in all the parameters. The functional indexes have stabilized after 8 weeks (PFI) and 6 weeks (TFI and SFI) and were positively time related. Lower amplitude of tibial nerve potential in group A and B was proved in comparison to nonoperated side. Neurographic parameters of peroneal nerve did not differ significantly.

Histomorphometry revealed significantly lower diameter and area of axons in operated peroneal nerves compared to nonoperated. The axon count was at a normal level in every group. Tibial nerve parameters did not differ from nonoperated values.

- Conclusions:**
1. Regeneration of peroneal nerve after ETS is at the same level as in free graft reconstruction.
 2. Peroneal nerve after ETS and free graft reconstruction has lower diameter and area then nonoperated.
 3. Epineural window does not influence the regeneration result of peroneal nerve.
 4. Tibial nerve potentials have lower amplitude in ETS groups, which can be a sign of axonal impairment.

10.1177/1753193409105935

A0068 NERVE REPAIR WITH ROBOT: EXPERIMENTAL STUDY

C. Taleb, E. Nectoux, P. Liverneaux
Department of hand surgery, Strasbourg University Hospital, Illkirch, France

Since the development of microsurgery in the 1960s, the prognosis of peripheral nerve lesions has greatly improved. However this new technique's evolution has remained limited by human factors, in particular by physiological tremor. Telesurgery, a technique used in other surgical fields, was developed in the 1990s. This study assesses the feasibility of peripheral nerve repair

using telemicrosurgery. Anatomical material from three subjects of different species (rat, pig, and human) was used. The telesurgical step of the procedure was performed with a Da Vinci S robot (Intuitive Surgical, Inc., Sunnyvale, CA). Four anatomical epiperineural repairs were performed. Another neurotrophic repair was performed with a nerve regrowth guide. Regardless of the type of repair performed, the telemanipulator removed the physiological tremor factor. The suture needle was distorted when held by two clamps at a time. Repairs were all performed without any damaging twisting movements of both nerve ends. Our results demonstrated that telesurgery allows very safe and precise peripheral nerve repairs by counteracting physiological tremor and by improving the overview of the surgical field, either with an anatomical or a neurotrophic technique.

10.1177/1753193409105929

A0116 SENSORY RECOVERY AFTER DIGITAL NERVE REPAIR: WITH AND WITHOUT ARTERIAL REPAIR

B. Hohendorff, U. von Wartburg
Kantonsspital Luzern, Department of Hand and Plastic Surgery Spitalstr. 15, 6000 Luzern 16, Switzerland

No study of unilateral digital vascular-nerve injury has yet directly compared the outcome of microsurgical vascular and nerve reconstruction, together, with the outcome of nerve repair alone. This study therefore investigates whether concomitant primary arterial vascular anastomosis contributes to improved sensory nerve function after unilateral digital vascular-nerve lesion.

Between January 2000 and May 2007 a total of 81 patients with unilateral digital vascular-nerve bundle lesions, including concomitant soft-tissue tendon lesions, were operated on the emergency day. Forty of the 56 patients treated with a nerve repair and 20 of the 25 patients treated with a microsurgical digital arterial and nerve reconstruction took part in a follow-up examination. In addition to anamnestic data, peripheral nerve function was evaluated by the static and the moving two-point discrimination test, and Semmes-Weinstein pressure aesthesiometers in the autonomous zone of the affected side of the injured finger. Stereognosis also was examined. The patency of the reconstructed digital artery was tested by a digital Allen test.

No statistically significant differences between the two groups were noted.

After unilateral digital vascular-nerve bundle lesion, a digital nerve repair is beneficial for recovery of as

much sensory nerve function as possible and prevention of painful neuroma. However, upon follow-up we did not observe that concomitant arterial anastomosis improved sensory nerve function more than nerve repair alone.

10.1177/1753193409105930

A0256 HOW OFTEN IS SYMPTOMATIC NEUROMA LEADING TO ADDITIONAL SURGERY IN FINGER AMPUTATION? A RETROSPECTIVE STUDY

D.-J. van der Avoort, J.W. van Neck, R.W. Selles, S.E.R. Hovius, J.H. Coert
Department of Plastic and Reconstructive Surgery Erasmus Medical Centre, The Netherlands

Introduction: In finger amputation, digital nerves are not able to connect to their initial end organ. Despite this, the stimuli for nerve regeneration and sprouting of the nerve are still transmitted to the proximal nerve ending. Therefore, a histological neuroma will develop, although not all of these peripheral nerve neuromas are symptomatic. The goal of this study was to determine the incidence of symptomatic neuroma formation in digital amputation and the need for additional treatment.

Methods: We included all hand injuries treated between 2001 and 2007 in our institution. We included all digital peripheral nerve injuries from the medical records. From this group, the subgroup of patients with a finger amputation was selected. Patients operated because of reporting unbearable pain due to nerve injury were defined as being symptomatic neuroma patients. We recorded type of injury, postoperative complications and additional operations.

Results: The total amount of hand injury patients treated in our institution between 2001 and 2006 was 1102. Of these patients, 583 had a peripheral nerve injury. We further analyzed these 583 patients, dividing them in two groups: a group with peripheral nerve injury without finger amputation ($n=406$) and a group with one or more finger amputations ($n=177$). From the 406 patients without finger amputation, 4 patients presented at the outpatient clinic with a symptomatic neuroma (1%). From the 177 finger amputation patients, 13 presented with a symptomatic neuroma (7.3%). The time until the first report of pain ranged from 1.5 to 14 months with an average of 6.7 months

In the none-symptomatic group no re-operations were performed with peripheral nerve pain as indication for operation. Conversely, in the symptomatic neuroma

group, an average of 3 re-operations were performed with peripheral nerve pain as the primary indication for operation.

Discussion/Conclusion: 50% of all hand injuries involved a peripheral nerve injury. 2.9% reported symptomatic neuroma. The incidence of symptomatic neuroma was higher in the finger amputation group (7.3%) than in the non-amputation group (1%). In the literature this incidence has already been discussed for many years and ranges from 2.7% (Fischer et al) to 30% (Nelson). In the amputation group, they reported to the outpatient clinic earlier with more pain than the non-amputation group. However, we found that the symptomatic neuroma group needed an average of 3 re-operations, compared to no operations in the non-symptomatic group.

In summary: Symptomatic neuromas in finger amputation occur frequently, will present early and cause multiple operations.

10.1177/1753193409105937

A0328 MEDIAN NERVE SLIDING BEFORE AND AFTER SURGICAL RELEASE

A. Fibir¹, R. Cap², L. Ungerma³, R. Kebrle⁴

¹*Dpt. of plastic and aesthetic surgery, SANUS hospital, Hradec Kralove, Czech Republic*

²*Dpt. of plastic surgery and burn treatment, Surgery clinic, Faculty hospital Hradec Kralove, Czech Republic*

³*Radiology clinic, Faculty hospital Hradec Kralove, Czech Republic*

⁴*Hand Surgery Centre, Vysoke nad Jizerou, Czech Republic*

Background: Carpal tunnel syndrome is the most frequent mononeuropathy of upper limb. Simple compression is the main cause of this disease, but tension of median nerve could also play an important role. Impaired sliding may lead to neuropathic symptoms. Sonographic assesment of transversal and longitudinal median nerve sliding before and after surgical release adds additional information about nerve movement in comparison with other diagnostic and clinical findings.

Aim: The purpose of this study was to describe the effect of open carpal tunnel release on the median nerve transverse and longitudinal movement and to evaluate its clinical significancy.

Methods: 53 patients with clinical signs and neurophysiological confirmation of CTS were examined sonographically before and 3 months after open surgical release. Patients were randomised into two groups with different postoperative care. In group A a static dorsal splint for two weeks was used. In group B no splinting was used. Changes of transversal and longitudinal nerve

movement were described. Clinical and electrophysiological parameters was compared with ultrasonography results before and after surgery and between both groups.

Results: In group A splinting after open surgical release reduced transversal and improved longitudinal nerve movement of median nerve. In group B with no splinting transversal movement was improved and longitudinal movement was reduced. There is no significant difference of clinical outcome between the splinted and non splinted group (0.95 confidence interval, $p < 0.01$).

Conclusion: Longitudinal and transversal median nerve movement is affected after open release and it also depends on postoperative care, but these changes have no clinical significance.

Special thanks to Andrew Dilley PhD, who developed the original method for measurement of longitudinal nerve sliding.

10.1177/1753193409105941

A0120 RANDOMIZED TRIAL OF LOCAL VERSUS BRACHIAL PLEXUS BLOCK ANAESTHESIA FOR CARPAL TUNNEL RELEASE

A. Żyluk, P. Puchalski, I. Walaszek, P. Janowski

Department of General and Hand Surgery, Pomeranian Medical University in Szczecin, Poland

Introduction: Carpal tunnel release can be performed in local anaesthesia, peripheral nerves blocks (either proximally or distally), intravenous regional (Bier block) and general anaesthesia. To our knowledge, in Poland operations of carpal tunnel syndrome are routinely performed under brachial plexus block. The objective of this study was to compare the effectiveness of local versus brachial plexus block anaesthesia for carpal tunnel decompression.

Material and methods: One hundred and fifty-five patients diagnosed with carpal tunnel syndrome were randomly allocated to the local anaesthesia or brachial plexus block. Operations were done with two minimally invasive techniques: one and two small incisions. Questionnaires received from 135 patients, 115 women (85%) and 20 men (15%) in a mean age of 57 years (range 31–87) were analyzed. Sixty-six patients (49%) received local infiltration with 2% Lignocaine, and 69 (51%) received brachial plexus block with a mixture of 2% Lignocaine and 0.5% Bupivacaine. Pre-intra- and post-operative patients' complaints were assessed in visual analogue scale, as well as duration of anaesthesia, operation and surgeon subjective satisfaction were noted.

Results: Except tourniquet pain, there were no significant differences between the groups in the pain scores associated with disease or operation. Although tourniquet pain was significantly lower favoring brachial plexus block, but the difference was slight (VAS 1.9) and most the patients well tolerated short-time inflation of the tourniquet. No significant difference was observed in duration of the operation, whereas duration of performing anaesthesia was significantly longer in brachial plexus blocks, but the difference of the mean values was as low as 1 minute. Operation under brachial plexus block provided greater surgeon's comfort.

Conclusion: The results of this study show similar effectiveness of local and brachial plexus block anaesthetics for carpal tunnel release, and confirm advantages of the former technique as simpler, cheaper and more easily available.

10.1177/1753193409105931

A0230 CORRELATION BETWEEN SYMPTOMS AND NEUROPHYSIOLOGICALLY DIAGNOSED MOTOR BRANCH COMPRESSION IN CARPAL TUNNEL SYNDROME

R. Boer, C.S. Modi, K. Ho, V. Hegde, S.M. Turner
Warwick Orthopaedics, University Hospitals Coventry and Warwickshire NHS Trust, UK

Introduction: Median nerve motor branch compression (MBC) in patients with carpal tunnel syndrome (CTS) is usually characterised by reduced finger grip and pinch strength, loss of thumb abduction and opposition strength and thenar atrophy. Surgical decompression is an absolute necessity in these patients but may result in poor outcomes due to irreversible intraneural changes. The recognition of alternative symptoms and signs of MBC may be beneficial by enabling earlier treatment to be performed. The aim of this study is to correlate symptoms, in particular the presence, location and frequency of pain with the severity of neurophysiologically diagnosed median MBC.

Methods: Neurophysiological testing was performed by a senior neurophysiologist between March 2007 and April 2008 at University Hospital, Coventry with motor and sensory branch compression (SBC) graded as mild, moderate or severe depending upon conduction velocity and latency. A symptom severity and functional questionnaire was completed by each patient prior to testing at the same appointment. Chi-squared testing and correlation analyses were performed to ascertain whether symptoms and their severity were associated with an increased incidence of median MBC.

Results: One-hundred-and-twelve patients (166 hands) were tested with an age range 29 to 88 years (mean 60 years). Eighty-eight were female, 24 male, with 91 right hands tested and 75 left hands. CTS was neurophysiologically diagnosed in 119 hands (80 patients, 39 bilateral) as either having sensory or motor branch compression or both.

Chi-squared analysis showed that there was a significant association between the severity of MBC and an increasing frequency of pain experienced by the patients ($p=0.0004$). This was not seen for sensory branch compression ($p=0.1047$). There were also significant associations between MBC and the frequency of paraesthesia ($p=0.0006$) and numbness experienced ($p=0.0031$) although these were also significantly associated with SBC. Interestingly, there were no significant associations between MBC and patients being able to fasten buttons or count money and only a mild association with dropping objects ($p=0.0499$).

Regression analysis did not show any significant correlations between the pain scores and the severity of MBC although there was a trend towards increasing pain radiating to the elbow region being associated with more severe MBC.

Conclusion: This study shows that an increasing frequency of pain experienced by the patient was associated with an increasing severity of median nerve MBC. Trends in the data also suggest that pain radiating to the elbow may also be associated with significant MBC. These symptoms should be considered by the clinician when treating patients with CTS and may enable earlier decompression to be performed thereby preventing permanent functional deficits.

10.1177/1753193409105936

A0121 INABILITY TO WORK BEFORE AND AFTER OPERATION FOR CARPAL TUNNEL SYNDROME

A. Żyłuk, P. Puchalski
Department of General and Hand Surgery, Pomeranian Medical University in Szczecin, Poland

Introduction: Carpal tunnel syndrome is the most common compressive neuropathy, affecting approximately 5.8% women and 0.6% men. In consideration of its commonness and occurrence in persons in employment age it is considered a cause of significant work absence. Operative treatment of the syndrome results in temporary decreasing of the power and dexterity of the hand, what is also a cause of inability to work. There is lack of information in Polish literature about the

dimension of this problem. The objective of this study was to determine a work absence caused by carpal tunnel syndrome, both before and after the operation.

Patients and methods: Fifty-six employed patients, 44 women and 12 men in a mean age of 49 years (range 27–63) who underwent a mini-invasive carpal tunnel release were analyzed. Patients were asked for duration of the disease and time off work before the operation and were followed-up for 6 months with a time off work to be noted. At 6 months, a self-assessment of the satisfaction with the result was performed in a simple four-grade scale.

Results: A mean duration of the disease in 56 employed patients was 34 months (range 2 months–20 years). Prior to the surgery, 22 patients (39%) were on sickness related sick leave for an average 2.9 months (range 3–12). After the operation all patients availed of sick leave for a mean of 2.3 months (range 1–6). Eight (14%) of the employed patients did not return to work in a 6 months follow-up for various reasons, but mostly due to weakness and reduced dexterity of the involved hand. None of the patients complained of symptoms similar to the pre-operative and in none any complication occurred. In subjective evaluation of the effectiveness of the surgery, comparing to the status before operation 31 patients (26%) were completely free of pain and other symptoms, in 80 (66%) complaints significantly reduced, in 5 (4%) remained the same and in 5 (4%) deteriorated. Statistical analysis revealed that 22 patients who availed of sick leave prior to surgery, were statistically significantly longer off work (a mean of 3 months) than 34 patients who did not were on sick leave (a mean of 1.8 months). Similarly, in 8 patients who did not return to work, 7 availed of sick leave before the operation and only one did not.

Conclusion: Our results show that carpal tunnel syndrome in Poland is a cause of considerable work absence. In comparison to other countries, time off work after surgery is relatively long and a proportion of patients did not return to work within 6 months, regardless that no complications occurred in these patients. We intuitively think, that a main cause of a long lasting time work off in majority of patients after carpal tunnel release is an unwillingness but not an inability to work.

10.1177/1753193409105932

A0313 NERVE CONDUCTION STUDIES AND THEIR SIGNIFICANCE IN CUBITAL TUNNEL SYNDROME

M. Anderton, F. Shah, I. Harvey, M. Webb
Countess of Chester Hospital NHS Foundation Trust, UK

Introduction: Nerve conduction study (NCS) examination of the ulnar nerve is a diagnostic tool when investigating patients presenting with cubital tunnel syndrome (CTS). However, NCS are associated with a false negative rate. Decompressive surgery of the ulnar nerve remains the primary treatment of cubital tunnel syndrome.

The aim of our study was to look at:

- 1) The correlation between the results of NCS and the subsequent outcome from surgery.
- 2) Compare these results with a similar group of patients that underwent decompressive surgery without NCS.

Method: A retrospective study of a cohort of 76 patients with symptoms and signs of CTS was undertaken. All patients had clinical examination with documentation of features, followed by NCS if indicated. If NCS were carried out, the result of the study was graded (negative, mild, moderate or severe). All patients had decompressive surgery of the ulnar nerve at the elbow. Operative functional outcome was evaluated pre and post operatively using standard DASH score. A successful outcome was defined as resolution of symptoms.

Results: There was an uneven sex distribution of 50 men and 26 women. Patient age showed a normal distribution (range 18–84, mean 49 years). Overall, 57 patients (75%) had resolution of symptoms postoperatively, 19 patients (25%) had unresolved symptoms (14 sensory paraesthesia & numbness, 3 motor weakness, 2 pain). Outcomes of patients that did not undergo NCS showed a resolution rate of 77% (24/31). Those that had a negative NCS, showed a resolution rate of 85% (11/13). Severe disease as demonstrated by NCS showed a 66% (4/6) resolution rate, with mild showing a rate of 68% (13/19). Patients who had shown a NCS outcome of moderate had a resolution of symptoms in 71% of cases (5/7).

Discussion: Our study highlighted the fact that surgical outcome can be correlated to the severity of the pre-operative NCS. There would seem no reason to refer patients for NCS prior to offering operative treatment.

10.1177/1753193409105940

A0361 RESULTS OF SURGICAL TREATMENT FOR THE CUBITAL TUNNEL SYNDROME USING THE ANTERIOR SUBCUTANEOUS TRANSPOSITION AND SIMPLE DECOMPRESSION IN A 7 YEAR PERIOD (2001–2007) – 356 PATIENTS

I. Humhej, A. Hejžl, R. Bartoš, P. Vachata, M. Bolcha, A. Vlasák, K. Saur, I. Fílová, M. Sameš

Department of Neurosurgery, Masaryk Hospital, Ústí nad Labem, Czech Republic

Background: The compression of the ulnar nerve in the cubital tunnel (CuTS) is the second most common compression syndrome of the peripheral nerve. Several surgical therapeutic modalities are available, from simple decompression (SD) and medial epicondylectomy to anterior subcutaneous (ASCT), intramuscular or submuscular transposition. Currently, there is no consensus on the most effective type of surgical therapy of the CuTS, however, there is an increasing preference of the SD of the ulnar nerve, which becomes the most preferred surgical type of therapy of the CuTS.

Aim: To evaluate and compare the results of the CuTS surgery using ASCT and SD as a single-institution experience.

Methods: The retrospective part of the study included 356 patients operated for the diagnosis of the CuTS at our department between the years 2001–2007. The ratio of females to males was 1.0:1.6, the average age at the time of surgery was 49.9 years (16–82). The right arm was operated in 144 cases, left arm in 212 cases. The ASCT was used in 283 patients, SD, which has been used in our department since 2005, in 73 patients. Preoperatively, 19% of patients were in grade 1 according to the McGowan scale, 60% of patients were in grade 2, and 21% were in grade 3. The Tinel sign was positive in 91%. In all patients the cubital tunnel was verified by the EMG. One to four years post-surgery the patients completed a questionnaire evaluating the effect of surgery.

Results: 82% of patients described disappearance or alleviation of paresthesias in the innervations zone of the ulnar nerve (78% after ASCT and 87% after SD), 15.5% were without change (17% after ASCT vs. 8% after SD) and 2.5% declared worsening (2% after ASCT vs. 2.5% after SD). Sensitivity improved in 77% of patients (74% vs. 75%), in 19.5% was without change (18% vs. 23%) and 3.5% declared worsening (4% vs. 2.5%). Improvement of fine motor activities was declared in 76% of patients (68% vs. 75%), no change in 18% of patients (15.5% vs. 20.5%) and its worsening declared in 5.5% of respondents (5.5% vs. 2.5%). Hand strength improvement was declared in 61% of patients (54% vs.

64%), the same strength in 29% respondents (26% vs. 28%) and weakening in 10% of patients (10.5% vs. 5%). As for complications, inflammation was present in 1% of patients after ASCT and in 2.5% after SD; scar hypersensitivity in 40% after ASCT and in 33% after SD. Overall, significant or partial arm improvement was present in 84% of patients (83% after ASCT vs. 89.5% after SD), unchanged in 12% of patients (13% vs. 8%) and worsened in 4% of individuals (4% vs. 2.5%).

Conclusion: SD of the ulnar nerve syndrome seems to be a safe, fast and effective method in the therapy of the CuTS and we can recommend it as the first method of choice in most patients with the cubital tunnel syndrome.

10.1177/1753193409105948

A0376 CUBITAL TUNNEL RELEASE SUPPORTED BY ENDOSCOPY

T. Matuszewski

Center of Sports Medicine, Warsaw, Poland

Plastic Surgery Clinic, Warsaw, Poland

Cubital Tunnel Syndrome is well defined condition in which ulnar nerve is compressed by surrounding tissue in limited space back to medial epicondyle. Recommended surgical procedures are varying depending on the stage of nerve compression and clinical reveals according to McGowan's scale. Consecutive series of 78 patients were treated surgically by a small skin port and endoscopical support for better visualization of peripheral operating field. Diagnosis of CuTS was based on neurographical findings and high resolution sonography as well. Results of this series were compared to results obtained in early series of 38 patients operated by traditional techniques: medial epicondylectomy or anterior transposition. It shows that there is no remarkable difference in late results of decompression in these series. Furthermore – recovery time was shorter and morbidity was evidently less. It suggests limiting indications to greater decompression procedure and expanding less invasive techniques.

10.1177/1753193409105943

SESSION 6: CONGENITAL

A0388	LECTURE: TREATMENT OF THE RADIAL CLUB HAND S. Vilkki (<i>Finland</i>)	32
A0055	IMPAIRMENT, DISABILITY AND HANDICAP IN PATIENTS WITH AN UNTREATED TRIPHALANGEAL THUMB J.M. Zuidam, M. de Kraker, R.W. Selles, S.E.R. Hovius (<i>The Netherlands</i>)	32
A0002	TRIPHALANGEAL THUMB: CLINICAL CHARACTERISTICS AND SURGICAL TREATMENT I. Shvedovchenko, O. Agranovich	32
A0032	SURGICAL TREATMENT IN HABILITATION OF PATIENTS WITH PROXIMAL ECTROMELIA OF UPPER EXTREMITIES I. Shvedovchenko, A. Koltsov (<i>Russia</i>)	33
A0115	ASSESSMENT OF THE 3-DIMENSIONAL THUMB WORKSPACE IN PATIENTS WITH A RECONSTRUCTED HYPOPLASTIC THUMB R.W. Selles, M. de Kraker, E. Bos, H.J. Stam, K.N.A. De Paepe, J.H. Coert, S.E.R. Hovius (<i>The Netherlands</i>)	33
A0243	GROWTH DIAGRAMS FOR GRIP STRENGTH IN CHILDREN H.M. (Ties) Molenaar, R.W. Selles, J.M. Zuidam, S.P. Willemsen, H.J. Stam, S.E.R. Hovius (<i>The Netherlands</i>)	34
A0001	CLINICAL VARIANTS AND SURGICAL TREATMENT OF ARTHROGRYPOSIS WRIST DEFORMITIES O. Agranovich, I. Shvedovchenko	35

A0388 LECTURE: TREATMENT OF THE RADIAL CLUB HAND

S. Vilkki

Tampere University Hospital, Dept. of Hand and Microsurgery, Tampere, Finland

no abstract received

A0055 IMPAIRMENT, DISABILITY AND HANDICAP IN PATIENTS WITH AN UNTREATED TRIPHALANGEAL THUMB

J.M. Zuidam, M. de Kraker, R.W. Selles, S.E.R. Hovius
Department of Plastic and Reconstructive Surgery, Erasmus Medical Centre Rotterdam, The Netherlands

Purpose: The triphalangeal thumb is a condition determined by an additional phalanx of the thumb. While surgical treatment focused on restoring function nowadays is general practice in triphalangeal thumb, only 50 years ago surgical treatment was generally not advised. Therefore, a population with an untreated triphalangeal thumb is still present. The purpose of this study is to compare impairment, disabilities and handicap of subjects with an untreated triphalangeal thumb to a normal population.

Methods: Twelve persons with an untreated triphalangeal thumb, unilateral or bilateral, were examined using objective measurements (thumb movement, joint instability, pain, and strength) and subjective measurements (VAS, DASH, and SF-36). In total 23 hands with an untreated triphalangeal thumb were tested.

Results: Objective measurements showed no limitations in range of motion or general hand strength. In addition, no joint instability was found in the interphalangeal joints. However, 5 thumbs had instability in the metacarpal joint. Strength of the thumb in anteposition was diminished to 64% compared to a normal population. Opposition was diminished to 62% and metacarpal joint flexion strength to 61%. Questionnaires scoring subjective measurements were only lower compared to a normal population for the domain of social functioning in the SF-36; the DASH showed no differences. Visual analog scores for appearance of the thumb were scored low (2.2 out of 10) by the subjects, in contrast to visual analog scores for function (7.7).

Discussion: The examined group of subjects with an untreated triphalangeal thumb had adequate thumb movement. Thumb strength was diminished for all specific thumb functions (anteposition, opposition, and

thumb flexion), up to 55%. Subjective measurements indicate that functionality is good. The appearance, however, was rated much lower, implicating a dislike of the thumb by the patients. This indicates that the main impact of an untreated triphalangeal thumb in daily functioning may not be diminished the function rather the dissimilar appearance.

10.1177/1753193409106052

A0002 TRIPHALANGEAL THUMB: CLINICAL CHARACTERISTICS AND SURGICAL TREATMENT

I. Shvedovchenko, O. Agranovich

Triphalangeal thumb is a rare congenital condition in which the thumb has three phalanges like the fingers. We examined and treated 65 patients with triphalangeal thumb in 101 hands. It has helped us to develop a classification of this deformity.

All patients were divided into groups: a simple form and a complex form.

The simple form of triphalangeal thumb includes: brachymesophalangeal type; pseudo-triphalangism; dolychophalangeal type.

The complex form of triphalangeal thumb includes: triphalangism in combination with hypoplastic first ray or in combination with radial polydactyly (with isolated deformities of hand and with deformities of forearm and hand).

Operative treatment of brachymesophalangeal type of triphalangeal thumb is determined by the age of the child, the size of the additional phalanx and the first ray, and the condition of the thenar muscles. In the presence of an additional phalanx in children up to 2 years, we perform its removal and joint stabilization. If the additional phalanx has the trapezoid or rectangular form and the child is older than 2, we carry out excision of one of the interphalangeal joint with a part of the additional phalanx. Operative treatment of pseudotriphalangism consists of open wedge osteotomies of the epiphysis of the thumb's distal phalanx. In dolychophalangeal type of triphalangeal thumb we perform pollicization. Triphalangeal thumb in combination with hypoplastic thumb was noted in the following variants: brachymesophalangeal type and dolycho-phalangeal type. In the combination of brachymesophalangeal type with hypoplastic thumb we restore the width of the thumb web space and the thumb opposition with (or without) resection of one of more hypoplastic interphalanx joints. In dolychophalangeal

type with hypoplasia only phalanges we carry out the resection of an interphalanx joint at which level a secondary deformity is noted. In the cases of combination of dolychophalangeal type with hypoplastic first ray as a whole we perform pollicization with a resection of one of the interphalanx joints. The combination of triphalangeal thumb with radial polydactyly is observed in 2 variants: with isolated alteration of hand or with alteration of forearm and hand. In the combination of triphalangeal thumb with radial polydactyly we remove an additional segment and the resection of most hypoplastic interphalanx joint or pollicisation. In the combination of triphalangeal thumb with radial polydactyly with deformities of forearm and hand, we perform restoration of the hand in middle position and pollicization.

10.1177/1753193409106050

A0032 SURGICAL TREATMENT IN HABILITATION OF PATIENTS WITH PROXIMAL ECTROMELIA OF UPPER EXTREMITIES

I. Shvedovchenko, A. Koltsov

Albrecht Center for Occupational Expertise, Prosthetics and Rehabilitation, St. Petersburg, Russia

Introduction: Proximal ectromelia is the rare and severe form of congenital malformations of the upper extremity. Clinically anomaly is characterized by the hypoplasia of clavicle, scapula, shortening of the limb. All segments of the upper limb are undeveloped, and the level of the undevelopment is decreasing in the distal direction. The shoulder joint is always absent; shoulder bone, elbow joint and the wrist-joint, bones of the forearm, the thumb are undeveloped or absent. Due to reduced functional ability of the upper extremities, the patients often use their legs for self-serving.

The aim of the current study is the evaluation of the outcomes of the surgical interventions for restoration of the appearance and functionality of the hand and the upper extremity in general. Patient population and methods.

We have the experience of treatment of 62 patients. The total number of the treated limbs were 80. Age interval in the group is from 1 month till 46 years of age. In 30 patients, the proximal ectromelia was in the left limb and in 14 patients - in the right limb, 18 patients had bilateral pathology.

All patients were divided in three groups.

Group I (26 patients) consisted of the patients with rudimental distal part of the shoulder, with hypo-plastic

elbow joint, forearm and hand, generally with bilateral malformations. All patients in Group I actively used their undeveloped limb in self-serving.

Group II (24 patients) consisted of the patients having only hypoplastic bones of the forearm or unspecified bony formations between the undeveloped hand and scapula. Functionality was dependent of the conditions of the forearm.

Group III (12 patients) consisted of the patients whose limb had only rudimental hand, directly connected to the scapula. The functionality in this group was at the lowest level, and that limb was not used for self-serving.

Results: Surgical procedures were performed in 13 patients (37 interventions). The youngest age of the patients on whom the surgery was performed was 10 months. There was surgery for formation of the thumb and creation of a grasp (pollicization, auto-transplantation of a second toe to the position of a thumb, reconstruction for forming of opposition of the thumb), the reconstructions for creation or restoration of shoulder bone using microsurgical transposition of lateral board of scapula, the corrections of deformations of different bones and of ulnar or radial deformation of the hand, the elongations of the arm and forearm with Ilizarov's apparatus.

More frequently the operations were performed in Group I, in Group III the only surgery was on the shoulder zone as a preparation for prosthetic management.

Conclusions: 1. Even with the severe proximal ectromelia, there is a possibility to improve the outcomes of rehabilitation by surgical management.

2. Surgical procedures are multi-stage, and should be performed at the early ages if possible.

3. Surgical procedures contributes to the improvement of the outcomes of habilitation.

4. Best results are achieved in patients with rudimental humerus and hypoplastic elbow joint.

10.1177/1753193409106051

A0115 ASSESSMENT OF THE 3-DIMENSIONAL THUMB WORKSPACE IN PATIENTS WITH A RECONSTRUCTED HYPOPLASTIC THUMB

R.W. Selles^{1,2}, M. de Kraker^{1,2}, E. Bos^{1,2}, H.J. Stam², K.N.A. De Paepe^{1,2}, J.H. Coert¹, S.E.R. Hovius¹

¹*Department of Plastic and Reconstructive Surgery, Erasmus Medical Center Rotterdam, The Netherlands*

²*Department of Rehabilitation Medicine, Erasmus Medical Center Rotterdam, The Netherlands*

Introduction: In hypoplastic thumb patients, surgical interventions are performed to restore range of motion

and increase functional thumb workspace. At present, outcome is generally measured using conventional goniometry, providing little detailed information.

The MiniBIRD electromagnetic motion analysis system allows measuring 3D position and orientation. We developed an experimental set-up to measure radial and palmar abduction as well as thumb circumduction, to study total thumb workspace and assess possible impairment. Goal of this study was to analyze these 3D kinematics in patients with a hypoplastic thumb and to describe in detail its functional workspace compared to control subjects.

Materials and methods: Radial abduction, palmar abduction and circumduction were measured in 7 hands that had undergone a flexor digitorum profundus (FDS4) tendon transfer for a Type II or IIIA hypoplastic thumb and in 3 hands with a pollicisation for a type IV/V hypoplastic thumb. Data were recorded with the MiniBIRD 500® (Ascension Tech. Corp., Burlington, VT) electromagnetic motion analysis system at 103 frames per second and data were analyzed using custommade MATLAB® programs. Angles were calculated from changes between a standard resting position. Additionally, total workspace was assessed by calculating the circumduction distance, normalized for length of the first metacarpal (normalized circumduction distance). We compared Kapandji scores with corrected circumduction to assess if they were correlated. Workspace impairment was assessed by comparing motion patterns of patients with those of 17 healthy subjects.

Results: Mean radial abduction was 18.5 degrees (range 11–28°) in patients with a FDS4 tendon transfer and 32 degrees (range 13–63°) in patients with a pollicisation, compared to 339° (SD: 69°, range: 24–45.59°) in healthy controls. Mean palmar abduction was 209° (range 6–41°) and 399° (range 17–64°) for the patients, respectively, and 379° (59°, 26.5–46.59°) in the controls. Mean absolute circumduction distance was 58 mm (range 41–103 mm) in patients with a FDS4 transfer and 92 mm (range 49–142 mm) in patients with a pollicisation compared to 93 mm (15 mm, 68–123 mm) in the controls. Finally, normalized circumduction distance was 1.9 (range 0.8–3.5) and 2.4 (range 1.8–3.4), compared to 2.2 (1.7–2.8) in the controls. Kinematic plots of the circumduction showed comparable patterns in all healthy subjects while the patients showed highly variable patterns, giving insight in which specific part of the workspace is limited in individual patients.

Mean Kapandji score was 7 (range 4–8) in patients with a FDS4 tendon transfer and 9 (range 7–10) in patients with a pollicisation. Correlation between Kapandji scores for opposition and corrected circumduction was not significant in both patient groups, indicating that

the Kapandji score has little or no relation with the 3-dimensional thumb workspace.

Conclusion: By comparing circumduction patterns it was possible to assess which part of the workspace was affected most. In both patients with a pollicisation, but even more in patients with an FDS4 tendon transfer, mean radial and palmar abduction and circumduction were smaller than in healthy subjects. This 3-dimensional functional thumb workspace assessment provides useful data for evaluation of thumb range of motion and impairment.

10.1177/1753193409106053

A0243 GROWTH DIAGRAMS FOR GRIP STRENGTH IN CHILDREN

H.M. (Ties) Molenaar^{1,2}, R.W. Selles^{1,2}, J.M. Zuidam¹, S.P. Willemsen³, H.J. Stam², S.E.R. Hovius¹

¹*Department of Plastic and Reconstructive Surgery, The Netherlands*

²*Department of Rehabilitation, The Netherlands*

³*Department of Biomedical Statistics, The Netherlands*

Objective: Grip strength dynamometers are often used to assess hand function in children. At present, the use of normative grip strength data in long-term follow-up of individual children is difficult because of the influence of growth. As an alternative to age-group interval data, infant welfare centers throughout the world use growth diagrams to visualize normative growth. The aim of this study was to develop similar growth diagrams for grip strength in children.

Material and methods: Grip strength, hand-dominance, gender, height and weight of 225 children between 4 and 12 years old were measured. Grip strength was measured for both hands with the Lode dynamometer (equivalent to the Jamar dynamometer). For all measurements, the mean of three maximum voluntary contractions was recorded. We developed statistical models for drawing growth curves using estimated centiles for grip strength. Separate models for the dominant and nondominant hand of boys and girls were developed as well as a combined model.

Results: Grip strength increased with age for both hands. For the whole group the dominant hand produced higher grip strength than the nondominant hand ($p < 0.001$) and boys were significantly stronger than girls ($p < 0.001$). Grip strength of boys and girls differed between 2–19 Newton for the different age-groups. The statistical models for grip strength as a function of age for each hand and for boys and girls separately were converted into growth diagrams. Finally a diagram was made for all data of boys, girls and both hands combined.

Conclusion: Because grip strength measurements are accompanied by a rather large variance, the growth diagrams (presenting a continuum in grip strength), make it possible to better visualize grip strength development over time corresponding to a more exact age. Using different diagrams for each target group gives the observer the best model to easily register and compare measurement outcome. Depending on the accuracy needed the use of one single combined diagram could be considered.

10.1177/1753193409106054

A0001 CLINICAL VARIANTS AND SURGICAL TREATMENT OF ARTHROGRYPOSIS WRIST DEFORMITIES

O. Agranovich, I. Shvedovchenko

The examination of 37 children with arthrogryposis with 72 affected wrists has allowed us to develop the classification of wrist flexor contractures.

The basic criteria were: angular size of initial deformity, the degree of correction of the contracture, range of active motion at the wrist.

There are four degrees of wrist flexor contractures.

Operative treatment of wrist flexor contractures in patients with arthrogryposis has been performed in 52 cases.

In cases of wrist contractures of first degree we performed transposition of m.flexor carpi ulnaris and m.flexor carpi radialis on extensor surface of hand and forearm. The tendons of m.extensor carpi ulnaris and m. extensor carpi radialis were shortened. In contractures of second and third degrees we offer a new technique of treatment including a resection of an intercarpal joint and preservation of radio-carpal joint and carpometacarpea joints of thumb and fingers and transposition of m.flexor carpi ulnaris and m.flexor carpi radialis on extensor surface of a hand and a forearm. In contractures of fourth degree special interventions were combined with preliminary soft-tissue distraction or with shortening osteotomy of forearm bones.

Conclusion: 1. The muscle transposition in patients with arthrogryposis allows us to restore active extension in a wrist.

2. The resection of an intercarpal joint combined with muscle transposition not only eliminates deformity, but also keeps active movements in the wrist.

3. The proposed techniques of treatment are a reliable alternative to wrist arthrodesis in patients with arthrogryposis.

10.1177/1753193409106049

SESSION 7: DRUJ

- A0387 DEBATE: TFCC PERIPHERAL AVULSIONS. OPEN VS ARTHROSCOPY TREATMENT 37
R. Luchetti, A. Atzei
- A0312 COMPARISON BETWEEN THREE DIFFERENT METHODS OF TRIANGULAR FIBROCARILAGE COMPLEX REPAIR: ARTHROSCOPIC ASSISTED TRANSCAPSULAR, ARTHROSCOPIC ASSISTED TRANSOSSEUS AND ARTHROSCOPIC ASSISTED TRANSOSSEUS REPAIR OF THE DEEP LAYER COMBINED WITH TRANSCAPSULAR REPAIR 37
A. Elgammal, K. Bäcker, B. Lukas
(Germany)
- A0222 THE USE OF THE 6-R PORTAL IN ARTICULAR DISTAL RADIUS FRACTURES 37
G. Herzberg, I. Izem, F. Weppe, F. Plotard, G. Mezari
(France)
- A0365 WRIST ARTHROSCOPY – A TEN YEAR EXPERIENCE AT A SINGLE CENTRE 38
S. Mukhtar, A. Latif, J. Leckenby, T. Colegate-Stone, A. Tavakkolizadeh, J. Compson
(UK)
- A0251 CLINICAL RESULTS OF ARTHROSCOPIC SYNOVIALECTOMY OF THE WRIST 38
M. Massarella, S.D. Poggi
(Italy)
- A0191 ULNAR SHORTENING OSTEOTOMY USING A SYNTHES COMPRESSOR APPARATUS 38
L.G. Warhold, N.L. Jenkins
(USA)
- A0023 COMPUTED TOMOGRAPHIC ASSESSMENT OF REDUCTION OF THE DISTAL RADIOULNAR JOINT BY GRADUAL LENGTHENING OF THE RADIUS 39
H.S. Gong, M.S. Chung, G.H. Baek, S.T. Kwon, S.H. Rhee, H.S. Park
(Korea)

A0387 DEBATE: TFCC PERIPHERAL AVULSIONS. OPEN VS ARTHROSCOPY TREATMENT

R. Luchetti, A. Atzei

no abstract received

A0312 COMPARISON BETWEEN THREE DIFFERENT METHODS OF TRIANGULAR FIBROCARILAGE COMPLEX REPAIR: ARTHROSCOPIC ASSISTED TRANSCAPSULAR, ARTHROSCOPIC ASSISTED TRANSOSSEUS AND ARTHROSCOPIC ASSISTED TRANSOSSEUS REPAIR OF THE DEEP LAYER COMBINED WITH TRANSCAPSULAR REPAIR

A. Elgammal, K. Bäcker, B. Lukas
Orthopädische Klinik München-Harlaching, Zentrum für Hand-, Mikro- und Plastische Chirurgie, Harlachinger Straße 51, 81547, München, Germany

Introduction: Triangular fibrocartilage complex lesion is the most common cause of ulnar sided wrist pain, and it is most commonly caused by trauma with pronated, hyperextended wrist or by distraction injuries that pull the ulnar side of the wrist from place. According to Palmer classification, triangular fibrocartilage lesion is classified into traumatic and degenerative tears and traumatic lesions are further classified according to their site. Our understanding of the anatomy and function of the TFCC has been refined. The TFCC plays an important role in load bearing across the wrist as well as in distal radioulnar joint stabilization.

Patients and methods: Our study includes 40 patients with mean follow up at two year. 22 of our patients were male and 18 female with an average age of 35 years. Indication for surgery was a peripheral TFCC tear type IB. In all cases we started with arthroscopic debridement of the TFCC followed by fixation by one of the techniques mentioned above. All patients were put in an above elbow cast for 4 weeks followed by below elbow cast for 2 weeks, then they began the rehabilitation program. In our study we compared these three surgical procedures by using examination of range of motion, stability of DRUJ, grip strength, pain (VAS 0–10) and patient satisfaction, functional outcomes were scored with DASH score and MAYO wrist score.

Results: About 80% of patients showed satisfactory results with all three techniques. Range of motion was about 90% of the other side and the grip strength was between 70% and 100%. The intensity of pain improved

in more than 80% of our patients, and more than 90% would undergo surgery again. 9 weeks after surgery our patients could return to work and after 12 weeks to sport activities, that require load to the wrist. 5 patients complained about problems caused by the suture material. 2 patients showed a persistent instability of the DRUJ. One patient had a irritation of the dorsal ulnar nerve.

Conclusions: Arthroscopic assisted transcapsular repair of the peripheral TFCC tears showed satisfactory results as long as there was no additional distal radioulnar joint instability. With distal radioulnar joint instability, the combined technique of arthroscopic assisted transosseus repair of the deep layer of the TFCC combined with transcapsular repair of the superficial layer showed the best results.

10.1177/1753193409106448

A0222 THE USE OF THE 6-R PORTAL IN ARTICULAR DISTAL RADIUS FRACTURES

G. Herzberg, I. Izem, F. Weppe, F. Plotard, G. Mezari
Hospices civils de Lyon, France

Introduction: Treatment of articular distal radius fractures (ADRF) is challenging. When arthroscopic reduction and internal fixation (ARIF) are chosen, the question arises as to which is the best portal to view and reduce the fragments. We hypothesised that the 6-R portal could provide a good control on the fragments (especially in case of impaction) and their reduction.

Methods: The 6-R portal was prospectively used in addition to the 3–4 portal in 10 ADRF. All patients were young adults. 3–4 portal was used first but reduction of the fragments was obtained with joy sticks and controlled through the 6-R portal instead of the 3–4 portal. In all cases a volar plate was used in addition to the fragment-specific K-wires fixation.

Results: We experienced an easier control and reduction of the fragments when a 6-R portal was used compared with the 3–4 portal we used previously. Visualization of the displacement and reduction of the fragments, especially in cases of impaction, was satisfactory in all cases.

Discussion: Based on this experience the authors recommend the use of the 6-R portal in addition to the 3–4 portal in order to optimize ARIF of difficult DRF especially those with centrally impacted articular fragment.

10.1177/1753193409106449

A0365 WRIST ARTHROSCOPY – A TEN YEAR EXPERIENCE AT A SINGLE CENTRE

S. Mukhtar, A. Latif, J. Leckenby, T. Colegate-Stone, A. Tavakkolizadeh, J. Compson

Department of Trauma and Orthopaedic Surgery, Kings College Hospital, Denmark Hill, London, SE5 9RS, UK

Introduction: We reviewed all wrist arthroscopies conducted in a single centre by a single surgeon over a ten-year period.

Methods: A retrospective review of medical notes was done for cases operated on during 1997 to 2004. From 2004 to 2007, information was collected prospectively on a wrist arthroscopy database set up in 2004. Data collected included patient demographics, previous injuries or surgery, symptoms, operative procedure carried out, pre-operative clinical diagnosis, MRI diagnosis and intra-operative arthroscopic findings.

Results: In a ten-year period 305 arthroscopies were performed. 27 medical notes were missing and these were excluded from analysis. Of the 279 patients, 44% were male and 56% female. Mean age was 42 years (11–69). Right side was affected in 58%. The documented occupation suggested that 72% of patients were in social class II and III. 80% of patients presented with pain with smaller number with stiffness and instability. Only 31% of patients had a history of previous injury and 34% of cases had previous surgery. The number of wrist arthroscopies carried out rose in a decade increasing to 39 per year in 2006.

65% of recorded pre-operative clinical diagnoses agreed with arthroscopic findings (51/78 cases). Only 50% of the 46 MRI-led diagnoses agreed with arthroscopic findings.

All the various pathologies and their grading were analysed as well as the procedures performed for each subgroup.

Discussion: This review demonstrates the changing patterns of a single surgeon's wrist arthroscopy workload and key features include:

- The growing use of wrist arthroscopy
- Poor correlation of MRI and intra-operative findings
- Pain significant as a symptom for underlying disease
- Largest group were people in social class II/III
- The spectrum of pathologies and specific procedures performed are discussed

10.1177/1753193409106112

A0251 CLINICAL RESULTS OF ARTHROSCOPIC SYNOVIALECTOMY OF THE WRIST

M. Massarella, S.D. Poggi

University of Perugia, Hand Surgery Unit, Italy

Synovitis of the wrist is not a common disease, and can be found without affecting the tendons, and at times occurs as the only sign of a monoarthritis.

We have treated this condition with arthroscopic synovialectomy to preserve the function of the joint as much as possible.

Our clinical study was to evaluate the results after this procedure concerning relief of pain, function and progression of the disease.

Between 2000 and 2008 we treated 25 patients (18 female, 7 male) follow up 1 year to 5 years, average age 45 years, the results were evaluated according to Mayo modified wrist score pain, function, motion, grip strength related to the controlateral side.

The patients' subjective evaluations were taken.

Wrist motion improved in all patients, most patients reported less pain after surgery, two patients still have dorsal pain of the wrist.

Conclusion: Arthroscopic synovialectomy of the wrist reduces pain and improves wrist motion.

10.1177/1753193409106111

A0191 ULNAR SHORTENING OSTEOTOMY USING A SYNTHES COMPRESSOR APPARATUS

L.G. Warhold, N.L. Jenkins

Dartmouth Hitchcock Medical Center, Dartmouth Medical School, University of Massachusetts Medical Center, USA

Ulnar shortening osteotomy is indicated for the management of symptomatic ulnocarpal impaction syndrome in those patients who fail conservative modalities or those who are unable to avoid aggravating maneuvers. Commercial plates and cutting jigs are available to assist with ulnar shortening osteotomy for ulnocarpal impaction syndrome. These devices are not always available and it is not clear that their expense is justified. The authors presents our unique technique of ulnar shortening osteotomy using freehand cuts and a small Synthes compressor devise(394.06 - Synthes USA, Paoli, PA) to control and compress the osteotomy site. This reusable compressor devise maintains compression and stability of the osteotomy until it is fixed with a standard dynamic compression plate. The equipment used in this technique is commonly present in most

operating rooms. This procedure greatly enhances the technical ease and opposition of the proximal and distal ends of the osteotomized ulna while minimizing the need for costly jigs and specialized compression plates. The cost benefits of this procedure will be described.

10.1177/1753193409106450

**A0023 COMPUTED TOMOGRAPHIC
ASSESSMENT OF REDUCTION OF THE DISTAL
RADIOULNAR JOINT BY GRADUAL
LENGTHENING OF THE RADIUS**

H.S. Gong, M.S. Chung, G.H. Baek, S.T. Kwon,
S.H. Rhee, H.S. Park

*Department of Orthopedic Surgery, Seoul National
University College of Medicine, Seoul, Korea*

Purpose: The authors assessed congruency of the distal radioulnar joint by computed tomography after gradual lengthening of the radius in patients with considerable ulnar positive variance and dislocation of the distal radioulnar joint.

Methods: Six patients of mean age 25 years were treated by radial osteotomy and subsequent gradual lengthening using either a single-rod or a half-ring external fixator, which was applied for a mean period of 81 days. Patients had a mean ulnar positive variance of 12 (range 10–17) mm and chronic distal or dorsal dislocation of the ulnar head. The causes of deformity were distal radial epiphyseal injury in four, malunion of a radius shaft fracture in one, and Madelung deformity in one.

Results: Computed tomography scans taken at one year postoperatively demonstrated that all patients had a congruent distal radioulnar joint. All patients achieved symptom and radiographic parameter improvements at a mean follow-up of 40 months. One of the chief disadvantages was unattractive scars on a cosmetically important surface of the forearm.

Conclusion: Given a relatively intact bony contour of the distal radioulnar joint, congruent reduction of the distal radioulnar joint can be obtained by gradual lengthening of the radius.

10.1177/1753193409106451

SESSION 8: THUMB

A0081	THE VALUE OF STRENGTH MEASUREMENTS TO PREDICT THE OUTCOMES OF DAILY FUNCTION IN PRIMARY CARPOMETACARPAL OSTEOARTHRITIS-I S. Brink, P. Houpt, C.H. Emmelot <i>(The Netherlands)</i>	42
A0189	ARTHROSCOPIC INTERPOSITION ARTHROPLASTY OF THE THUMB CMC JOINT T.K. Cobb, P. Sterbank	42
A0017	ARTHROSCOPIC SURGERY FOR BASAL JOINT ARTHRITIS AND INSTABILITY J.-T. Shih <i>(Taiwan, ROC)</i>	42
A0370	DOUBLE OSTEOTOMY FOR TREATMENT OF EARLY CMC I JOINT ARTHRITIS J.F. Goubau, P. Ackerman, P.V. Hoonacker, B. Berghs <i>(Belgium)</i>	43
A0354	PATIENT REPORTED OUTCOME AFTER THUMB CMC JOINT REPLACEMENT WITH THE ARPE PROSTHESIS A. Gal, C.K. Sivaji, G.J. Packer <i>(United Kingdom)</i>	43
A0305	FAILURE OF TRAPEZIOMETACARPAL PROSTHESIS TREATED WITH PYROCARBON IMPLANT INTERPOSITION P12 P. Bellemère, J.P. Péquignot, M. Genestet, E. Gaisne, A. Berthe <i>(France)</i>	44
A0169	COMPARISON OF BIOREPLACEABLE JOINT PROSTHESIS WITH TRAPEZIECTOMY AND ABLP ARTHROPLASTY IN THE TREATMENT OF THE OSTEOARTHROSIS AT THE CMCJ LEVEL. A RANDOMISED PARALLEL GROUPS STUDY IN ADULT SUBJECTS A.L. Acciaro, N.D. Rosa, A. Marcuzzi, A. Landi <i>(Italy)</i>	44
A0187	LONG TERM PROSPECTIVE STUDY OF 35 TRAPEZIECTOMY-LIGAMENOTOPLASTY USING THE ENTIRE FCR T. Dubert, A. Petrea <i>(France)</i>	45
A0057	VOLAR PLATE REINFORCING TECHNIQUE FOR CHRONIC VOLAR INSTABILITY OF THE METACARPOPHALANGEAL JOINT OF THE THUMB J.P. Kim, J.S. Lee, B.K. Min <i>(South Korea)</i>	45
A0013	RESULTS OF RESECTION-INTERPOSITION-ARTHROPLASTY OF THE STT-JOINT IN CASES OF ISOLATED OSTEOARTHRITIS OF STT-JOINT M. Richter, P. Brueser <i>(Germany)</i>	46

A0134 OUR EXPERIENCE IN TREATING ISOLATED SCAPHOTRAPEZIUM ARTHRITIS
USING A PYROCARBON IMPLANT (A STUDY OF TWELVE CASES WITH A MEAN
2.5 YEARS OF FOLLOW-UP)
C. Sartorius, F. Montanier
(France)

46

A0081 THE VALUE OF STRENGTH MEASUREMENTS TO PREDICT THE OUTCOMES OF DAILY FUNCTION IN PRIMARY CARPOMETACARPAL OSTEOARTHRITIS-I

S. Brink, P. Houpt, C.H. Emmelot
Hand Centre, Isala klinieken, Zwolle, The Netherlands

Background: Assessing grip and pinch strength are common procedures to record recovery after surgery in Carpometacarpal Osteoarthritis-I (CMC-I arthritis) patients. To attach importance to functioning by measuring abilities is common practice more and more in hand rehabilitation nowadays. It is an interesting question as to what extent strength measurements predict functional outcome.

Aims: The aim of the study is to determine the correlation between strength measurements and the improvement of functioning in the treatment of CMC-I arthritis of the thumb.

Methods: Patients diagnosed with CMC-I arthritis, Eaton & Glickel's stage II and III, were included in this study. Prior to surgery, 3 and 12 months post-operatively patients completed the Patient Rated Wrist/Hand Evaluation. Grip strength and two-, three- point pinch and key pinch (E-link device) were recorded as well. The Pearson's correlation was used to determine correlations between the questionnaires and strength measurements.

Results: 25 females, mean age 59 years (± 8) were included in this study. 75 completed questionnaires and strength measurements were obtained. Moderately correlations between PRW/HE and grip strength ($r = -0.536$, $p < 0.001$), and PRW/HE and two point pinch ($r = -0.602$, $p < 0.001$) were measured. Poor correlations between PRW/HE and three point pinch ($r = -0.437$, $p = 0.001$), and PRW/HE and key pinch ($r = -0.423$, $p < 0.001$) were determined.

Conclusion: Although there are arguments to measure strength in CMC1 osteoarthritis of the thumb, it is important to realize that strength measurements gives minimal information about the function of the hand in patients with CMC-I osteoarthritis. Results of surgical intervention should be assessed by modern clinimetric measurements.

10.1177/1753193409106030

A0189 ARTHROSCOPIC INTERPOSITION ARTHROPLASTY OF THE THUMB CMC JOINT

T.K. Cobb, P. Sterbank
Orthopaedic Specialists

Introduction: The purpose of this study was to evaluate outcome of arthroscopic interposition arthroplasty of thumb CMC joint.

Methods: 50 cases of arthroscopic interposition arthroplasty of thumb CMC joint were performed by a single surgeon. Key and chuck pinch, grip, range of motion, pain scale, and DASH were evaluated pre and post-operatively at week 1, 4, 12, 26, 52, and 104.

Results: There were 37 females and 13 males. Average follow-up was 543 days. Average age was 57 (range 42–71). Average preoperative findings included 9 pounds for key pinch, 7 pounds for chuck pinch, 10 pounds for grip and 47 for DASH. Postoperative findings at each aforementioned time interval included key pinch 2, 4, 7, 9, 12 and 12 pounds; chuck pinch 3, 4, 8, 9, 12 and 13 pounds; grip strength 17, 29, 43, 44, 50 and 57; DASH 24, 27, 15, 19 and 13. The percent of patients who could oppose the thumb to the base of the small finger was 29% at 1 week, 73% at 4 weeks, 91% at 12 weeks and 100% at 26 weeks. Satisfaction at final follow-up, of those not revised, was rated as very satisfied in 87%, moderately satisfied in 13%, and zero dissatisfied. There were 3 failures requiring re-operation.

Conclusion: Our data demonstrates very rapid recovery following arthroscopic interposition arthroplasty of the thumb CMC joint with high patient satisfaction.

10.1177/1753193409106036

A0017 ARTHROSCOPIC SURGERY FOR BASAL JOINT ARTHRITIS AND INSTABILITY

J.-T. Shih
Department of Orthopaedic Surgery, Taoyuan Armed Forces General Hospital, Taiwan, ROC

Basal joint arthritis and instability of thumb is a common problem encountered by hand surgeons. Traditionally, surgical approaches have included arthrodesis, trapeziectomy or tendon reconstructive and arthroplasty procedure. Recently, arthroscopic techniques have brought new alternatives for diagnosis and treatment of this condition. From 2003 Jun. to 2006 Jun., there were 24 patients with Eaton's stages I to III symptomatic basal joint arthritis underwent arthroscopic debridement of basal joint, partial trapezectomy, tendon interposition using the palmaris longus tendon, and thermal shrinkage over the volar ligament and capsule. All patients were followed-up on average for 20.4 months and assessed with pinch strength, Mayo evaluation score both pre- and post- operation. According to the MAYO score, there were 12 excellent results, 9 good, and 3 fair. No complications occurred.

Treatment of the painful, unstable and arthritic thumb basal joint has received relatively little attention. In this study some were previously treated by other physicians and were initially misdiagnosed with a condition other than basal joint instability. The results of this study, with 21 of 24 cases having good or excellent results at up to 4 years after surgery, confirm the same conclusions of Eaton and Littler's ligament reconstruction and resection arthroplasty. The use of electrothermal shrinkage techniques for basal joint laxity has obvious appeal. Arthroscopic surgery of basal joint with resection and electrothermal methods could enable patients with early stage instability and arthritis to be treated with minimal complications. Outcomes from this study reveal that this procedure with proper indications gives a valid option for the treatment of basal joint arthritis of thumb.

10.1177/1753193409106028

A0370 DOUBLE OSTEOTOMY FOR TREATMENT OF EARLY CMC I JOINT ARTHRITIS

J.F. Goubau, P. Ackerman, P.V. Hoonacker, B. Berghs
*AZ St Jan AV, Department of Orthopaedics and trauma,
Upper Limb Unit, Ruddershove 10, B-8000 Brugge, Belgium*

Rhizarthropathy is an invalidating condition long before radiological changes appear. Treatment is often conservative and tries to diminish the symptoms and concomitant functional impairment. Unfortunately, an unstable base of the first metacarpal combined with a dysplastic trapezium, often resists conservative treatment, due to its dynamic feature. The fundamental problem is instability and function tempts to increase the symptomatology. Moreover, most of the patients are young and demanding. Surgical treatment options are relatively classic, starting with a ligamentoplasty of the base of the first metacarpal (Eaton Littler type) or (eventually followed by) arthrodesis of the trapezometacarpal joint for ineffective ligamentoplasty or osteoarthritis of the joint. Other options are less or not valid due to their incapacity to withstand the forces applied by a demanding type of patient. (Pelligrini-Burton, Weilby, ...) The idea arose around the millennium change to combine two techniques described previously. In 1973, Wilson published his technique of abduction osteotomy of the first metacarpal as a treatment for rhizarthritis. A wedge removed at the proximal metaphysis of the first metacarpal in order to put it in abduction improved the symptomatology and decreased the radiological deterioration of the rhizarthrosis. In 2002, Kapandji and Heim published their opening wedge osteotomy of the trapezium in order to correct the slope

of a dysplastic trapezium. This technique tried to improve the dysplasia of the lateral rim of the trapezium. Drawback was the closing of the first web with this technique. The combination of both of these techniques avoids the closing of the first web by performing an abduction osteotomy of the first metacarpal. Moreover, the opening wedge osteotomy corrects the dysplastic lateral rim of the trapezium by correcting its slope. The removed wedge at the metacarpal level is then inserted in an anterolateral fashion in the trapezium to achieve this. We have been performing this technique since 2001 in 20 patients. The midterm results are encouraging in normal to pre arthrotic trapeziometacarpal joints. The described technique has the advantage of preserving the trapeziometacarpal joint. It is far easier to perform than other described techniques of vascularised rotation of the articular trapezometacarpal complex. Moreover, it leaves the gate open for other techniques if it eventually should fail in the long term.

10.1177/1753193409106039

A0354 PATIENT REPORTED OUTCOME AFTER THUMB CMC JOINT REPLACEMENT WITH THE ARPE PROSTHESIS

A. Gal, C.K. Sivaji, G.J. Packer
*Division of Hand Surgery, Orthopaedic Department,
Southend University Hospital, United Kingdom*

Aim of the study: Basal joint osteoarthritis is one of the most frequent problems in Hand Surgery. If it has to come to operative treatment some form of trapeziectomy with or without ligament reconstruction is still considered to be the most popular first choice all over the world. It certainly has got a long history, and at present there is no all-convincing evidence of superiority of any alternative surgical techniques. On the theoretical basis joint replacement could offer preservation of the length of the thumb, the better biomechanical constraint of a joint replacement, better strength, more ROM and higher patient satisfaction. A prospective randomized trial comparing trapeziectomy and joint replacement could provide evidence, but one faces ethical and practical difficulties to run such a study. That may be the reason why we do not have the benefit of such a study yet. We would like to share our surgical experience, and more importantly our patients' self-reported experience with the ARPE prosthesis. These data may well be helpful to conduct further studies in this field aiming to provide further evidence to guide our future practice.

Materials and methods: Between the years of 1999 and 2007 95 ARPE prostheses were implanted to 79 patients

(16 bilateral cases). Mean follow up period was 4.5 years (1.5–9). Follow up consisted of clinical examination, measurement of grip and pinch, ROM, and radiological imaging and analysis. Patients were asked to fill in a retrospective quick DASH and PEM (Patient Evaluation Measure) questionnaires.

Results: 88 ARPE prostheses have survived. ROM and grip strength was similar to the reported values in trapeziectomy elsewhere. Long term pain relief has been enjoyed by all of our patients including those who underwent to revision to partial trapeziectomy and PL interposition grafting as a salvage procedure (7 patients). A further 3 patients had radiological failure (dislocation), but refused to have revision surgery! Patient-reported outcome was favourable even in cases of chronically dislocated or revised prostheses. Questionnaire results will be analysed and discussed focusing on different fields of measurement.

Conclusion: We report some data supporting the theory that joint replacement in basal joint osteoarthritis can provide comparable outcome to trapeziectomy. New observation is, that even cases which would traditionally be considered to be treatment failures are frequently reported as acceptable in patient reported outcome measures. These findings could encourage further research in this area, and maybe more of our colleagues would to consider joint replacement as a treatment option for basal joint osteoarthritis of the thumb in the future.

10.1177/1753193409106038

A0305 FAILURE OF TRAPEZIOMETACARPAL PROSTHESIS TREATED WITH PYROCARBON IMPLANT INTERPOSITION PI2

P. Bellemère¹, J.P. Péquignot², M. Genestet¹, E. Gaisne¹, A. Berthe²

¹Nantes Assistance Main, Clinique Jeanne d'Arc, Nantes, France

²Institut Niçois de Chirurgie de la Main, Nice, France

Background: Failure rate of trapeziometacarpal (TM) prosthesis goes from 1.6% to 37.8% in the literature. Revision procedures for salvage are rarely detailed.

Aim: To present a new revision surgery with a Pyrocarbon implant interposition Pi2 in a retrospective series of 18 cases.

Material and method: 18 failures of total TM prosthesis underwent a revision procedure in 16 patients (15 female and 1 male) with a mean age of 61 years (range: 36 to 73). The mean delay from the first procedure was 32 months (range: 9 to 72).

Surgery has included, total prosthesis removal, total trapeziectomy, partial trapezioidectomy, metacarpal bone reconstruction, interposition of an ovoid shaped pyrocarbon implant and ligamentoplasty.

The average follow-up after the revision surgery was 39 months (range: 13 to 66). For 6 patients the follow-up reached more than 5 years.

Mobility and strength of the thumb were tested. Pain and function were evaluated with 2 autoquestionnaires, PRWE and quickDash. Radiological evaluation has been performed.

Results: One patient was reoperated on after 2 months due to a subluxation of the implant.

For the other patients, no major complication occurred. Pain level ranged from 0 to 4 on a VAS. Mobility of the thumb was rather equivalent to the contralateral side as well as the average strength which was 3.84 kg (range: 2.2 to 6.5) for the key pinch and 16.47 kg (range: 7 to 34) for the grasp. The mean score of the PRWE was 57.9 (range: 29 to 108) and the quickDash was 26 (range: 5 to 48).

X rays evaluation has showed that the implant was well tolerated.

Conclusion: We believe that Pyrocarbon implant interposition Pi2 is a reliable salvage procedure for failed TM prosthesis at 3 year follow up. This interposition allows conservation of the thumb length and is completely free without any fixation to the bone and the soft tissues. For these reasons and because of the mechanical properties of the implant, we can expect good further tolerance and results.

10.1177/1753193409106037

A0169 COMPARISON OF BIOREPLACEABLE JOINT PROSTHESIS WITH TRAPEZIECTOMY AND ABLP ARTHROPLASTY IN THE TREATMENT OF THE OSTEOARTHROSIS AT THE CMCJ LEVEL. A RANDOMISED PARALLEL GROUPS STUDY IN ADULT SUBJECTS

A.L. Acciaro, N.D. Rosa, A. Marcuzzi, A. Landi
Operative Unit of Hand Surgery and Microsurgery, Azienda Ospedaliera Policlinico di Modena, Italy

Our Unit has participated in a European project, coordinated from Tampere University, Finland, regarding new “biodegradable” prosthesis.

The investigational bioreplaceable joint prosthesis consists in porous, fibrous spacer (scaffold), made of L and D lactic acid copolymers with L,D-monomer ratio 96 to 4 (PLDLA).

The primary aim of this study is to compare the new biodegradable "scaffold" in osteoarthritis subjects at the CMCj level to the patients treated with trapeziectomy and arthroplasty with ABLP tendon. The secondary aim is to estimate (follow-up 5 years) the performance and the life of these scaffolds.

The study had been carried out as a randomised, multi-centre parallel groups study with two treatment groups. The surgical technique for the implantation of the "scaffold" has been performed by our personal technique: mini-incision at the CMCj level, trapeziectomy and positioning of the prosthesis stabilizing with a bone anchoring device to the distal pole of the scaphoid and distally to the base of the first metacarpal by a double suture.

The Aa have performed 42 trapeziectomies, from November 2004 to June 2006, adding the scaffolds in 25 cases, according to personal surgical technique, and the AbPL arthroplasty in the 17 cases of the controlled group.

Currently the preliminary results in a groups of 20 patients have shown a significative improvement of the results in the "scaffold group" compared to the control group (Jamar test of 35%, pinch test of 16%, Kapandji test of 12%). In the VAS scale the impairment of the perceived pain has been of 70% in the scaffold group compared to 40% of control.

The preliminary report shows encouraging outcome studies, presenting better results to the controlled group. However, because of the incomplete controlled cases and follow-up it is necessary to wait up to the end of the study for reasonable results.

10.1177/1753193409106035

A0187 LONG TERM PROSPECTIVE STUDY OF 35 TRAPEZIECTOMY-LIGAMENOTOPLASTY USING THE ENTIRE FCR

T. Dubert, A. Petrea

Clinique La Francilienne, 16, av de l'Hôtel de Ville, 77340 Pontault-Combault, France

Harvesting the entire Flexor Carpi Radialis tendon (FCR) is simple and provides substantial tissue for ligament interposition and ligamentoplasty. The objectives of this study were to evaluate the results after complete trapeziectomy and ligamentoplasty using the entire FCR after a mean 2.5 years follow-up (6 to 52 months).

In this prospective study we included 27 women and 3 men aged 66 on average (53 to 80). Five cases were operated on both sides so 35 thumbs were included.

Preoperative osteoarthritis was staged 4 (Dell classification) in 25 cases. Evaluation of the results were evaluated in 30 patients (35 thumbs) on self-assessment, clinical measurements and relational measurements, with particular attention to postoperative wrist ulnar deviation.

Regarding self-assessment, the DASH score was 51 on average (27 to 84) preoperatively, and 23 (0 to 82) postoperatively. Regarding clinical findings, we did not record any deviation of the wrist after 6 months. On average, pinch strength improved from 3 to 5 kg, antepulsion improved from 30° to 57°, abduction from 25° to 54°. Metacarpophalangeal extension instability was unchanged. Thumb opposition (Bourrel angle) was diminished (32° to 17°). The patients returned to their previous occupations at a lower level in 3 (11%), at the same level in 9 (26%), at a higher level in 17 (60%).

In conclusion, we consider that harvesting the entire FCR tendon yielded satisfactory results on self-assessment, clinical and relational points of view.

10.1177/1753193409106032

A0057 VOLAR PLATE REINFORCING TECHNIQUE FOR CHRONIC VOLAR INSTABILITY OF THE METACARPOPHALANGEAL JOINT OF THE THUMB

J.P. Kim, J.S. Lee, B.K. Min

Department of Orthopaedic Surgery, Dankook University College of Medicine, Cheonan, South Korea

Department of Orthopaedic Surgery, Chung Ang University College of Medicine, Seoul, South Korea

Purpose: To describe a surgical technique for chronic volar instability of the metacarpophalangeal (MCP) joint of the thumb by using reinforcing free tendon grafts passed through two holes at the base of the proximal phalanx and through a single hole in the metacarpal neck. The results of this technique will be demonstrated by a retrospective review.

Methods: Seventeen consecutive patients who underwent volar plate reinforcement using a palmaris longus free tendon graft were enrolled. There were 11 males and 6 females, with an average age of 39 years (range, 16–56 years). The mechanisms of instability were hyperextension injury in 15 patients and generalized laxity in 2 patients. Preoperative and postoperative evaluation, with measurements taken by independent evaluators, included clinical examination (physical examination, radiographs, strength testing) and standardized outcome parameters (DASH, MHQ).

Results: Ten patients who had combined subsesamoid arthritis underwent the procedure after sesamoid

excision. The mean follow-up time was 22 months (range, 12–37 months). The mean grip strength and pinch strength significantly improved from 46.9% and 48.4%, respectively, of the value of the unoperated hand, preoperatively, to 82.7% and 87.4% of that of the unoperated hand, postoperatively. The mean range of motion of the MCP joint was $-0.5/56.7$ degrees. The mean DASH score significantly improved from 54.7 (range, 22–60), preoperatively, to 21.7 (range, 5–37), postoperatively. Mean MHQ scores, except for the aesthetic scale, showed improvement over preoperative scores. Assessment of overall patient satisfaction showed 10 excellent results, 5 good results, 1 fair result, and 1 poor result.

Summary: *Although long-term follow-up is warranted to determine the results, follow-up patients who have undergone surgery demonstrate good pain relief and function.

*Early clinical results suggest that the described procedure is a viable option for surgical treatment of chronic volar instability of the MCP joint of the thumb.

10.1177/1753193409106029

A0013 RESULTS OF RESECTION-INTERPOSITION-ARTHROPLASTY OF THE STT-JOINT IN CASES OF ISOLATED OSTEOARTHRITIS OF STT-JOINT

M. Richter, P. Brueser

Hand-, Plastic and Reconstructive Surgery, Malteser-Hospital Bonn-Rhein/Sieg, Germany

In cases of isolated STT-joint osteoarthritis most authors recommend STT-fusion.

Concerning the results of STT-fusion there are several papers dealing with this subject to date.

Restriction of wrist movement to at least 65% compared to the unaffected hand and a decrease of grip strength to 74% may be expected. Furthermore, there were reports about secondary osteoarthritis in the long term.

As an alternative treatment option we present a resectional arthroplasty of the STT-joint with interposition of a capsular flap. The results of 11 patients with a median follow-up of 106 month(13–141) are shown.

Range of motion of the wrist was on average $122^{\circ}(100^{\circ}-145^{\circ})$ which corresponds to 97% of the opposite hand. Similar good results were achieved for radial and ulnar abduction and the mobility of the CMC joint of the thumb.

Powergrip strength was 92% (median) and pulp- and key pinch strength was 100% of the unaffected hand. In 7 out of 11 the dominant hand was affected.

None of the patients complained about wrist pain without load. Only 3 patients complained about pain under load. 2 of them only referred to mild pain under heavy load (VAS 10 points). The worst result was the third one with 28 VAS-points under load. The other 8 patients were painfree.

Compared to the results of STT-fusion STT-resectional arthroplasty seems to be superior and is a useful treatment option in isolated STT-osteoarthritis.

10.1177/1753193409106040

A0134 OUR EXPERIENCE IN TREATING ISOLATED SCAPHOTRAPEZIUM ARTHRITIS USING A PYROCARBON IMPLANT (A STUDY OF TWELVE CASES WITH A MEAN 2.5 YEARS OF FOLLOW-UP)

C. Sartorius, F. Montanier

Centre De La Main - 18, Boulevard Jean Pain - F - 38000 Grenoble, France

Treating isolated scaphotrapezium osteoarthritis remains a true therapeutic challenge.

Scaphotrapezium-trapezoidal arthrodesis, after which often pronounced stiffness of the previously mobile wrist appears, remains rare.

Good results have also been obtained with excision of the distal part of the scaphoid bone, a simple and probably very effective treatment.

Since 2004, pyrocarbon implant arthroplasty has provided good results and provides interposition that corrects scapholunate displacement. The simple scaphotrapezium implant is closely adapted to the morphology of the proximal side of the trapezium, which provides good primary stability. Nevertheless, its implantation remains delicate because the cutting plane on the scaphoid must be highly rigorous. Postoperative care is simple, with no real immobilization.

Our preliminary results, although with a limited number of cases but with more than 3 years of follow-up in 6 cases out of 12, in one case longer than 5 years, are highly promising, notably in terms of pain reduction and good range of motion and force recovery.

Radiological monitoring shows no implant instability, but often a small notch appears at the foot of the capitulum.

The quality of our preliminary results has encouraged us to continue using this technique provided that these precise indications and a meticulous technique are respected.

10.1177/1753193409106031

SESSION 9: COMBINED FESSH-EFSHT SESSION: REHABILITATION

A0346	DYNAMIC PROPRIOCEPTION IN SHOULDER INSTABILITY P. Ogrodowicz, M. Wojtaszek, P. Lubiowski, L. Romanowski (<i>Poland</i>)	49
A0262	HAND THERAPIST LED WRIST INJURY ASSESSMENT CLINICS G. McArthur, F. Sandford, G. Branstiter, M. James (<i>UK</i>)	49
A0105	EFFECTIVENESS OF SPLINTING AFTER RELEASE OF DUPUYTREN'S CONTRACTURE: A RCT M.A. Kemler, A.K.J. Ahmed, J. van Loon, P. Houpt (<i>The Netherlands</i>)	50
A0341	REHABILITATION PROTOCOLS FOR MP ARTHROPLASTIES; ADJUSTMENTS AFTER OUTCOME S. Knijnenburg-Janse, G. Westdorp, H. Dommissie-Verburg, A.R. Schreuders, M.V. van Wensen, B. de Craene-Wauters, J. de Jager, H.P. van Not (<i>The Netherlands</i>)	50
A0101	TIME, STRENGTH AND SPATIAL COORDINATION CONDITIONS OF THE PROCESSES OF UPPER EXTREMITY CONTROL AND REGULATION IN PATIENTS WITH ACUTE PHASE OF RHEUMATOID ARTHRITIS J. Rojczyk-Chmarek, K. Gieremek, J. Cieslinska-Swider, M. Grygorowicz	51
A0294	THE REHABILITATION OF PATIENTS WITH DUPUYTREN'S CONTRACTURE A. Novikov (<i>Russia</i>)	52
A0368	ORGANIZATION OF CARE FOR PATIENTS NEEDING COMPLEX HAND SURGERY AND THERAPY IN A RURAL AREA H.P. van Not, S. Knijnenburg-Janse, G. Westdorp, T.A.R. Schreuders (<i>The Netherlands</i>)	52
A0248	AESTHETIC ASPECTS OF MINIMALLY INVASIVE AND ENDOSCOPIC SURGERY OF HAND AND FOREARM R. Hoffmann (<i>Germany</i>)	53
A0241	VIDEOTHERMOGRAPHY OF HAND FRACTURE PATIENTS; IMPLICATIONS FOR UNDERSTANDING POST-TRAUMATIC COLD INTOLERANCE E.S. Smits, T.H.J. Nijhuis, S.P. Niehof, H.J. Stam, R.W. Selles, S.E.R. Hovius (<i>The Netherlands</i>)	53

- A0315 EFFECT OF THE CARPAL TUNNEL DECOMPRESSION EXERCISE PROGRAM ON PREVENTION OF REPETITIVE TRAUMA DISORDER AND CARPAL TUNNEL SYNDROME. A PROSPECTIVE STUDY OF 250 MEATPACKERS 54
H. Seradge, W. Parker, C. Baer
(USA)
- A0245 REFLEX SYMPATHETIC DYSTROPHY OF UPPER EXTREMITY AS A CONSEQUENCE OF TRAUMA OR SURGERY. MANAGEMENT WITH INTRAVENOUS REGIONAL ANESTHESIA 54
L. Papatheodorou, S. Varitimidis, Z. Dailiana, L. Poultsides, A. Venouziou, K. Malizos
(Greece)
- A0009 INVESTIGATION ON THE RESIDUAL PAIN FOLLOWING THE DISTAL RADIUS FRACTURES 55
K.A. Siwicka, H. Mitsuguchi, H. Hirata
(Poland, Japan)

A0346 DYNAMIC PROPRIOCEPTION IN SHOULDER INSTABILITY

P. Ogrodowicz, M. Wojtaszek, P. Lubiowski, L. Romanowski

Department of Traumatology, Orthopaedics and Hand Surgery Poznan University of Medical Sciences, Poland

Proprioception is an important element of shoulder dynamic stability. It is supposed to be affected in case of capsule and labral injury of glenohumeral joint. The aim of this study was to evaluate influence of posttraumatic chronic shoulder instability on neuro-motoric shoulder control.

Material and methods: 16 patients 5 females and 11 males in average age of 23 (11–38) with posttraumatic shoulder instability were investigated in years 2005–2008 and compared to the control group of 10 healthy volunteers with no history of shoulder problem and normal shoulder function on examination. All patients were examined using computer controlled electronic goniometer. Active reproduction of joint position (ARJP) was measured in flexion, abduction, external and internal rotation in both shoulders.

Results: Comparison of results of measured angles between affected and non-affected shoulders within instability group did not show statistically significant differences.

However, most of the measured values of ARJP revealed significant deficiencies in affected shoulder when compared to healthy group. Interestingly enough deficiencies were also noted when comparing a non-affected shoulder in an instability group to healthy volunteers.

Reproduction angle

Abduction 90 IR 60 ER 45 Flexion 120

Instability group Affected $6.07 \pm 2.62^*$ $4.38 \pm 2.38^*$
 $5.03 \pm 2.46^*$ $4.94 \pm 2.18^*$

non affected $7.59 \pm 4.43^*$ $3.92 \pm 1.35^*$ 3.48 ± 1.85
 $5.23 \pm 3.23^*$

Healthy group 4.3 ± 3.03 2.86 ± 1.70 3.57 ± 2.05
 3.02 ± 1.29

* $p < 0.05$

Conclusions: A unilateral shoulder injury resulting in instability affects proprioception in both shoulders as demonstrated by active reproduction of joint position. In our study no differences were found when comparing affected and non-affected shoulders in an instability group.

10.1177/1753193409106116

A0262 HAND THERAPIST LED WRIST INJURY ASSESSMENT CLINICS

G. McArthur, F. Sandford, G. Branstiter, M. James
St. Thomas' Hospital, London, UK

Introduction: Carpal injuries are frequently ignored or misdiagnosed in the A&E department. This has three major implications.

1. Delayed recognition and intervention of carpal injuries may lead to long term disability. Patients may require more complex salvage procedures, than if treated at an earlier stage.

2. Subsequently some patients may not be able to return to their original occupations, with obvious cost implications to society.

3. Medico-legal costs of missed pathology or delays in recognition of injuries may be significant.

Therefore, we believe that early recognition and intervention of carpal injuries has obvious benefits.

St Thomas' Hospital is a large central London teaching hospital. 115,000 patients attended the main A&E department last year. All wrist injuries are initially assessed by the A&E staff. No pathways were previously established for the follow-up of wrist injuries without bony pathology on their initial x-rays. The exception to this was suspected scaphoid fractures which were followed up in the orthopaedic fracture clinic. The senior author noted that this led to a significant delay in patients reaching his out-patient clinic for definitive diagnosis and treatment. Most carpal injuries were diagnosed too late for simpler primary repair procedures to be performed. Therefore a hand therapist-led carpal injury assessment clinic was instigated to allow prompt recognition and facilitate early treatment.

Materials and methods: All patients with non-specific wrist injuries that were seen in the A&E department and discharged home were given an information leaflet. This gave some simple advice and if after 10 days they still had pain or weakness they were urged to contact the helpline for urgent assessment within a few days. Some patients were also referred directly by A&E staff into the wrist clinic.

The clinic was staffed by two senior hand therapists with an interest in wrist injuries. Full histories and complete wrist examinations were carried out including provocative and grip strength testing. All patients had their initial X-rays reviewed and had further investigations, including urgent CT or MRI scan, if deemed appropriate. Once a working diagnosis was made, the patients were fed directly into a consultant-led wrist clinic for urgent arthroscopic staging and surgical treatment. Lesser injuries were closely observed and given isometric exercises or a splint if required.

Results: Our data for the first 6 months showed that 56 patients had attended the clinic. 21 MRI's and three CT scans were performed.

We discovered significant treatable pathology in 23 cases. These included five TFCC injuries, four

scaphoid fractures, three scapholunate ligament injuries, two distal radius fractures, and one triquetral fracture. We will present all results for the first nine months of the running of the clinic and discuss the numbers of patients seen, the further investigations required, and the types of injuries encountered. We will also present the subsequent need for surgery and the patient outcomes. We would advocate the introduction of a similar system in other hospitals in the UK to try and reduce the costly sequelae of carpal injuries.

10.1177/1753193409106041

A0105 EFFECTIVENESS OF SPLINTING AFTER RELEASE OF DUPUYTREN'S CONTRACTURE: A RCT

M.A. Kemler, A.K.J. Ahmed, J. van Loon, P. Houpt
Martini Hospital, Groningen, The Netherlands
Academic Medical Center, Amsterdam, The Netherlands
Isala Clinics, Zwolle, The Netherlands

Object: To prevent recurrence of flexion contracture after operative treatment of Dupuytren's disease, it is generally accepted to apply splints postoperatively. The aim of this study was to assess the clinical effectiveness and possible adverse effects of splinting after release of Dupuytren's contracture.

Method: Prior to operative release of a Dupuytren's contracture, 36 patients with a flexion contracture of the proximal interphalangeal (PIP) joint of at least 30 degrees were randomized to receive either a 3-month splinting protocol together with hand therapy, or hand therapy alone. Therapy started ten days after partial fasciectomy when the wounds had healed and sutures were removed. In the splint group, a dorsal splint with Velcro straps was applied. Patients were requested to continue day and night splint use for at least 3 months and to practice finger flexion without the splint at least 5 times a day. Not applying this exact protocol was not a reason to exclude patients. Extension deficit of the PIP joint, the global perceived effect (on a scale from 1 <much worse> to 7 <much improved>), the intensity of pain (on a visual analogue scale from 0 cm <no pain> to 10 cm <very severe pain>), comfort (on a visual analogue scale from 0 cm <extreme uncomfortable> to 10 cm <extreme comfortable>) and complications were assessed at baseline and 2 weeks, 6 weeks, 3 months and one year thereafter.

Results: In an intention-to-treat analysis, the group assigned to receive the splint plus hand therapy had a mean reduction of 20 degrees of PIP flexion contracture at one year, as compared with 26 degrees in the group

assigned to receive hand therapy alone ($P=0.4$ for the comparison between the two groups). The mean score for comfort of the splint was 5.3. Also with regard to global perceived effect (both groups "improved"), pain intensity (2.4 vs 2.9; $P=0.6$) and the number of complications, there was no difference between the groups. At one year, however, a flexion deficit was noted in 7 (40%) splint patients versus 2 (10%) control patients ($P=0.05$).

Conclusion: After operative release of Dupuytren's contracture, a postoperative protocol of splint plus hand therapy does not outweigh hand therapy alone in preventing recurrence of flexion contracture. Splinting, however, does result in a higher percentage of flexion deficit.

10.1177/1753193409106095

A0341 REHABILITATION PROTOCOLS FOR MP ARTHROPLASTIES; ADJUSTMENTS AFTER OUTCOME

S. Knijnenburg-Janse¹, G. Westdorp¹, H. Dommisse-Verburg¹, A.R. Schreuders¹, M.V. van Wensen¹, B. de Craene-Wauters¹, J. de Jager¹, H.P. van Not²
¹*RGZ rehabilitation centre, Goes, the Netherlands*
²*Dept. of Plastic- and Reconstructive surgery, Vlissingen, The Netherlands*

Introduction: In 2006 we evaluated the results of pyrocarbon arthroplasties in the MP-joint for RA and OA patients. Based on these results we adjusted the indications for this procedure and our rehabilitation protocol. The adjustments in the rehabilitation protocol will be illustrated in two case studies.

Material and methods: Twelve patients (28 prostheses; 9 in OA, 19 in RA) were included: four male and eight female, average age 53 years (range 39–64). Operations were performed between February 2002 and February 2005 by one hand surgeon. The operation was followed by dynamic splinting for six weeks. All patients received specialized hand therapy. Measurements of range of motion (extension and flexion), ulnar deviation and pain on a visual analogue scale (0–10) were performed with a mean follow-up of 38 months (range 13–53 months). Adverse effects were scored. A questionnaire was used to determine patients' satisfaction.

Results: The postoperative total active range of motion was 43° in the OA patients (SD 20) and 31° in the RA patients (SD 23). Mean pain score was 2.2 (SD 1.9). Seven patients were satisfied with the results of the operation. Not all results were favourable and we saw: 5 luxations, 3 cases of pronounced ulnar deviation (>15°), 2 rotations, while 15 fingers (4 in OA, 11 in RA) had extension loss of more than 20°.

Learning from this experience two new rehabilitation protocols were developed (one for OA patients, one for RA patients) with emphasis on earlier active mobilisation in case of OA and emphasis on better protection against deviation and luxation in case of RA. The indications for this surgical procedure were also revised.

Case studies

First case: a 67 year old man received a pyrocarbon MP implant to the third joint 9 months after a severe sawing injury (amputation of the fourth and fifth digit, arthrodesis of the third MP-joint because of extensive damage to the joint and extensor tendon). The rehabilitation program started at day five with early active motion exercises and a splint with MP's and IP's in 0°. After two weeks the patient wore the splint only during the night. During daytime the third digit was buddy-taped to the second finger. Three months after surgery TAROM is 58° (19/77), pain score 0. The ulnar deviation is reduced from 22 (4 weeks post-op) to 12° by splinting and exercising.

Second case: a 68 year old man with RA. Indication for surgery was subluxation of MP II. Post-operative MP II/V were immobilized in plaster for four weeks in 0°, the IP's left free for active exercises. After 4 weeks the plaster was replaced by a removable splint and mobilizing exercises were started. Three months after surgery TAROM is 74° (8/82), pain score 1, no adverse effects. These preliminary results encourage us to continue to use these protocols. Continuous evaluation of surgical indications and outcomes is essential.

10.1177/1753193409106097

A0101 TIME, STRENGTH AND SPATIAL COORDINATION CONDITIONS OF THE PROCESSES OF UPPER EXTREMITY CONTROL AND REGULATION IN PATIENTS WITH ACUTE PHASE OF RHEUMATOID ARTHRITIS

J. Rojczyk-Chmarek¹, K. Gieremek², J. Cieslinska-Swider¹, M. Grygorowicz³

¹Academy of Physical Education in Katowice, Department of Nervous and Movement System Physiotherapy

²Academy of Physical Education in Katowice, Department of Physiotherapy Basics

³Higher Vocational State School in Pila, Institute of Health Protection, Department of Physiotherapy

Introduction: Rheumatoid arthritis (RA) is a chronic and progressing disease leading to a series of pathological changes. Due to the disease joint stiffness and subluxation, as well as muscle atrophy and contracture occur. Inflammatory and destructive changes in RA affect

also the nervous, vascular and muscular system, as well as the organ of sight. These issues have been widely described in previous researches. The authors of this study investigate how degenerative abnormalities occurring in RA patients affect their motor coordination abilities.

Aim of study: The aim of the study was to examine the movement abilities of the upper extremity in patients with acute phase of RA. Authors determined the influence of degenerative changes occurring in RA (in the hand and in the organ of sight) on the patients' motor performance, especially on the kinesthetic coordination skills and time and spatial orientation.

Material and methods: 33 persons participated in the study. 22 patients with RA (aged 56.66 ± 13.61 yrs, weight 69.47 ± 14.58 kg, height 166.28 ± 8.86 cm) of the rheumatology ward of the Wojewódzki Szpital Specjalistyczny nr 5 in Sosnowiec were included into the research group. Among the tested patients, 8 were in the 2nd phase and 14 in the 3rd stage of the disease, according to Steinbrocker's criteria. Medical interviews confirmed concomitant changes of the sight organ (episclera or sclera inflammation) in all patients. Control group comprised 11 healthy subjects (aged 48.81 ± 7.02 yrs, weight 73.27 ± 13.52 kg, height 171.54 ± 10.10 cm.) To diagnose the spatial orientation abilities and kinesthetic adjustment both groups were subjected to a series of 8 different motor tests. To evaluate the results a computer system "motoryk" was used. Different parameters were recorded, such as: test time, simple reaction time, distance from target, velocity of movement toward the target, distance and position reproduction, and task projection quality index. The W Shapiro-Wilks test, descriptive analysis, and *t* test were used in the statistical analysis. Statistica ver. 6.0 software was used in the study. The level of statistical significance was set at $p < 0.05$.

Results: The results confirmed statistical differences between the research group and the control group. Significantly longer test duration ($t = 1.26$ s) proved that RA patients perform the test slower when compared to the healthy subjects ($t = 0.91$ s.) Mean value of the task projection quality index was considerably greater in the RA patients ($I = -0.06$) than in the control group ($I = -0.18$.) The test proves that RA patients performed the task slower, but with more precision than the healthy subjects.

Conclusions: 1. Decreased physiological range of joint motion observed in RA patients does not influence the quality of the motor task projection of the upper extremity. 2. Pathological concomitant changes of the sight and movement organs in RA patients increase the time determinant of the regulation and control processes in the upper extremity movement.

3. In the aspect of the hand-eye coordination (a rapid hand movement towards a specific direction) RA patients act according to Fitts' psychomotor law, which says that the time of a motor task performance is determined by the distance and the size of the target area.

10.1177/1753193409106074

A0294 THE REHABILITATION OF PATIENTS WITH DUPUYTREN'S CONTRACTURE

A. Novikov

Research Institute of Traumatology and Orthopedics, Nizhny Novgorod, Russia

Introduction: An important number of patients with Dupuytren's contracture present complications. Immediate causes are operation characteristics and lack of general tactics of postoperative rehabilitation.

Aim: Development of a rehabilitation program for patients with Dupuytren's contracture.

Materials and methods: 107 patients with Dupuytren's contracture treated at rehabilitation department of Research Institute of Traumatology & Orthopedics. Contracture of the stage I had 14 patients (conservative treatment), stage II 19, stage III – 65, and stage IV – 9 (operative treatment).

The patients with Dupuytren's contracture of I stage treat conservative (physiotherapy, massage, splinting, drug therapy) twice a year.

The rehabilitation program of patients with Dupuytren's contracture of II-IV stage is four periods: pre-operative, immobilization, detachable splint and post-immobilization period.

On the basis of analysis of the literature and wide experience we arranged rehabilitation programs on the basis of operation character, concomitant disease and basic clinical symptoms. Basic components of these programs are: rational physiotherapy and kinesitherapy on original training device, training of hand muscles on device with biofeedback, reflex therapy, psychotherapy, drug therapy.

Average time rehabilitation – 32.0 ± 2.7 days. Value of rehabilitation effectiveness taking into consideration the dynamics of clinical symptoms, hand dysfunction, daily life activity, view of the patient on the result of rehabilitation.

Results: All patients with stage I contracture noted substantial improvement, but in 9 patients the pathological process grew progressively. Using these rehabilitation programs after operation has given excellent results in 46 patients, good – in 31, satisfactory – in 14 and poor – in 2.

Conclusion: Patients after operations for Dupuytren's contracture must be treated in a special rehabilitation department. Complex rehabilitation of these patients has allowed us to obtain good clinical results, improving daily life activities and preserving the ability to work.

10.1177/1753193409106096

A0368 ORGANIZATION OF CARE FOR PATIENTS NEEDING COMPLEX HAND SURGERY AND THERAPY IN A RURAL AREA

H.P. van Not¹, S. Knijnenburg-Janse², G. Westdorp², T.A.R. Schreuders²

¹*Dept. of Plastic- and Reconstructive surgery, Vlissingen, The Netherlands*

²*Rehabilitation Centre Zeeland (RGZ), Goes, The Netherlands*

Introduction: Complex hand surgery without appropriate specialized hand therapy yields poor results. Zeeland is a sparsely populated rural region in the Netherlands. In spite of this we are able to maintain a high standard of care for hand surgery patients. Complex hand rehabilitation is concentrated in one rehabilitation centre with specialized hand therapists. Additionally we have created a regional network with physiotherapists (PT's) and occupational therapists (OT's) trained and coached at the rehabilitation centre. The purpose of this paper is to show the organization and the additional value of a regional hand therapist network.

Geography: The Netherlands are known to be one of the most densely populated countries of the world with more than 16 million people living in an area of 41.500 km². However the province Zeeland has approximately 380.000 people living in an area of 3000 km² (212/km²) as opposed to i.e. the The Hague area, which has a population of 1225/km². In Zeeland there are three plastic surgeons who treat more than 90% of all hand surgery cases of the region in 3 hospitals. Hand Team Zeeland (HTZ) has been responsible for coordination and treatment of complex hand problems in the south western part of the Netherlands since 1998. The main rehabilitation centre is situated in the city of Goes, the geographical centre of Zeeland.

Workforce and training: In the rehabilitation centre 7 hand therapists and 2 rehabilitation doctors work for the HTZ. Between 2005 and the beginning of 2008 we have seen a rapid increase in new cases referred to our

institute from 100 to 288 per annum. To cope with this growth and to treat patients nearer to their homes, a regional network has been created throughout the province, consisting of nine physiotherapy clinics with 13 PT's and 1 OT. The training and coaching of these PT's and OT's was organized in seven training sessions of four hours at the rehabilitation centre with an additional internship. Therapy programs are partly performed by the regional therapists under supervision of the rehabilitation centre's therapists. The HTZ website (www.handenteam.nl) is the most important tool for communication and is up-dated with all new therapy protocols and relevant publications.

Conclusion: Regional training and coaching of PTs and OTs has proven to help in managing the increased numbers of patients referred for hand rehabilitation without compromising the quality of hand therapy. This regional network also reduced inconvenience caused by travelling for the patients.

10.1177/1753193409106098

A0248 AESTHETIC ASPECTS OF MINIMALLY INVASIVE AND ENDOSCOPIC SURGERY OF HAND AND FOREARM

R. Hoffmann

Institute Hand and Nerve Surgery Oldenburg, Germany

Hand Surgery is generally believed to be a column of Plastic Surgery. Yet aesthetic aspects are often neglected in this field. While in cosmetic surgery it is natural and obligatory to think carefully about the line of incision, in hand surgery surgeons mostly follow traditional thinking and are reluctant to improve their techniques.

Minimally invasive and endoscopic techniques have found their way into hand surgery and therefore small incisions and less obvious incisions are possible both in elective and traumatic cases.

We have found that using new and different incisions following the natural skin creases, the positive effect is not only aesthetic but functional as well.

In this paper we present our philosophy and practice with regard to minimizing scars and applying soft tissue endoscopic methods to hand and forearm with regard to carpal tunnel syndrome, cubital tunnel syndrome, pronator syndrome, Dupuytren's contracture, base of thumb arthritis, tennis elbow, metacarpal fractures, carpal surgery, flexor tendon surgery, tendon transfer and compartment syndrome.

10.1177/1753193409106115

A0241 VIDEOTHERMOGRAPHY OF HAND FRACTURE PATIENTS; IMPLICATIONS FOR UNDERSTANDING POST-TRAUMATIC COLD INTOLERANCE

E.S. Smits^{1,2}, T.H.J. Nijhuis^{1,2}, S.P. Niehof³, H.J. Stam³, R.W. Selles^{1,2}, S.E.R. Hovius¹

¹*Department of Plastic and Reconstructive Surgery, Erasmus MC, University Medical Center, Rotterdam, The Netherlands*

²*Department of Rehabilitation Medicine, Erasmus MC, University Medical Center, Rotterdam, The Netherlands*

³*Experimental Anaesthesiology, Erasmus MC, University Medical Center, Rotterdam, The Netherlands*

Introduction: Cold intolerance frequently occurs after a hand trauma, most probably due to secondary peripheral nerve injury cause by the trauma. Cold intolerance is defined as an abnormal cold pain sensation after exposure to mild or severe cold. While the pathophysiology of cold intolerance is unknown, it is often assumed that patients with cold intolerance have a disrupted thermoregulation of the hands and therefore are unable to compensate for a cold environment. To evaluate this, we cooled the hands of hand fracture patients with and without complaints of cold intolerance and measured the rewarming patterns with videothermography.

Methods: Thirteen control subjects and eighteen hand fracture patients participated in this study. Both hands were immersed for 90 seconds in water of 13°C. Rewarming at room temperature was registered with a computer-assisted infrared thermograph with a frame rate of 1 per second. Mean temperature readings of the fingertips were exported to matlab for further analysis. The start and stop of active (due to vasodilatation) re-warming for each finger was determined based on the second derivative of temperature in time. The total amount of heat (Q) added to the digits was calculated as the area under the temperature curve. In addition, the average re-warming per second (Q/s) was calculated for each finger.

Results: Nine fracture patients (50%) had abnormal cold intolerance based on the Cold Intolerance Severity Scale. The rewarming duration of the involved fingers (312 seconds) was not significantly different from the non-involved fingers (323 seconds). We found a decreased or absent active rewarming in one or more fingers in 3 of the controls (23%) and 6 of the patients (33%). We found no significant difference between the Q-values of the involved and non-involved hands in the patients and between patients and controls. Similarly, we found no significant differences in Q/s between involved and

uninvolved hand of the patients or between patients and controls.

Conclusion: The pathophysiology of post-traumatic cold intolerance is unknown, although it is often assumed to be related to a disturbed thermoregulation of the hands. However, this has only been studied in nerve injury patients, where indeed abnormal rewarming was found. In this study, we found abnormal rewarming in the hands of 6 of the 18 hand fracture patients. However, abnormal rewarming was also found in 3 of the 13 controls. We found no significant differences between patients and controls and no correlation between rewarming patterns and subjective scoring of cold intolerance in these patients. This finding indicates that cold intolerance may not be the result of abnormal thermoregulation in these patients, which may give important insight into the treatment options for cold intolerance in these patients and suggest that there may be an alternative cause for cold intolerance.

10.1177/1753193409106006

A0315 EFFECT OF THE CARPAL TUNNEL DECOMPRESSION EXERCISE PROGRAM ON PREVENTION OF REPETITIVE TRAUMA DISORDER AND CARPAL TUNNEL SYNDROME. A PROSPECTIVE STUDY OF 250 MEATPACKERS

H. Seradge, W. Parker, C. Baer
Orthopedic Institute, Oklahoma City, Oklahoma, USA

Question: Does the Carpal Tunnel Decompression Exercise Program (Exercise Program) reduce the incidence of repetitive trauma disorder (RTD) and Carpal Tunnel Syndrome (CTS)?

Background: 1. Specific exercises improve physical performance and reduce injury.

2. The incidence of RTD is higher in certain individuals with a reduced physical condition.

3. Decompression exercises reduce the intra-tunnel pressure in the general population and patients with CTS.

Method: All 250 employees of a meatpacking company participated in the Exercise Program. The program was mandatory. The exercises were done on the clock at the beginning of each shift. Workers were not allowed to start work without completing the Exercise Program. Total time required was 7 minutes per employee, per day. No other ergonomic improvements or changes in the work environment were implemented during the one year of this study. The authors were blind to the results and did not treat the employees of this corporation.

Results: The following information is from the company's official report to the Governor's Council on Safety Policies for the State of Oklahoma:

1. The incidence of RTD (7.25 workers per month) was reduced by 59%.

2. The incidence of upper limb RTD was reduced by 10% in the first 5 months and 18% by the end of the year.

3. The worker's compensation loss ratio improved from 13.89% to 11.61%.

4. The company reported a net financial gain from cost savings as a result of injury reduction versus cost of work time lost to the Exercise Program.

5. The incidence of CTS was reduced from 55 cases to 16 cases per year.

Conclusion: The Carpal Tunnel Decompression Exercise Program is effective in reducing the incidence of repetitive trauma syndrome and carpal tunnel syndrome.

10.1177/1753193409105959

A0245 REFLEX SYMPATHETIC DYSTROPHY OF UPPER EXTREMITY AS A CONSEQUENCE OF TRAUMA OR SURGERY. MANAGEMENT WITH INTRAVENOUS REGIONAL ANESTHESIA

L. Papatheodorou, S. Varitimidis, Z. Dailiana, L. Poultsides, A. Venouziou, K. Malizos
Department of Orthopaedic Surgery, University of Thessaly, Larissa, Greece

Background: Reflex Sympathetic Dystrophy (RSD) syndrome is a known complication after surgery or trauma to the upper extremity and difficult to treat.

Aim: Evaluation of intravenous regional anesthesia with xylocaine and methylprednisolone for the treatment of RSD of upper extremity.

Methods: In a 5-year period, one hundred and sixty-eight patients with RSD of upper extremity were treated with intravenous regional anesthesia. An average of 4.8 (3–6) intravenous regional anesthetic blocks was needed. Range of motion in the hand, two-point discrimination, grip strength and pain (with use of visual analogue scale –VAS) were evaluated in all patients. A score based on Zyluk's criteria was also obtained for each patient. Pain in the hand (100% of patients), deficit of finger flexion (82%) and temperature changes relative to the other hand (74%) were the most frequently observed and strongly expressed symptoms before initiation of treatment.

Results: After a mean follow-up period of 38 (10–68) months complete absence of pain was noted in 88% of

patients after treatment. 12% of patients rated their pain at 2–4 in a scale of 10 (VAS score). Total active motion increased from 119 to 210 degrees after treatment. Swelling of the hand or forearm subsided and the skin regained its normal color and the ability for wrinkling in 136 (81%) patients. Moderate hand swelling after use was reported by 17 (10%) patients. The swelling did not reduce the function of hand and disappeared with rest in several hours. No hand presented with atrophy. The symptoms of the acute phase of the syndrome were reversed.

Discussion/Conclusions: Early recognition and prompt initiation of treatment is very important for the course of the disease, as symptoms can be reversible when treatment starts early. Permanent results with a functional upper extremity and very satisfactory pain relief can be anticipated with intravenous regional anesthesia.

10.1177/1753193409106114

A0009 INVESTIGATION ON THE RESIDUAL PAIN FOLLOWING THE DISTAL RADIUS FRACTURES

K.A. Siwicka¹, H. Mitsuguchi², H. Hirata²

¹*Medical University of Gdansk, Department of Hand Surgery, Gdansk, Poland*

²*Nagoya University Graduate School of Medicine, Department of Hand Surgery, Nagoya, Japan*

Currently the treatment of distal radius fractures (DRF) concentrates on achieving a radiographically confirmed anatomical reduction. With the development of volar locking plates (VLP), the favorable reduced positions can be maintained without failure. Nevertheless, regardless of satisfactory outcomes verified by radiographs, many patients continue to complain of pain for an extended period of time following the injury.

The objective of this study was to investigate the predictors of the residual pain after DRF. Beginning in April 2005 over a 1-year period, at fifteen centers belonging to the Hand Frontier (a Japanese non-profit organization devoted to investigating on improvement of hand function), 241 patients with DRF were treated

using the VLP. “Hand20” (the patient-friendly, self administered questionnaire evaluating upper limb performance developed by Hand Frontier) was mailed to these patients for three times in 6 months intervals, beginning at 6 months after surgery. In addition, the distribution of the residual pain was assessed using the diagram of the hand. At the final follow-up radiographic parameters such as volar tilt (VT), radial inclination (RI) and ulnar variance (UV) were assessed as well.

Mean Hand20 scores for first, second and third test were 18.1, 11.7 and 14.0, respectively. (Maximum possible score – 200, zero represents an excellent outcome.) Thus the patients complained difficulty with performing works necessitating large forces, and with the movements requiring pronation or supination. In all three questionnaires, the incidence of the radial sided wrist pain was higher than that of the ulnar pain. In addition the ulnar pain was more likely to disappear over a period of time, contrary to the radial pain. Some patients experienced additional tenderness in the areas besides the wrist; however they assumed that these discomforts were also related to the fracture. The radiological assessment showed mostly favorable outcomes regarding the wrist alignment parameters.

Based on the questionnaire results, multiple regression analysis was conducted setting the pain assessed by visual analogue scale (VAS) (incorporated in Hand 20) as a dependent variable, and gender, age, injured hand, insurance type, total active motion (TAM), grip strength, duration of external fixation, fracture type, presence of an ulnar fracture, final VT, RI and UV, articular surface step-off, surgeon career and pain location as independent variables. Patients with poor TAM or diffuse pain complained of severe pain. Pain was also reported to be stronger in cases of articular surface step-off and radial sided pain involvement.

To date the triangular fibrocartilage complex has been the focus of the wrist pain source following DRF, but the present results showed that frequency and severity of pain were greater for the radial side than for the ulnar side, suggesting that the causes of pain are beyond the previously assumed range.

10.1177/1753193409106302

SESSION 10: RADIUS

A0218	<p>THE P.A.F. METHOD FOR DISTAL RADIUS FRACTURES ANALYSIS G. Herzberg, Y. Izem, M.A. Saati, F. Weppe, F. Plotard, G. Mezari <i>(France)</i></p>	58
A0220	<p>USEFULNESS OF THE VOLAR RADIAL PORTAL IN ARTHROSCOPIC RADIAL STYLOIDECTOMY G. Herzberg <i>(France)</i></p>	58
A0302	<p>LONG-TERM RESULTS OF UNSTABLE DISTAL RADIUS FRACTURES TREATED WITH CLOSED REDUCTION AND PINNING T. Husby, I. Hauksson, J. Hellund, L. Bjørnstad, L. Maurstad <i>(Norway)</i></p>	58
A0212	<p>SCREWS VERSUS PEGS – A BIOMECHANICAL STUDY OF THE FIXATION OF DISTAL RADIUS EXTENSION FRACTURES I. Mehling, D. Klitscher, L.P. Müller, A. Hrubesch, W. Sternstein, P.M. Rommens <i>(Germany)</i></p>	59
A0180	<p>EXPLOSION TYPE ARTICULAR DISTAL RADIUS FRACTURES: TECHNIQUE AND RESULTS OF VOLAR LOCKING PLATE UNDER DRY ARTHROSCOPIC GUIDANCE F. del Pinal, F. Garcia-Bernal, A. Studer, L. cagigal, H. Ayala, J. Regalado <i>(Spain)</i></p>	60
A0061	<p>FUNCTIONAL OUTCOMES AND COMPLICATIONS OF VOLAR DISTAL RADIUS LOCKED PLATES F. del Canto, M. Sanchez, V. de Diego, M. Gutierrez, F. Peñas <i>(Spain)</i></p>	60
A0269	<p>SHORT TERM OUTCOMES FOLLOWING FIXED-ANGLE DISTAL VOLAR RADIAL (DVR) LOCKING PLATING OF DISTAL RADIUS FRACTURES I. Ibrahim, S.Z. Naqui, G. Pendlebury, J.G. Warner <i>(UK)</i></p>	61
A0064	<p>DISTAL RADIUS DISPLACED FRACTURES TREATED USING “TRIMED” FIXATION SYSTEM H. Nicolaos, D. Antonopoulos, P. Kanellos, F. Giannoulis, I. Ignatiadis, S. Spyridonos N. Gerostathopoulos <i>(Greece)</i></p>	61
A0077	<p>PRELIMINARY RESULTS WITH MICRONAL™, INTRAMEDULLARY FIXATION OF DISTAL RADIUS FRACTURES S. Olesen, M.S. Skjaerbaek, A. Hoegh. R.-J. Leusink <i>(Denmark)</i></p>	62
A0306	<p>DISTAL RADIUS OSTEOTOMY IN MALCONSOLIDATED FRACTURES WITH VOLAR PLATE E. Carità, A. Donadelli, M. Corain <i>(Italy)</i></p>	62

A0130	SURGICAL TREATMENT FOR ULNAR METAPHYSEAL FRACTURE COMBINED WITH DISTAL RADIUS FRACTURE H.-J. Kang, M.S. Her, J.G. Lee, Y.R. Choi, H.K. Yoon, S.B. Hahn (<i>Korea</i>)	63
A0181	ARTHROSCOPIC GUIDED OSTEOTOMY FOR DISTAL RADIUS MALUNIONS F. del Pinla, F. Garcia-Bernal, H. Ayala, L. Cagigal, A. Studer, J. Regalado (<i>Spain</i>)	63
A0148	SURGICAL TREATMENT FOR MAL-UNITED INTRAARTICULAR FRACTURES OF THE DISTAL RADIUS (BARTON TYPE) T. Haridimos, N. Hadjinicolaou, A. Papagiavis, F. Giannoulis, E. Fandridis, G. Bastardis, N. Gerostathopoulos (<i>Greece</i>)	64
A0073	MANAGEMENT OF THE COMMINUTED FRACTURE OF THE ULNAR HEAD AND NECK COMBINED WITH DISTAL RADIUS FRACTURE BY DARRACH PROCEDURE AND TENODESIS OF ECU I. Rhyou, C. Chung, B.G. Suh, K. Kim (<i>Korea</i>)	64
A0018	SHOULD WE FIX THE ULNAR STYLOID FRACTURE IN STABLY TREATED DISTAL RADIUS FRACTURE? J.K. Kim, N.H. Do (<i>Korea</i>)	65

A0218 THE P.A.F. METHOD FOR DISTAL RADIUS FRACTURES ANALYSIS

G. Herzberg, Y. Izem, M.A. Saati, F. Weppe, F. Plotard, G. Mezari
Hospices Civils de Lyon, France

Introduction: there is a consensus that no classification system of distal radius fractures (DRF) except the first three AO groups has enough reproducibility to be widely used. Most series of DRF consider wide spectrums of patients ages, including patients that are not similar in terms of functional needs. There is a need for a “factors oriented” system of analysis. We propose to analyze a DRF according to criteria that have a direct influence on the treatment.

Methods: “P” relates to the patient: age, sex, health status, functional needs (VAS 1–3).

“A” refers to the accident: energy ((VAS 1–3), polytrauma, carpal tunnel syndrome.

“F” refers to the fracture: closed/open, AO group (extra articular, complete articular, partial articular), factors of radius fracture (PA and lateral geometry, radiocarpal and DRUJ articular lines and displacements according to standard radiographs or CTS or arthroscopy).

Factors of the ulna fractures and carpal injuries if requested, are added.

A chart was prospectively filled out on 100 patients to analyze the distribution, diagnostic (CTS or not, arthroscopy or not) and therapeutic choices according to the factors.

Results: The distribution and therapeutic choices are presented.

Discussion: The PAF systems helps us to better delineate the diagnosis and treatment in each individual taking into account his/her age, status and functional needs, the accident and the main characteristics of the fracture.

10.1177/1753193409106303

A0220 USEFULNESS OF THE VOLAR RADIAL PORTAL IN ARTHROSCOPIC RADIAL STYLOIDECTOMY

G. Herzberg
Hospices civils de lyon, France

Introduction: Arthroscopic Radial styloidectomy may be a very useful minimally invasive operation at different stages of SLAC or SNAC wrists, either in association with early SLAC-SNAC treatment, or as a palliative procedure in more advanced stages. Using only a 3–4 portal in our experience does not always provide a

perfect visualization of the dorsal aspect of the radial styloid, where the degenerative disease is the most significant. The use of a volar radial (VR) portal in combination with 3–4 and 1–2 portals has been recommended by Slutsky in 2002. The purpose of this paper was to report our experience using this combination of three portals for radial styloidectomy.

Material and methods: We prospectively used the “three portals technique” in ten patients (8 SNAC and 2 SLAC wrists) during the 2008 year. The VR portal (according to Slutsky’s description) was done first, then the 3–4 and 1–2 portals. The Scope was placed first into the 3–4 portal in order to delineate the ulnar limit of the styloidectomy and begin the resection with a 3 mm diameter burr. Then the VR portal was used to delineate the dorsal ridge of the radial styloid and to complete the resection from ulnar to radial. Alternating VR and 3–4 portals was used until the resection was completed, depending on the radiographic initial status.

Results: In this series of patients and in comparison to our previous arthroscopic styloidectomies, we felt that the use of a volar portal in addition to the classic 3–4 and 1–2 portals was a significant improvement in terms of visualization of the dorsal aspect of the radial styloid. It allows for a fine tuning of the radial styloidectomy. Alternating VR and 3–4 portals allowed for a perfect and easy control of the area of the radial styloid to be resected. It is therefore possible to associate a limited arthroscopic dorsal radial styloidectomy the treatment of early SNAC and SLAC wrists. No complication related to the VR portal was observed.

Discussion: In 2002 Slutsky published two papers on volar portals in wrist arthroscopy. He emphasized the fact that the VR was a safe portal and allowed for visualization of all the dorsal wall of the radio-carpal space. In this prospective series of patients, we confirm significant technical improvement of the radial styloidectomy operation using the volar radial portal included in a “three portals technique”. We feel that this portal is safe and should be always used when performing arthroscopic radial styloidectomy.

10.1177/1753193409106042

A0302 LONG-TERM RESULTS OF UNSTABLE DISTAL RADIUS FRACTURES TREATED WITH CLOSED REDUCTION AND PINNING

T. Husby, I. Hauksson, J. Hellund, L. Bjørnstad, L. Maurstad
Ullevaal University Hospital, Orthopedic Department, Division of Hand Surgery, Oslo, Norway

We have started a randomized clinical trial of plating versus external fixation/pinning of unstable distal radius fractures. With this in mind we were interested in looking up the long-term results of our earlier routine method with closed reduction and pinning for this large group of patients.

Material and method: 88 patients (74 ♀, 14 ♂, age 58(29–84), AO type A (41), type C (47)) with unstable distal radius fractures were treated with closed reduction and pinning in the period 2004–2005. After reduction three 1.5 mm pins were inserted (1 dorsal/radial, 1 volar/radial and 1 ulnar/dorsal), all pins had a strong hold in the proximal cortex. The patient had a cast for 5–6 weeks, and the follow-up time were 37(28–64) months.

Results: The primary dorsal angulations were 20(–17–51)°, at follow-up the volar angle were 4(23–(–29))°, a permanent improvement of 24°. The radial shortening was initially 2(–6–8) mm, at follow-up 2(–4–8)mm. The index radial inclination was 18(2–33)° and at follow-up 23(2–35)°. 38 patient with primary intraarticular steps >1 mm were reduced to 16 patients postoperatively and at follow-up. The degree of osteoarthritis increased from primary 2(1–5) to 3(1–6) at follow-up (Kellgren & Lawrence).

At follow-up the patients had a flexion of 58(36–87)°, extension 64(38–86)°, supination 81(36–92)°, pronation 84(58–96)°, radial deviation 25(10–21)° and ulnar deviation 35(15–52)°. The grip strength was 25(4–47) kg compared to 27(1–54) kg on the unaffected side. There was no significant stiffness of fingers. The Mayo Modified Wrist Score was 85(50–100) and Quick Dash was 12(0–75) at follow-up. On a pain Visual Analogue Scale (VAS) from 0–10 (10 = worst) the patients scored 1(0–6) at rest and in activity 2(0–10). On a VAS scale assessing satisfaction with the treatment (10 = best) the patients scored 9(0–10). The patients had a total sick leave of 8(0–52) weeks. 35 patients were retired when injured, 4 had to change work after the fracture, none of the patients were unable to work at follow-up.

15 patients had pin infections, two had pin movements, three patients were reoperated, one patient had CRPS I, one had carpal tunnel syndrome, one had a minor cutaneous nerve lesion and six other patients had temporary minor combinations of complications.

Conclusion:

Both radiologically and functionally closed reduction and pinning still is an option and a realistic alternative regarding unstable AO type A and C distal radius fractures. Further clinical randomized trials has to be performed to show if there is a real benefit from the increased use on ORIF in this large group of patients.

10.1177/1753193409106304

A0212 SCREWS VERSUS PEGS – A BIOMECHANICAL STUDY OF THE FIXATION OF DISTAL RADIUS EXTENSION FRACTURES

I. Mehling, D. Klitscher, L.P. Müller, A. Hrubesch, W. Sternstein, P.M. Rommens

Department of Trauma Surgery, University Hospital of the Johannes Gutenberg-University of Mainz, Germany

Purpose: The purpose of this biomechanical study was to determine whether locking screws or smooth locking pegs optimize fixation of AO A3 distal radius fractures.

Methods: 8 pairs of fresh-frozen human distal radii were used. AO A3 extra-articular distal radius fractures were created by removal of a 1-cm-wide dorsal wedge of corticocancellous bone centered 2 cm from the articular margin of the distal radius and were fixed using palmar locking plates.

The radii were divided into 2 matched-paired groups for comparison. The side order, the fixation order and the testing order were randomized. The distal fragment in group I was stabilized with 7 angular stable screws. The distal fragment in group II was fixed with 7 locking pegs. The proximal fragment in both groups was fixed with 3 screws. The probes were tested with 1.5 Nm for torsion and with 100 N axial load for 1000 cycles each. Stiffness was measured from 6 slow cycles regarding torsion and axial load. Then the differences of the stiffness were recorded during the remaining cycles. The Wilcoxon test was performed, a value of $p \leq 0.05$ was considered statistically significant.

Results: There were no statistically significant differences in the first 6 load cycles within the eight matched pairs. After 1000 cycles the constructs with locking screws (group I) showed statistically higher stiffness values ($p = 0.008$) compared to the constructs with smooth locking pegs (group II). The median stiffness values regarding torsion for the first 6 cycles within group I were 10.8 N cm/° (mean: 10.4 N cm/°) and for group II 9.6 N cm/° (mean: 10.1 N cm/°). Under axial loading condition the median stiffness within group I was 193.1 N/mm (mean: 188.2 N/mm) and within group II it was 136.6 N/mm (mean: 163.3 N/mm). After 1000 cycles the median torsion stiffness remained at 99.1% (mean: 88.6%) for group I and at 90.1% (mean: 79.2%) for group II.

Conclusion: This biomechanical study showed a statistically significant difference between the locking screw and locking smooth peg configuration concerning the stiffness of the constructs after 1000 cycles. The use of locking screws as opposed to smooth locking pegs for AO A3 extra-articular distal radius fractures optimizes

construct stability. Therefore locking screws should be preferred in osteosyntheses of AO A3 distal radius fractures.

10.1177/1753193409106305

A0180 EXPLOSION TYPE ARTICULAR DISTAL RADIUS FRACTURES: TECHNIQUE AND RESULTS OF VOLAR LOCKING PLATE UNDER DRY ARTHROSCOPIC GUIDANCE

F. del Pinal, F. Garcia-Bernal, A. Studer, L. Cagigal, H. Ayala, J. Regalado
Private Practice and Hospital Mutua Montañesa, Santander, Spain

Purpose: Explosion fractures of the distal radius are defined in this study as any with more of 4 articular fragments and/or a totally free articular fragment. The aim of this study was to test if on this subgroup of comminuted fractures it is feasible to carry out arthroscopy with safety, and if it improved the fluoroscopy reduction achieved. The technical management and the outcome of a consecutive series of patients treated under dry arthroscopic control and fixed volar angle plate is presented.

Methods: In the period January 2006 to June 2007 we have operated 16 explosion type fractures. Seven were C31, and in the rest there were severe articular and metaphyseal comminution (C32). All had a preoperative CT scan: four patients had 4 articular fragments, seven had five, and five had more than five fragments. One or more totally free articular fragments were present in 9 patients. All were operated as soon as feasible (1 to 18 days after the injury). In all a volar locking plate was applied and the articular fragments were preliminary fixed under fluoroscopic control with K-wires. Then, under traction, fine tuning of the reduction was carried out, under visual control using the dry arthroscopy technique. All required fragment re-reduction during the arthroscopy. Immediate range of motion was started except when concomitant injuries did not permit it. Bone graft was not used in this series.

Results: At a minimum follow up of 1 year all patients had a functioning joint and resumed their previous activities, including all manual workers (14 patients). Average ROM was: flexion 53.3 degrees (40–70), extension 57.7 (20–72), pronation: 83.8 (40–90), supination 79.9 (15–90), radial deviation 21.9 (10–32) and ulnar deviation 39.8 (20–58). Grip strength obtained was 85.3% of the contralateral. Average DASH score was 8.1 (0–38.3). According to the Modified Clinical Score System of

Green and O'Brien results were 4 excellent, 7 good and 5 fair, and to the Gartland & Werley Score results were 7 excellent, 7 good and 2 fair. Radiological findings were: radial inclination 19.9 degrees (14–28), radial height 11.3 (7–16), lateral tilt 5.7 (0–11), ulnar variance – 0.6 mm (–3.5/+2.5). At the final follow-up examination four patients had mild arthritis changes and one moderated and all had less than 1 mm articular step. One patient had a poor radiological result as a mismanagement of the extraarticular fracture during the operation.

Conclusions: Dry arthroscopy can be combined successfully with plating in the most severe group of comminuted articular fractures. Despite the fact that this series involved only the most severe articular fractures imaginable, our results compared favorably with other studies dealing with less severe injuries but where arthroscopy was not used.

10.1177/1753193409106308

A0061 FUNCTIONAL OUTCOMES AND COMPLICATIONS OF VOLAR DISTAL RADIUS LOCKED PLATES

F. del Canto, M. Sanchez, V. de Diego, M. Gutierrez, F. Peñas
Hospital Universitario Marques de Valdecilla. Santander, Spain

Introduction and purpose: The distal radius is the most frequently fractured bone in the human body. In recent times, there has been an increasing tendency towards adopting a more aggressive method of treatment, the open reduction and internal fixation with plates, which produces a comparatively better reduction of both the radio-carpal and radio-ulnar joints. Moreover, the LCP plates prevent metaphyseal collapse even in the presence of osteoporotic bone and are helpful in maintaining the reduction and allowing early movement. The volar approach assures good soft tissue cover, is not excessively aggressive and minimizes the risk of complications. However, there is still not enough evidence as to which is the best method of treatment for distal radius fracture. The aim of this study is to evaluate our findings in the area both of functional outcome and of the complications arising from the use of volar locked plates for the distal radius.

Material and method: Retrospective study of 145 unstable fractures of the distal radius treated in our department with volar locked plates. Average follow-up time of 28 months and minimum of 12. Polytrauma patients and those suffering bilateral fractures were excluded. The fractures were classified according to both the AO and

Fernandez classifications. The study considers the presence of osteoporotic bone, the use of bone graft, the necessity of ulnar plating, the comparative range of movement between healthy and fractured wrist, the measurement of radiological parameters on the fractured and unfractured bones, as well as the presentation of postoperative complications. For the functional evaluation, the PRWE test and statistical analysis were used.

95 patients were studied; most of the fractures were AO group C and Fernandez type III (60%). Despite showing a high rate of comminuted bone, only 3 cases were bone grafted. In 11% ulnar fixation was needed. The study revealed neither radiological loss of the reduction achieved surgically nor evidence of non-union. The radiological parameters of radial height and ulnar radiocarpal slope had a very significant influence on the recovery of mobility range and, consequently, on the functional recovery. Age, gender, type of fracture, surgery delay time and time of follow-up (a minimum of one year) had no significant influence on the final result. The mean PRWE value was 13 points, while 90% of the patients resumed activities in keeping with their previous lifestyle.

Conclusion: We believe that treatment with locked plates for unstable distal radius fractures through a volar approach brings about good functional outcomes, with few complications. It minimizes the need for bone grafting and allows early movement. Furthermore, it is instrumental in achieving and maintaining a good longer-term reduction of the fracture.

10.1177/1753193409106309

A0269 SHORT TERM OUTCOMES FOLLOWING FIXED-ANGLE DISTAL VOLAR RADIAL (DVR) LOCKING PLATING OF DISTAL RADIUS FRACTURES

I. Ibrahim, S.Z. Naqui, G. Pendlebury, J.G. Warner
*The Upper Limb Unit, The Royal Bolton Hospital,
Minerva Rd, Farnworth, Bolton, BL40JR UK*

Introduction: The traditional methods of management of unstable distal radial fractures are being challenged with the recent plethora of expensive, fixed angle, locking plates. No local, formal studies have looked at the outcomes of these devices, which are currently being popularized in an aggressive trauma industry market, fueled by technological advances, an increasing age demographic with resultant trauma levels and higher patient expectations of recovery time and function. The fixed angle device claims to offer early mobilization by fixation in osteoporotic bone in a population previously

felt to be low demand with low expectations. Our aim was to study the outcomes of DVR plating for all unstable distal radius fractures.

Methods: We prospectively studied all patients (150) managed with a DVR plate, over a twelve-month period in 2007. Patients were seen in our dedicated physiotherapy research clinic at 2, 6, 12 and 26 weeks post-operatively. Physiotherapy started at 2 weeks post-op. Active range of motion (ROM) of the injured wrist was recorded at 6, 12 and 26 weeks and compared with the normal side. Standardized radiographs were taken at 2 and 6 weeks and compared with pre- and post-operative films for radial and volar angulations, relative radial length, ulnar variance and implant position. Patient satisfaction was measured with the Patient Rated Wrist Evaluation score (PRWE) (Subjective outcome score) at 6, 12 and 26 weeks.

Results: 129 patients (male:female 1:3) with a median age of 59 years (17–92 years) completed 6 month follow-up. Mean measurements of pre-operative films were of 16° dorsal angulation, 15° radial inclination, 7mm relative radial length and +2mm ulnar variance. In comparison post-operative results were 6° volar angulation, +22° radial angulation, 11mm and 0mm respectively, which remained unchanged at 2 and 6 weeks. The mean comparative active ROM was 70%, 88% and 98% at 6, 12 and 26 weeks respectively. The PRWE Score showed a mild degree of disability at 6 weeks and only minimal disability at 12 and 26 weeks. There were two cases of lost fracture position and no case of deep infection.

Conclusion: Our study suggests that the DVR locking plate provides excellent fracture stability, allowing for early rehabilitation, with minimal complications. Radiological measurements were markedly improved and this correlated with a good ROM and high patient satisfaction. We recommend the use of the DVR plate to manage unstable distal radius fractures. Due to our results, we have now gone on to set up and lead a regional, 5 hospital multicentre randomized control trial looking at the outcomes of plate fixation versus K-wire fixation for extra-articular distal radius fractures.

10.1177/1753193409106311

A0064 DISTAL RADIUS DISPLACED FRACTURES TREATED USING “TRIMED” FIXATION SYSTEM

H. Nicolaos, D. Antonopoulos, P. Kanellos,
F. Giannoulis, I. Ignatiadis, S. Spyridonos,
N. Gerostathopoulos
*Upper limb and Microsurgery Clinic, General Hospital
“KAT”, Athens, Greece*

Introduction: Distal radius fractures sustain the most common fracture in Orthopaedics. It is obvious that correct treatment of these fractures is very important and especially for the intra-articular fractures that need operative treatment.

Aim: We present our experience of 200 cases with distal radius displaced fractures treated with open reduction and internal fixation using the “TRIMED” locking fixation system.

Method-patients: 93 males and 107 females mean age of 55 years old. All cases were staged using the AO classification system. 17 cases were class A, 12 B1, 9 B2, 17 B3, 32 C1, 80 C2, 33 C3. All patients were operated using the “TRIMED” system by 4 particular upper limb surgeons of our clinic.

Results: Evaluation of all cases took place within 6 months – 3 years postoperatively. Radiographic assessment and range of motion of the affected wrist were examined and compared with the opposite. Functional outcome were evaluated using the Disabilities of the Arm, Shoulder, and Hand (DASH) questionnaire and the MAYO Modified Wrist scoring system. The mean DASH score was 17.06 (very good) and the MAYO score was 76% equal with excellent results.

Conclusion: Distal radius fractures and especially the comminuted intra-articular class C by AO are a challenge for the surgeon. Anatomic reduction of the articular surface and stable fixation is a must for a good outcome. “TRIMED” low profile fixation system helps and supports the surgeon especially using the distal locking screws. We admit that this fixation system is a very helpful tool nowadays.

10.1177/1753193409106314

A0077 PRELIMINARY RESULTS WITH MICRONAIL™, INTRAMEDULLARY FIXATION OF DISTAL RADIUS FRACTURES

S. Olesen, M.S. Skjaerbaek, A. Hoegh, R.-J. Leusink
Orthopaedic department, Regionshospital Viborg, Denmark

Introduction: MICRONAIL is a minimally invasive system for fixation of extraarticular distal radius fractures as well as intraarticular fractures without diastasis of the distal radius articular surface. The nail has been developed to minimize the surgical exposure and to give the patient a fast return to activity. We have performed a retrospective analysis of the functional outcome and radiological status of fourteen (14) patients one (1) year post operatively with MICRONAIL. By spring 2009

we will be able to present 1 year post-op control of 50 patients with MICRONAIL.

Patients and material: Retrospective analysis of 36 patients with distal radius fractures (Older Type 2) having undergone surgery with MICRONAIL from December 2006 until November 2007. The patients were controlled for one year. The study consists of 31 women and 5 men, median age 68 years (range 41–90 years). One year post operatively 22 patients had been lost for follow up. One patient had died, 9 did not want to show up for the control, 9 patients did not respond to the invitation and 3 patients did not show up for the control. 14 patients were evaluated in regards to functional outcome according to the modified Gartland & Werley score. Pain level was furthermore described by visual analogue score. Radiological status was determined based on dorsal angulation and inclination of the radius articulating surface, as well as shortening of distal radius immediate post-op and after one year. For the statistical analysis a paired *t*-test was used.

Results: At the control, the functional outcome (modified Gartland & Werley score) resulted in: 4 excellent, 8 good and 2 fair. Average pain level using the VAS-score was 1.5. Comparing the pre- and postoperative x-rays, we found significant differences in both dorsal angulation and inclination of the radius articulating surface as well as the radius length ($p < 0.001$ for everyone). All patients showed an acceptable positioning of the fracture postoperatively. There was no significant difference between post-op radiographs and 1 year follow up radiographs for the 3 measurements ($p > 0.05$ for everyone). At 1 one year post-op there were no fracture collapses. One patient had a screw protruding in the wrist area; however this did not result in a clinical issue. 7 patients reported parasthesia in the area of the scar radial to the wrist. No infections were found.

Discussion: Our preliminary results indicate that MICRONAIL is a good method for minimally invasive intramedullary nailing of distal radius fractures. There is a good functional outcome, and radiological positioning of the fracture is maintained one year post-operatively.

10.1177/1753193409106330

A0306 DISTAL RADIUS OSTEOTOMY IN MALCONSOLIDATED FRACTURES WITH VOLAR PLATE

E. Carità, A. Donadelli, M. Corain
Servizio Chirurgia della Mano – Casa di cura San Francesco, Verona, Italy
U.O. Chirurgia della Mano – Policlinico G.B. Rossi, Italy

The authors describe their technique and their results in corrective osteotomy of distal radius for malconsolidated fractures.

From August 2005 to December 2008 12 osteotomies were performed and stabilized by distal radius volar plates.

Rx including criteria were ulna plus, loose of radial and volar tilt associated by pain and loose of ROM and grip strength.

Pre and post-operatively Criteria of Evaluation were: ROM, Pain with VAS (Visual Analogic Scale), grip strength with Jamar by MMWS and wrist function by PRWE score.

With a medium F-U of 16 months, according to MMWS, we found 8 excellent, 2 good and 2 poor results. We did not find complications of the implants. In all cases ROM and grip strength improved and we had reduction of pain; in two cases we did not restore normal height of radius and volar tilt and we had poor results. We believe that correction of malconsolidated fracture with recent systems of osteosynthesis can restore normal anatomy and biomechanical aspect of the wrist improving functionality and reducing degenerative changes.

10.1177/1753193409106331

A0130 SURGICAL TREATMENT FOR ULNAR METAPHYSEAL FRACTURE COMBINED WITH DISTAL RADIUS FRACTURE

H.-J. Kang, M.S. Her, J.G. Lee, Y.R. Choi, H.K. Yoon(*), S.B. Hahn

Department of Orthopedic Surgery, Yonsei University College of Medicine, Seoul, Korea

Department of Orthopedic Surgery, Soonchunhyang University, College of Medicine, Seoul, Korea()*

Purpose: The treatment of ulnar metaphyseal fracture combined with distal radius fracture has been the difficult subject. This study was undertaken to analyze the results of operatively treated unstable ulnar metaphyseal fractures associated with distal radial fractures using various operation methods according to the Biyani classification of ulnar metaphyseal fracture.

Materials and methods: From March 2002 to February 2006, out of 450 distal radius fractures that were treated in our hospital, 11 cases of accompanied unstable ulnar metaphyseal fracture that received surgery were chosen. Average age was 61.1 years old and average follow up period was 26 months (15–56). According to Biyani classification 1 case was type I, 2 were type II, 2 were type III and 6 were type IV. Four cases of ulnar

metaphyseal fracture received percutaneous pinning, 1 case received open reduction and internal fixation with minicondylar plate, 5 cases received distal ulnar resection and 1 case received the Sauve-Kapandji operation. Operative results were compared by analyzing the preoperative and postoperative clinical and radiographic results.

Results: All cases of distal radius fracture achieved union. After union was achieved, the average distal radial inclination angle was 24 degrees and volar tilt angle was 3 degrees. For ulnar metaphyseal fractures, all cases which were treated with internal fixation, achieved the union. And in the other 5 cases which received distal ulnar resection or Sauve-Kapandji operation, we found that the grip strength weakened around 25% compared to the unaffected extremity. According to Gartland and Werley score, 1 was excellent, 4 were good, 5 were fair and 1 was poor.

Conclusion: Unstable ulnar metaphyseal fractures accompanying distal radius fractures can be treated successfully surgically with good clinical and radiographic results. The optimal treatment modality of unstable ulnar metaphyseal fracture should be chosen considering age of patient and the type of ulnar metaphyseal fracture.

10.1177/1753193409106332

A0181 ARTHROSCOPIC GUIDED OSTEOTOMY FOR DISTAL RADIUS MALUNIONS

F. del Pinla, F. Garcia-Bernal, H. Ayala, L. Cagigal, A. Studer, J. Regalado

Private Practice and Hospital Mutua Montañesa, Santander, Spain

Purpose: It has been shown that step-offs of 1 mm or more are associated in the midterm to pain and osteoarthritis after a distal radius fractures. On the other hand impaction fractures are healed after 3 weeks. Corrective osteotomies of the intra-articular fragments guided by arthroscopy may be performed months after the injury preserving the nourishment of the fragments and being associated to excellent outcomes. Our aim is to present our experience in the management of intra-articular distal radius malunions guided by the dry arthroscopy technique.

Methods: 11 patients were operated for malunion of the distal radius 3 to 9 months after the traumatic event under arthroscopic guidance. In all cases the dry arthroscopic technique was used. Original fracture patterns were: 1 styloid fracture, 1 radiocarpal dislocation, and 9 C31 fractures. Seven patients have had surgery prior to the referral, while the rest had cast

treatment. In 5 cases an antero-ulnar or radial styloid fragment was repositioned. In the rest more than one fragment (up to 3) were osteotomized. In one patient the articular osteotomy was combined with an ulnar shortening.

Results: One patient was considered a failure, because the fragment redisplaced due to poor fixation, although so far no additional surgery has been required. Intraoperative gaps were quite common as the fragments did not fit as in an acute fracture (<2 mm). Step-offs however were reduced in most cases to zero. Improvement in ROM and DASH was the norm in the whole group of patients.

Conclusions: Arthroscopic guided osteotomy permit precise definition of the malunited fragments with minimal interference with the vascularization. This technique can be used for patients with irregularly defined fragments that are not amenable.

10.1177/1753193409106333

A0148 SURGICAL TREATMENT FOR MAL-UNITED INTRAARTICULAR FRACTURES OF THE DISTAL RADIUS (BARTON TYPE)

T. Haridimos, N. Hadjinicolaou, A. Papagiavis, F. Giannoulis, E. Fandridis, G. Bastardis, N. Gerostathopoulos

Upper limb and Microsurgery Clinic, General Hospital "KAT", Athens, Greece

Purpose: The purpose of this study is to evaluate the surgical treatment of patients with mal-united intraarticular fractures of the distal radius (Barton type).

Materials – methods: From January 1992 to December 2007, 32 patients with mal-united intraarticular radius fractures, were treated in our department. 11 patients were female and 21 male with a mean age of 51.2 years (range 23–71). The patients had been primarily treated in other departments. 27 (84.3%) of them had been treated conservatively and 5 (15.7%) of them surgically. All patients were operated by using a volar approach, osteotomy of the radius, internal fixation with plate and screws and the appropriate use of autografts or allografts, for anatomic alignment of the radius. General or regional anesthesia was used. All patients were evaluated with the Mayo Wrist score and the DASH score preoperatively and postoperatively. Pain assessed on a Visual Analogue Scale in all patients. Postoperative follow up performed at one, three, six and twelve months after surgical treatment.

Results: Excellent results were obtained in 65.6% (21 patients) of cases, good in 21.8% (7 patients),

moderate in 9.3% (3 patients) and poor in 3.3% (1 patient). Mean duration of fracture healing was 8 weeks (range 7–12). The mean of wrist extension was 3.20 degrees (range 00–50) and of flexion was 23.20 degrees (range 150–350), preoperatively. Postoperatively, the mean of wrist extension was 60.20 (range 350–650) and of flexion was 63.80 (range 400–650). No significant complications were noted.

Conclusions: It is about an effective treatment of malunited intraarticular radius fractures. Excellent results were obtained with anatomic reduction of the radius leading to excellent functional outcomes.

10.1177/1753193409106334

A0073 MANAGEMENT OF THE COMMINUTED FRACTURE OF THE ULNAR HEAD AND NECK COMBINED WITH DISTAL RADIUS FRACTURE BY DARRACH PROCEDURE AND TENODESIS OF ECU

I. Rhyou, C. Chung, B.G. Suh, K. Kim
Department of Orthopaedic Surgery, Upper Extremity and Microsurgery Center, Semyung Christianity Hospital, Pohang, Korea

Purpose: To evaluate the surgical results of distal radio-ulnar fracture managed by ORIF for the fracture of the distal radius and excision of the fractured fragments and ECU tenodesis for the comminuted fracture of ulnar head and neck.

Methods: Six cases of combined fracture of the distal radius and ulna were enrolled. Distal radius fractures were fixed by ORIF with AO locking plate without bone graft. The comminuted fragments of distal ulnar head and neck were excised and the tenodesis using half strip of ECU was added to stabilize the proximal ulnar stumps. After immobilization for 6 weeks active ROM exercise started. The change of radial inclination and dorsal tilt, the ulnar shift and collapse of carpal bone and ulnar impingement were investigated with simple X-ray. Patients were assessed with residual subjective symptom and Modified Mayo Score (MMS). All were female and average age was 68(58–75) years. Average follow up was 20(10–29) months.

Results: Resting pain was absent in all patients but heavy lift made them feel weakness and discomfort intermittently. All patients returned to the normal daily activities except one patient handicapped by hemiplegia. The average range of motion and grip power were 89% and 85% compared to the contralateral side respectively. The average MMS was 87(75–95). The carpal bone changes were not observed in follow up X-ray.

Conclusion: ORIF of distal radius associated with the excision of the distal ulnar fragments and stabilization procedure using half strip of ECU may be one good method for the treatment of the fracture of the distal radius combined with the comminuted distal ulnar fracture difficult to be managed by ORIF. The intermittent weakness felt in this method made it not suitable in young active patients doing heavy work. AO locking plate was strong enough to maintain reduction until bone union.

10.1177/1753193409106335

A0018 SHOULD WE FIX THE ULNAR STYLOID FRACTURE IN STABLY TREATED DISTAL RADIUS FRACTURE?

J.K. Kim, N.H. Do

Department of Orthopedic Surgery, School of Medicine, Ewha Womans University, Korea

Purpose: The purpose of this study was to determine whether the presence of an ulnar styloid fracture has any effect on wrist function and on the development of chronic distal radioulnar joint (DRUJ) instability in anatomically reduced and stably fixed distal radius fractures.

Materials and methods: One hundred and thirty-eight consecutive patients, who required surgical treatment

due an unstable distal radius fracture, were included in this study. During surgery, no procedure was performed on accompanying ulnar styloid process fractures. Patients were divided into intact, non-base fracture, and base fracture groups based on locations of the ulnar styloid fractures, and into intact, minimally displaced (≤ 2 mm) and significantly displaced (> 2 mm) groups according to ulnar styloid fracture displacement at the time of injury. We compared wrist functions and the occurrence rates of chronic DRUJ instability between these groups after a minimum follow-up of one year.

Results: Ulnar styloid fractures were present in 76 (55%) of the 138 patients included in this study. Of these 76 ulnar styloid fractures, 47 (62%) involved the upper portion of the ulnar styloid base, 29 (38%) involved the base of the ulnar styloid, 34 (45%) were minimally displaced, and 42 (55%) were significantly displaced. Wrist functions including grip strength, range of motion, the modified Mayo wrist score and DASH score were not statistically significantly dependent on ulnar styloid fracture size, or displacement. Chronic DRUJ instability occurred only in two cases (1.4%).

Conclusion: We believe that the presence of an ulnar styloid fracture had no adverse effect on wrist function and DRUJ instability in anatomically reduced and stably fixed distal radius fractures.

10.1177/1753193409106336

SESSION 11: CARPUS 1

- A0384 LECTURE: CARPAL DISLOCATIONS. CLASSIFICATION AND TREATMENT 68
E. Apergis
- A0186 DE QUERVAIN CARPAL FRACTURE DISLOCATIONS: LATE OUTCOME AFTER 68
SURGICAL TREATMENT
C. Hess, I. Tami, C. Contaldo, D. Weishaupt, M. Calcagni, P. Giovanoli
(*Switzerland*)
- A0138 TREATMENT OF LUXATIONS AND FRACTURE-LUXATIONS OF CARPAL 68
BONES
D.A. Magdiev
(*Russia*)
- A0364 A NOVEL TECHNIQUE FOR PROXIMAL POLE SCAPHOID FRACTURE FIXATION 69
C. Roslee, S. Shetty, A. Latif, T. Colegate-stone, A. Tavakkolizadeh, J. Compson
(*UK*)
- A0166 MODIFIED FLUOROSCOPIC IMAGING TECHNIQUE FOR THE CENTRAL 69
SCREW PLACEMENT IN PERCUTANEOUS SCREW FIXATION OF SCAPHOID
FRACTURE
J.W. Park, J.I. Lee, Y.S. Lee, S.B. Cho, I.J. Rhyu, J.H. Park, J.W. Kang
(*Korea*)
- A0072 KIRSCHNER WIRE PLACEMENT IN SCAPHOID USING FLUOROSCOPIC 70
NAVIGATION: A CADAVER STUDY
P. Liverneaux, A. Gherissi, M. Beustes-Stefanelli, S. Facca
(*France*)
- A0094 PERCUTANEOUS VOLAR VERSUS DORSAL LIMITED APPROACH FOR THE 70
TREATMENT OF MINIMALLY AND NON-DISPLACED SCAPHOID WAIST
FRACTURES: AN ASSESSMENT OF FUNCTIONAL OUTCOMES AND
COMPLICATIONS
P. Drác, I. Cizmár, P. Manák
(*Czech Republic*)
- A0223 SCAPHOID NONUNION TREATED BY ILIAC BONE GRAFTING AND PULSE 70
ELECTROMAGNETIC FIELD STIMULATION AND PLATELET DERIVED
GROWTH FACTORS. PRELIMINARY REPORT
M. Enrique, L. Clavel, J. Hernández, D. Perea
(*Spain*)
- A0019 PALMAR PERCUTANEOUS SCREW FIXATION IN SCAPHOID WAIST DELAYED 71
UNION
J.K. Kim, S.Y. Lee
(*Korea*)

A0275	INDICATIONS AND OUTCOMES OF VOLAR VASCULARISED BONE GRAFTS FOR SCAPHOID NONUNION S. Fairbank, E. Papadogeorgou, C. Mathoulin (France)	71
A0265	RECONSTRUCTION OF ULNAR SIDED CMC FRACTURE DISLOCATION MALUNION BY OSTEOTOMY R. Kebrle, T. Hellmuth, J. Paroulek (Czech Republic)	72
A0353	INTRA- AND INTEROBSERVER RELIABILITY OF STANDARD WRIST-ARTHROSCOPY S. Loew, T. Pillukat, K.-J. Prommersberger (Germany)	72

A0384 LECTURE: CARPAL DISLOCATIONS. CLASSIFICATION AND TREATMENT

E. Apergis

no abstract received

A0186 DE QUERVAIN CARPAL FRACTURE DISLOCATIONS: LATE OUTCOME AFTER SURGICAL TREATMENT

C. Hess, I. Tami, C. Contaldo, D. Weishaupt, M. Calcagni, P. Giovanoli

Division of Reconstructive Surgery and Institute of Diagnostic Radiology, University Hospital, Zurich, Switzerland

Introduction: Most perilunar fracture dislocations occur after high-energy trauma in young and active patients. In this study, the outcome after surgical treatment of 19 De Quervain fracture dislocations is reported and compared with data in the literature.

Methods: Over a 10 year period 19 patients (16 men and 3 women, average age 35 years) underwent surgical treatment with carpal reduction and scaphoid fixation, 15 of which were performed with a Herbert screw and 4 with scaphoid pinning. Pain evaluation, range of motion, grip strength, and several functional scores (i.e. PWRE, Green & O'Brien, Witvoet & Allieu, and SF36) were assessed clinically and radiologically with a mean follow-up of 60 months. The radio- and midcarpal bone changes were evaluated by postoperative MRI at the time of follow-up.

Results: Whereas residual pain of variable intensity was reported, the subjective evaluation of most patients ranked the outcome as good. All patients had a reduction in wrist range of motion and grip strength compared to the contralateral side, however it did not affect the daily occupational grade. The outcome of the functional scores ranged from good to fair, only one patient had a poor score. The X-ray images of most patients showed radio- and midcarpal osteoarthritis. One case developed into a SLAC-wrist, resulting in a proximal row carpectomy less than 2 years after the injury. In accordance with the X-ray findings, MRI images confirmed scaphoid healing without avascular necrosis as well as corrected radio- and midcarpal alignment with different stages of osteoarthritis.

Conclusion: Early reduction and rigid fixation of the scaphoid proved to be critical in achieving a satisfactory functional result. The late outcome after surgical

treatment using scaphoid pinning did not seem to differ from that using the Herbert screw.

10.1177/1753193409106048

A0138 TREATMENT OF LUXATIONS AND FRACTURE-LUXATIONS OF CARPAL BONES

D.A. Magdiev

Russian State Medical University, Moscow, Russia

Treatment of luxations and fracture-luxations of carpal bones is an urgent problem of hand surgery which is stipulated by the complexity of anatomical structure, a high percentage of poor results and the mistakes in diagnostics and treatment.

We have investigated 363 cases of luxations and fracture-luxations of carpal bones. 146 (40.2%) patients had luxations and fractures-luxations of carpal bones combined with fractures of other carpal bones. Disbalance of the function of medial and ulnar nerves was observed in 116 (31.9%) patients. Recent injuries (less than 2 weeks from the time of the injury) were observed in 147 (40.5%) patients and delayed injuries (more than 2 weeks from the time of the injury) - in 216 (59.5%) patients. On the day of the injury 78 (29.6%) patients applied to the specialized clinic for medical assistance. While researching the reasons of delayed injuries it was found out that mistakes in diagnostics were made in 115 (53.5%) patients and the mistakes in treatment - in 128 (59.6%) patients. Late applying for medical help was registered in 11 (4.6%) cases. X-ray study by first-time applying to a non-specialized clinic was carried out on 346 (95.4%) patients. For 115 (33.4%) patients luxations and fractures-luxations of carpal bones were not diagnosed on first-time roentgenograms.

In recent cases manual reposition of the carpal bones by a modified Bohller method was applied under the anesthesia of the axillary area. In instability of the carpal bones after the elimination of the luxations were carried out temporary fixation of the carpal joint (in the course of 3 weeks) with the Kirschner wires. The immobilization of the forearm and hand was carried out by means of a two plasters (palm and dorsal) in a medium-physiological position of the hand. The length of the immobilization in isolated luxations of the carpal bones made 4 weeks and in fractures-luxations - 3-4 months.

In delayed cases in the first stage the distraction method with the use of the device developed in our clinic was applied. The device was applied onto the Kirschner wires put through both bones of the lower third of the forearm and the base of II-V ossa metacarpalia. The distraction

was 2–3 mm per day. After 2–4 weeks the second stage was performed: operation – open elimination of the luxation.

Long-term results of the treatment – from 1 year to 20 years were studied in 315 (87%) cases. Good results were received in 242 (77%) patients, fair results – in 52 (16.7%) patients, and poor results – in 21 (6.3%) patients.

Thus, the applied methods of conservative and operational treatment of recent and delayed luxations and luxation-fractures of carpal bones made it possible to receive positive results in the majority of patients. This gives the foundation for recommending the proposed methods to be introduced in the practice of medical institutions.

10.1177/1753193409106046

A0364 A NOVEL TECHNIQUE FOR PROXIMAL POLE SCAPHOID FRACTURE FIXATION

C. Roslee, S. Shetty, A. Latif, T. Colegate-Stone, A. Tavakkolizadeh, J. Compson
Department of Trauma and Orthopaedic Surgery, Kings College Hospital, Denmark Hill, London, SE5 9RS, UK

Introduction: Fractures of the scaphoid are the second most common fractures involving the upper limb. Only 10% to 20% occur at the proximal pole.

Aim: To describe a new technique for fixing the proximal pole scaphoid fractures both in acute and chronic setting and to present our preliminary results.

Materials and methods:

- Prospective cohort study of all proximal pole scaphoid fractures operated on by a single surgeon in a single centre.
- 25 patients (20 males and 5 female).
- The mean age was 25.
- The mean time to surgery was ~6 months.

Operative technique: After routine set up and a transverse incision access to the radio-carpal joint is achieved preserving the ligament attachment to the scaphoid using a modified Mayo approach. A window is created at the proximal end of the dorsal ridge at fracture level before reduction and insertion of a K-wire for temporary fixation. The fracture is then fixed with an appropriate length Herbert screw. The fracture site is curetted through the window and cancellous bone graft from the distal radius is packed into the fracture site.

The capsule and extensor retinaculum are then closed in layers. The hand is immobilised in a cast for 6 weeks.

Results: No patients were lost to follow up.

All fractures fixed showed evidence of clinical and radiological union.

Conclusion: Our technique is tendon sparing, capsule retaining, and ensures maintenance of articular surface congruity. So far this technique has led to excellent results.

10.1177/1753193409106337

A0166 MODIFIED FLUOROSCOPIC IMAGING TECHNIQUE FOR THE CENTRAL SCREW PLACEMENT IN PERCUTANEOUS SCREW FIXATION OF SCAPHOID FRACTURE

J.W. Park, J.I. Lee, Y.S. Lee, S.B. Cho, I.J. Rhyu, J.H. Park, J.W. Kang
Department of Orthopaedic Surgery, College of Medicine, Korea University, Seoul, Korea
Department of Radiology, College of Medicine, Korea University, Seoul, Korea
Department of Anatomy, College of Medicine, Korea University, Seoul, Korea

The fluoroscopic imaging technique which has been used in the dorsal percutaneous screw fixation of scaphoid fracture was modified for more consistent central screw placement according to the different fracture locations. Eighteen scaphoids of the fresh frozen cadaver were used. The CT data of scaphoid were reconstructed for 3D images. The reconstructed image was 3 dimensionally rotated to define the outlining images of scaphoid according to the 3 imaginary fracture lines (proximal 1/3, waist, distal 1/3). 2D plain radiographic images were taken based on the 3D image to show the overlapping shapes of outer cortical lines of proximal and distal scaphoid. Under the fluoroscopic guidance, guide wire was inserted following the previously obtained 2D images. To verify the accuracy of fluoroscopic guidance for the fixation, the scaphoid was cut through each fracture plane and central position of each guide wire was analyzed. For the proximal 1/3 fracture, the proximal cortical line was positioned on the radial side to the distal cortical line. For the waist fracture, two cortical shadows were eclipsed and for the distal 1/3, proximal cortical line was positioned ulna side to the distal cortical line. The cut surface analysis revealed statistically significant results of central guide wire placement for each fracture plane. The fluoroscopic images should be individualized according to the fracture planes for more consistent and accurate central

guide wire placement in the dorsal percutaneous screw fixation of scaphoid fracture.

10.1177/1753193409106047

A0072 KIRSCHNER WIRE PLACEMENT IN SCAPHOID USING FLUOROSCOPIC NAVIGATION: A CADAVER STUDY

P. Liverneaux, A. Gherissi, M. Beustes-Stefanelli, S. Facca

Department of Hand Surgery, Strasbourg University Hospital, Illkirch, France

During scaphoid fixation, a pin guide is first inserted along the axis of the scaphoid, and then a cannulated screw is inserted around the pin guide. Finally, the pin guide is removed. To verify the position of the pin guide, fluoroscopy is typically used, with the disadvantage of irradiation. Thus, it is impossible to visualize the pin guide in more than one view simultaneously.

The goal of this study was to compare two pin guide placement techniques in scaphoid fixation: conventional (CF) vs. fluoroscopic navigation (FN).

Eleven upper limbs of cadavers were divided into two groups. The CF group included four scaphoids which were to be fixed with pin guide. The FN group included seven scaphoids which were to be fixed with the same technique under FN.

The accuracy of screw insertion in both groups does not differ. In the CF group, the X-ray exposure time is four times higher. The total duration of the surgical procedure is slightly higher in the FN group.

We are of the opinion that FN could be applied in clinical practice and could offer significant benefits in the treatment of fixation of the scaphoid.

10.1177/1753193409106047

A0094 PERCUTANEOUS VOLAR VERSUS DORSAL LIMITED APPROACH FOR THE TREATMENT OF MINIMALLY AND NON-DISPLACED SCAPHOID WAIST FRACTURES: AN ASSESSMENT OF FUNCTIONAL OUTCOMES AND COMPLICATIONS

P. Drác, I. Cizmár, P. Manák

Department of Traumatology, Faculty Hospital Olomouc, Czech Republic

Introduction: Non-displaced or minimally displaced scaphoid waist fractures can be surgically treated using either the percutaneous volar or the limited dorsal approach.

These techniques provide a possibility of early wrist physiotherapy throughout the healing period, better functional outcomes and shorter sick leave duration. Many reports cite low complication rates. The purpose of this study is to compare both techniques based on the complication rate and functional outcomes.

Materials and methods: The authors compare 42 patients treated for the acute scaphoid waist fracture by percutaneous osteosynthesis and 38 patients treated by osteosynthesis using limited dorsal approach after a follow-up of at least 12 months. The differences between the groups were tested statistically.

Results: The overall complication rate was 11.9% for the percutaneous approach and 15.8% for the dorsal approach. There was one case of nonunion in each group. The differences in the complication rates as well in range of wrist motion and in persistent complaints were statistically insignificant. We found significantly ($p=0.042$) better grip strength for the percutaneous approach.

Discussion: Most of the complications detected were caused by the surgeon peroperatively and can be minimized by meticulous adherence to technique.

Conclusion: Based on the statistical analysis of the results of our clinical data, the two techniques are comparable yet slightly in favour of the percutaneous approach.

10.1177/1753193409106045

A0223 SCAPHOID NONUNION TREATED BY ILIAC BONE GRAFTING AND PULSE ELECTROMAGNETIC FIELD STIMULATION AND PLATELET DERIVED GROWTH FACTORS. PRELIMINARY REPORT

M. Enrique, L. Clavel, J. Hernández, D. Perea

Elche University General Hospital. Hand Unit, Spain

Introduction: The platelet derivative factors play a role in stimulating the migration of osteoblasts and mesenchymal progenitor cells, having an osteoconductive property; meanwhile electromagnetic fields have been found to stimulate the upgrading of mRNA responsible for the production of transforming growth factor and bone morphogenic protein, both of which are involved in osteogenesis.

The aim of the study was to determine the efficacy of pulsed electromagnetic field (PEMF) stimulation and platelet derived growth factors (PDGF) as an adjunct to iliac bone graft in the treatment of scaphoid nonunion.

Materials and methods: A randomized, prospective, clinical trial. A preliminary report of the treatment of the first thirty patients, of a study of sixty, with

established nonunion of the scaphoid is presented. Fifteen were treated by iliac corticocancellous bone graft (Russe inlay graft) and PEMF three hours a day (Group 1) and fifteen by iliac corticocancellous bone graft and PEMF three hours a day and PDGF (Group 2). Exclusion criteria were a history of wrist fracture-dislocation or associate ligament ruptures.

PEMF uses two electromagnetic coils positioned outside the cast and centered over the nonunion site; electromagnetic fields are produced by electrical pulse burst through the coils. The PDGF were obtained with a gravitational platelet separation system which is designed to produce a consistent $8\times$ baseline count while capturing over 80% of the available platelet within the sample.

The demographic details included age, gender, hand dominance, mean time interval from injury to surgery, site of nonunion, fracture pattern, stability of the nonunion, displacement at the nonunion site and presence of avascular necrosis.

All patients were followed up at two, four, eight and twelve weeks, and six and twelve months.

Results: Two patients in Group 1 were excluded because of associated ligament injury detected at surgery and which was repaired at the time of surgery. One patient in Group 2 was excluded because he didn't follow the Protocol.

The nonunion consolidated in 96% of cases. All the patients in Group 1 showed union and there was one persistent nonunion in Group 2. The healing took place between 4 and 12 weeks with a mean of 8 weeks. In Group 1 it took place in an average of 9 weeks and in Group 2 in 7 weeks.

All the patients were asymptomatic and none had further surgery. The case with persistent nonunion had instability and displacement at the nonunion and avascular necrosis of the scaphoid. None of the others factors studied have a statistical significance.

Conclusion: The addition to the autogenous bone graft, with osteogenic, osteoinductive and osteoconductive properties, of PDGF (osteoinductive) and PEMF stimulation (osteogenic) in the treatment of scaphoid nonunion, has permitted a high and fast rate of union and a short period of immobilization.

10.1177/1753193409106072

A0019 PALMAR PERCUTANEOUS SCREW FIXATION IN SCAPHOID WAIST DELAYED UNION

J.K. Kim, S.Y. Lee

Department of Orthopedic Surgery, School of Medicine, Ewha Womans University, Korea

Background: To report the surgical results of percutaneous screw fixation in scaphoid waist delayed union.

Materials and methods: Twelve consecutive patients with scaphoid waist delayed union were included in this study. All patients were male of an average age 31.1 years (range, 19 to 49). Mean duration of injury was 12.3 ± 3.8 weeks. An acutrak screw (Acumed, Hillsboro, OR) was introduced volarly under image intensifier guidance in all patients.

Results: Preoperative radiographs showed a minimal sclerotic margin at the fracture site in six patients and a fracture site resorption in three patients. However, no patient had dorsal intercalated segment instability or a lateral intrascaphoid angle of >35 degrees. All fractures united successfully at 12.5 ± 3.1 weeks postoperatively without any additional procedures. At 12 month follow-up evaluations, flexion arc of injured wrist was 94% of uninjured wrist, and extension arc of injured wrist was 93% of the uninjured wrist. Grip strength averaged 34 ± 2.9 kg, which was 92% of the grip strength of the uninjured hand. The mean MMWS was 93.8 ± 6.1 points (nine patients had an excellent result and three a good result) and the mean DASH score was 9.1 ± 6.2 points.

Conclusion: We believe that volar percutaneous screw fixation is a reliable method in case of scaphoid waist delayed union.

10.1177/1753193409106043

A0275 INDICATIONS AND OUTCOMES OF VOLAR VASCULARISED BONE GRAFTS FOR SCAPHOID NONUNION

S. Fairbank, E. Papadogeorgou, C. Mathoulin
Institut de la Main, Paris, France

Scaphoid fracture ranks as the second most common in the upper extremity, and up to 15% progress to nonunion due to poor proximal vascularity. Vascularised bone grafting for scaphoid non-union can result in higher union rates than non-vascularised, however this benefit must be weighed against the potential problems posed by more complex surgery. As a result, vascularised bone grafting is usually only employed in secondary cases or where there is evidence of an avascular proximal pole, the remainder receiving nonvascularised grafts. The purpose of this study is to evaluate a large consecutive series of volar vascularised bone grafts for scaphoid non-union, in order to more precisely evaluate the efficacy and safety of the method. 102 patients underwent surgery by the senior author between 1994 and 2006. There were 90 male and 12 female patients, with a median age at surgery of

29 years (range 15–61 years). There were 21 proximal pole fractures and 81 waist fractures. 22 patients had previous internal fixation, 14 had previous iliac bone grafting and 66 had no previous surgery. Median delay to surgery was 12 months (range 4–120). There were 59 cases with Alnot stage 2A non-union, 39 with stage 2B, and 4 with stage 3A. Patients with stage 1 non-union for which simple percutaneous fixation is adequate were excluded. Intraoperatively, surgical access to both the fracture and bone graft was provided by the same volar wrist incision. The vascularised bone graft was harvested from the ulnar aspect of the volar distal radius, raised on the volar carpal pedicle and wedged into an anterior scaphoid window. Screw osteosynthesis was utilised. Patients were followed for a mean of 29 months, with a range of 10 to 65 months. Results showed overall union in 94% of cases, with a mean time to union of 10 weeks. Previous surgery was associated with a consolidation rate of 89%, compared with 97% in primary cases. Union rates were also related to surgical delay of over 18 months, Alnot's stage, and patient occupation with lower rates in manual workers. Complications comprised stiffness in 4 patients, Südek's dystrophy in 3 patients, and styloid arthritis in 2 patients. Postoperative Modified Mayo wrist scores were good or excellent in 89%, with significant increases in range of motion and grip strength. Overall patient satisfaction rate was 97%. In conclusion, the volar vascularised bone graft allows an effective repair of scaphoid non-union even after previous failed surgery, and its simplicity and safety are sufficient to permit its use in place of non-vascularised bone grafting for the treatment of primary scaphoid non-union. Union rates and functional outcomes are best in patients undergoing vascularised bone grafting less than 18 months after injury.

10.1177/1753193409106338

A0265 RECONSTRUCTION OF ULNAR SIDED CMC FRACTURE DISLOCATION MALUNION BY OSTEOTOMY

R. Kebrle, T. Hellmuth, J. Paroulek
Ústav chirurgie ruky a plastické chirurgie Vysoké nad Jizerou, Czech Republic

Objectives: CMC fracture dislocation of IVth and Vth metacarpal healed in malposition is a painful and disabling condition for the patient. Recommended treatment by arthrodesis or arthroplasty of IVth and Vth CMC joint is a limiting condition to the patient and to their ability to work manually. Intraarticular osteotomy is an accepted method for treatment of intraarticular

fracture malunion in other anatomical areas. Hence the reason why we would like to describe a group of the first 5 anatomic reconstructions of malunion after fracture dislocation of ulnar sided metacarpals by osteotomy of the bases of IVth and Vth metacarpals or osteotomy of the dorsal rim of the hamate eventually.

Methods: 5 male patients were treated by anatomic reconstruction for dislocating dislocation and malunion of ulnar sided CMC joints. All of them were treated by osteotomy of the malunited bones, reposition of the bones and joints and stabilization by internal osteosynthesis with use of corticocancellous graft from distal radius if necessary. Additional K wire transfixation to uninjured metacarpals was used to unload osteotomy site. Palm splint with syndactylization was used routinely in postoperative period for 6 weeks before removal of transfixing K wires. ROM in CMC joint, PA, true lateral and oblique radiographs, CT scan, VAS and grip strength were assessed preoperatively. A specific test for intermetacarpal malposition "hand shake" was used in all the cases. The same examination was repeated 6 months after the surgery. The appearance of the CMC joint congruity and length of the metacarpals were assessed.

Results: All the patients healed in near-to-anatomic position of the bones and joints on the ulnar side of CMC area. The position and length of metacarpals changed significantly with the reposition of a dorsal dislocation. CMC joint space and contour improved. CMC motion appeared from 0 preoperatively to 30 degrees postop.. VAS decreased from 7.6 to 1.4 postoperatively. The grip strength increased from 19.2 to 45.6. In all the cases reconstruction made a significant change in status of the patients. All patients returned to their previous occupation. Hand-shaking stopped being an unlikely procedure for them.

Discussion: The anatomic reconstruction after ulnar sided CMC joints malposition gives, in this small group and short time, predictable improvement. It decreases pain and improves appearance of the wrist, increases grip strength and allows the patient to return to manual work. It is a demanding procedure recommended only in indicated cases with precise assessment of the situation and planning preoperatively. Long term results are going to come.

10.1177/1753193409106339

A0353 INTRA- AND INTEROBSERVER RELIABILITY OF STANDARD WRIST-ARTHROSCOPY

S. Loew, T. Pillukat, K.-J. Prommersberger
Hand Center, Bad Neustadt, Germany

Purpose: To determine the intra- and interobserver reliability of diagnosis based on photograph documentation in wrist-arthroskopy.

Method: 102 wrist-arthroscopies were done in a standardized technique by 13 different surgeons. A minimum of 6 photographs were taken: Radioscaphoidal joint and radiovolar ligaments; scapholunate joint from radiocarpal; TFCC; ulnar recessus with lunotriquetral joint; scapholunate and lunotriquetral joint from mid-carpal. Additional photos were taken of further relevant pathologies. After 3 months the taken photographs again were shown to the arthroscoping surgeons and to two hand surgeons with more than 10 years experience in wrist-arthroskopy asking for diagnosis. This was done in a sequential manner: first the 6 standard and then all taken photographs were presented. Intraobserver reliability was assessed by comparing the intraoperative diagnosis with the diagnosis based on the photographs. Interobserver reliability was assessed by comparing the intraoperative diagnosis of the scoping surgeons with the diagnosis of the two experienced hand surgeons based on the photographs. Statistical analysis were

performed using kappa values ranging from -1 (complete disagreement) to $+1$ (complete agreement). Kappa values of 0.80 to 1.00 indicate excellent reproducibility; 0.60 to 0.80, substantial; 0.40 to 0.60, moderate; 0.20 to 0.40, slight and <0.20 , poor reproducibility.

Results: Intraobserver reliability was moderate with a mean kappa value of 0.50 and was higher than interobserver reliability (0.37/0.39). Assessing all taken photographs instead of the 6 minimum photographs did not improve reproducibility (0.52/0.34/0.38 vs. 0.50/0.37/0.39). For diagnosis of scapholunate ligament tear as well as for TFCC lesions intraobserver reliability and interobserver reliability in one experienced hand surgeon was moderate and fair in the other.

Summary: Intra- respectively interobserver reliability of diagnosis based on photograph documentation in wrist arthroscopy is limited. This may be caused by the lack of dynamic information. Video-arthroskopy might illustrate wrist pathologies more sufficiently.

10.1177/1753193409106342

SESSION 12: NERVE 2

- A0252 TENDON TRANSFER SURGERY ON CHILDREN WITH CEREBRAL PALSY IMPROVES BIMANUAL HAND FUNCTION MEASURED WITH ASSISTING HAND ASSESSMENT (AHA) 76
E. Pontén, C. Ekholm, A.-C. Eliasson
(Sweden)
- A0066 RESULT OF TENDON TRANSFER AND MUSCLE RELEASE IN 34 SPASTIC TYPE CEREBRAL PALSY PATIENTS WITH FOREARM AND WRIST DEFORMITY 76
A. Dianat, S. Dianat
(Iran, Dubai)
- A0255 WRIST ARTHRODESIS IN NEUROLOGICAL PATIENTS 76
M. Llusa-Pérez, M.R. Morro-Martí, D. Pacha-Vicente, J. Nardi-Villardaga, Á. Lluch-Bergada, X. Mir-Bullo
- A0110 A NOVEL APPROACH TO GRIP RECONSTRUCTION IN PATIENTS WITH TETRAPLEGIA 77
C. Reinholdt, J. Fridén
(Sweden)
- A0333 THE MULTIDISCIPLINARY CONSERVATIVE APPROACH IN TREATMENT OF TOS 77
F. Layeghi, M. Farzad
(Iran)
- A0288 FALSE POSITIVE RATE OF THORACIC OUTLET SYNDROME DIAGNOSTIC MANEUVERS IN NORMAL POPULATIONS 78
F. Layeghi, M. Farzad
(Iran)
- A0092 CONTROVERSIES IN TREATMENT OF GLENOHUMERAL DYSPLASIA IN CHILDREN SUFFERING FROM OBSTETRIC BRACHIAL PLEXUS PALSY 78
J. Bahm, C. Ocampo, W. Elkazzi, F. Schuind
(Germany, Belgium)
- A0277 ELBOW EXTENSION RESTORATION IN OBSTETRIC PALSY 78
A. Aydın, T. Özkan, S. Özkan, Z. Hoşbay
(Turkey)
- A0260 NERVE TRANSFERS FOR ELBOW FLEXION IN ADULT BRACHIAL PLEXUS INJURIES 78
M. Novikov, I. Golubev, T. Torno
(Russia)
- A0343 EVALUATION OF LIFE QUALITY IN PATIENTS OPERATED FOR SEVERE BRACHIAL PLEXUS LESIONS 79
B. Battiston, G. Vasario, L.G. Conforti, D. Ciclamini, P. Tos
(Italy)

A0270	THE POSSIBILITY OF REPLANTATION OF AVULSED BRACHIAL PLEXUS ROOTS TO THE ANTERIOR SURFACE OF CERVICAL SPINE – ANATOMICAL AND PHYSIOLOGICAL BASIS, OUR EXPERIENCE IN RAT MODEL A. Astapov, P. Czarnecki, J. Huber, A. Szukala, L. Romanowski <i>(Poland)</i>	79
A0015	ETIOLOGY OF THE PRONATOR SYNDROME: CORRELATION WITH SURGICAL FINDINGS Y. Nishio, S. Kato, M. Kondo, M. Minami <i>(Japan)</i>	80
A0249	THE INSIDIOUS POSTERIOR INTEROSSEOUS NERVE C. Tiengo, V. Macchi, A. Porzionato, F. Bassetto, R. De Caro <i>(Italy)</i>	81
A0135	POSTOPERATIVE COURSE OF THE CROSS-SECTIONAL AREA OF THE MEDIAN NERVE IN PATIENTS WITH CARPAL TUNNEL SYNDROME S. Kluge, B. Hennecke, J. Kreutziger, E. Vögelin <i>(Switzerland, Austria)</i>	81
A0375	RESULTS AFTER IMPLANTATION OF COLLAGENEOUS NERVE TUBES FOR SENSORY NERVE REPAIR IN THE HAND A. Haug <i>(Italy)</i>	82

A0252 TENDON TRANSFER SURGERY ON CHILDREN WITH CEREBRAL PALSY IMPROVES BIMANUAL HAND FUNCTION MEASURED WITH ASSISTING HAND ASSESSMENT (AHA)

E. Pontén, C. Ekholm, A.-C. Eliasson

Dept of Pediatric Orthopaedic Surgery, Dept of Women and Child Health, Neuropediatric Unit, Astrid Lindgren Children's Hospital, Karolinska University Hospital, Stockholm, Sweden

Introduction: The brain lesion in cerebral palsy will after a few years result in an imbalance between wrist flexors and extensors. This may, in turn, result in a flexed position of the wrist and fingers. By transferring the insertion of a flexor muscle to an extensor tendon, or by releasing a muscle, the balance of the wrist and the position of the hand can be improved. We have assessed the functional effect of the surgery with Assisting Hand Assessment, AHA, which is an instrument that measures how efficient a child with cerebral palsy spontaneously uses his or hers affected hand in bimanual activities. AHA is validated for children with hemiplegic cerebral palsy and has a very good reliability.

Material: Children with hemiplegic cerebral palsy who consecutively had been actualized for hand surgery. $n = 18$, age 6–16 years, mean 11 years.

Methods: The children were assessed within 14 months before the surgery and within 12 months after the surgery. Goal setting and self-assessment of performance were made on a 10-grade scale. Non-parametric tests were used for testing of the effect of the surgery.

Results: Median AHA was improved from 35.5%, range 8–65 to 45%, range 12–71 ($p = 0.004$), after the surgery. The part of the assessment that tested grip and opening of the hand improved the most ($p < 0.0001$). The children rated, on a scale of 10, their performance of activities they wanted to improve to 2.4 before the surgery, and 6 after the surgery.

Discussion: Earlier studies have shown that hand surgery in cerebral palsy improves the grip. Tests with Assisting Hand Assessment demonstrate that the children also use this ability in bimanual activities.

10.1177/1753193409105927

A0066 RESULT OF TENDON TRANSFER AND MUSCLE RELEASE IN 34 SPASTIC TYPE CEREBRAL PALSY PATIENTS WITH FOREARM AND WRIST DEFORMITY

A. Dianat¹, S. Dianat²

¹*Iran University of Medical Sciences, Tehran Iran*

²*Wollongong University, Dubai*

Introduction: 4% of spastic type CP patients with forearm and wrist deformity could be helped by surgery. Best results are achieved after age of 4 when the child has good sensibility, placement, cognition and some motor control. Surgery in spastic type CP is usually more predictable and has better functional result than other types of CP.

Materials and methods: Between the years 1998 and 2005, 34 patients with spastic CP who had persistent deformities not improved by physical therapy and/or splinting and age of 4 or above were selected. All of them had forearm-pronator and wrist flexion deformity. The mean age was 11 (5–24). 20 were female and 14 were male. The deformity was on left side in 23 and right side in 11 patients.

The following surgical procedures were performed:

- 1 - FCU to ECRB in 34
- 2 - Flexor-pronator sliding in 34
- 3 - Pronator-teres rerouting in 14
- 4 - Pronator-quadratus release in 5
- 5 - Brachio-radialis transfer to ECRB in 5

The mean follow-up period was 53 months (32–103 months)

Results: 52% improvement in forearm and wrist ROM
27% improvement in wrist and hand function
34% improvement in daily life activity
38% improvement in upper limb function

Conclusions: Significant improvement of function has been achieved by decrease in spasticity through tendon and muscle release and correction of deformity obtained by tendon transferring.

10.1177/1753193409105926

A0255 WRIST ARTHRODESIS IN NEUROLOGICAL PATIENTS

M. Llusa-Pérez, M.R. Morro-Martí, D. Pacha-Vicente, J. Nardi-Villardaga, Á. Lluch-Bergada, X. Mir-Bullo
Hospital de Traumatología y Rehabilitación de Vall d'Hebron

Objective: To present the experience of a Department of Neuroorthopedics in treatment of the severe deformities of the wrist using the technique of the wrist arthrodesis very often associated to other surgical procedures such as musculotendinous lengthenings and transferences.

Material and methods: 20 patients with neurological sequelae of cerebral palsy, head trauma, stroke and other

neurological disorders of the first motoneuron were retrospectively studied. Fusion of the wrist with an specific plate was performed on these patients.

Results and discussion: Despite the fact that many text books contraindicate wrist arthrodesis in patients with neurological sequelae because of the remote possibility that they may need the flexoextension for the use of walker or crutches or manual or electric wheel-chairs, in our experience many patients benefit from this procedure to correct severe deformities that make their hands absolutely dysfunctional. Furthermore, the intervention provides the patients and their family with benefits in terms of hygiene, dressing, very often improvement of the pain and, even the aesthetics. Some patients have also gained function, passing from a dysfunctional hand to a useful hand for the basic functions of life. Nowadays, for these kinds of patients to be able to move one or two fingers, if they are correctly positioned, can be useful to manage a walker, a computer or a motorized wheel-chair.

10.1177/1753193409105968

A0110 A NOVEL APPROACH TO GRIP RECONSTRUCTION IN PATIENTS WITH TETRAPLEGIA

C. Reinholdt, J. Fridén

Dept of Handsurgery, Sahlgren's University Hospital, Sweden

Background: Reconstructing the grip in patients with tetraplegia is a surgical and physiotherapeutical challenge. Previously patients underwent surgical procedures in two stages in order to achieve both finger flexion and extension. By adding combinations of tenodesis procedures to the flexor reconstruction phase it is possible to restore both active flexion and passive extension. The current study was undertaken to investigate the applicability of this combination of surgical procedures.

Methods: 15 patients classified OCu 3–6 underwent tendon transfers for finger and thumb flexion and a combination of tenodesis procedures of modified House's procedure for finger extension, EPL tenodesis for thumb extension and ECU tenodesis to correct radial deviation in the wrist. Rehabilitation started on the first postoperative day and focused on early mobilization. After 4 weeks the rehabilitation was focused on task-oriented training. The range of motion (ROM) of finger flexion and extension were measured.

Results: Passive extension of the thumb and fingers was created with a ROM of 45 degrees in the metacarpal

phalangeal joints. Finger flexion was satisfactory. The opening grip was 5 cm. Radial deviation deformity in the wrist was corrected.

Conclusions: Grip reconstruction including active finger flexion and passive extension is possible to restore in a one-stage procedure. Patients were satisfied with the extension range and felt no need for active extension reconstruction. The study also shows the importance of early mobilization to reduce the risk of adhesions.

10.1177/1753193409106117

A0333 THE MULTIDISCIPLINARY CONSERVATIVE APPROACH IN TREATMENT OF TOS

F. Layeghi, M. Farzad

University of Welfare and Rehabilitation Sciences, Iran Hand Rehabilitation Sciences, Iran

Objective: The aims of this study were to evaluate the efficacy of conservative treatment in patients with cervical ribs and neurogenic thoracic Outlet Syndrome. There are so many kinds of conservative treatment in the literature, we use a multidisciplinary approach (correction of posture, maximize muscle endurance and power, stretch shortened muscles, massage for reducing trigger points, maximize thoracic span with stomach breathing) in order for the treatment to be more effective with less duration and more long-term relief.

Methods: 20 patients with cervical ribs, pain and numbness were included in this study. 60% had bilateral cervical ribs. In the first evaluation all of them had forward head/abdominal weakness/weakness in hip extensors/shoulder medial rotation in 80% kyphosis 90%, anterior pelvic tilt 80%, lordosis 20%, sceliosis 20%,s hortness in hip flexor and posterior pelvic tilt in 20%. In 90% onset of pain and numbness were less than one year.

Results: After 4 weeks using a multidisciplinary approach, 90% of patients showed near full recovery, 10% had partial improvement (the patients with long lasting signs) which was due to more weakness and need of more exercise time.

Conclusions: Faulty posture can cause narrowing of the space in the thoracic outlet and lead to pain and numbness, correction of posture despite the cervical rib can widen the space and reduce pressures on vessels and nerve, long term follow-up and postural correction must be done in order to have long-term relief.

10.1177/1753193409106009

A0288 FALSE POSITIVE RATE OF THORACIC OUTLET SYNDROME DIAGNOSTIC MANEUVERS IN NORMAL POPULATIONS

F. Layeghi, M. Farzad

University of Welfare and Rehabilitation Sciences, Iran Hand Rehabilitation Center, Iran

Objective: In this study, we aim to determine the false-positive rate & specificity subjects of provocative maneuvers used to diagnose thoracic outlet syndrome (TOS) in normal persons.

Design/Methods: Maneuvers advocated for the assessment of thoracic outlet compression were performed on 56 (31 female, 25 male) randomly chosen normal volunteers without any Pain complain. All subjects underwent provocative testing blindly by a physician, which included the Adson A & B tests, Costoclavicular maneuver (CCM), Elevated arm stress test (Rose), tinel and Supraclavicular pressure (SCP).

Results: Adson (30%), Rose(20%), C.C.T.(5%), S.C.P. [LT (18%), U.T. (7%)] were positive in cases.

Conclusions: We conclude that current provocative maneuvers used to diagnose TOS result in a high false-positive rate in normal subjects. We suggest this low specificity devalues these tests in clinical practice.

10.1177/1753193409106008

A0092 CONTROVERSIES IN TREATMENT OF GLENOHUMERAL DYSPLASIA IN CHILDREN SUFFERING FROM OBSTETRIC BRACHIAL PLEXUS PALSY

J. Bahm, C. Ocampo, W. Elkazzi*, F. Schuind*

Euregio Reconstructive Microsurgery Unit, Franziskushospital Aachen, Germany Department for Orthopedics and Traumatology, Erasmus University Hospital, Brussels, Belgium

Between 1997 and 2008, we operated on more than 200 children with sequelae of upper obstetric brachial plexus palsy suffering from a medial rotation contracture of the gleno-humeral joint.

Although a common hypothesis concerning muscular dysbalance between shoulder lateral and medial rotators exists, some small children show a typical dorsal subluxation of the humeral head very early despite good physiotherapy.

There is an ongoing controversy how to manage this problem and we want to present our strategy and results, using a stepwise surgical approach through closed joint

reposition, use of Botox, shoulder release procedures, tendon transfers and osteotomy of the humerus. Advantages and drawbacks in the long term outcome are presented and discussed.

10.1177/1753193409105999

A0277 ELBOW EXTENSION RESTORATION IN OBSTETRIC PALSY

A. Aydın, T. Özkan, S. Özkan, Z. Hoşbay
Istanbul University Istanbul Medical Faculty Plastic and Reconstructive Surgery Department, Turkey

Introduction: Obstetric palsy patients either had primary nerve surgery or followed by physiotherapy may need palliative surgery. Shoulder abduction, external rotation restoration, forearm pronatoplasty, elbow flexion procedures are frequently performed in our department. In this study we present elbow extension restoration procedures which is not commonly mentioned in relevant literature.

Material and methods: We have 13 patients with elbow extension restoration ages between 5–16 years. We used brachioradialis muscle in 6 patients, brachialis muscle in 6 patients and posterior deltoid muscle in one patient. After muscle transfer to triceps and 4 weeks of cast immobilisation, physical therapy was started.

Results: Average elbow extension was improved 40 degrees and shoulder abduction was improved 30 degrees in our patients.

Conclusion: Since elbow extension is a passive movement in daily live and at secondary importance comparing elbow flexion, muscle transfer to triceps is not commonly mentioned in obstetrical palsy literature. This need was observed specially in patients whom had improved shoulder abduction with surgery but limited elbow extension. Having good results with brachioradialis and brachialis to triceps muscle transfer we added this procedure in our palliative surgery algorithm.

10.1177/1753193409106007

A0260 NERVE TRANSFERS FOR ELBOW FLEXION IN ADULT BRACHIAL PLEXUS INJURIES

M. Novikov, I. Golubev, T. Torno
Department of Orthopaedic Surgery, Yaroslavl state medical academy, Solovjov University Hospital, Division of Hand Surgery and Reconstructive Microsurgery, Yaroslavl, Russia

Introduction: Restoration of elbow flexion is one of the priorities in cases of brachial plexus injuries (BPI). Nerve

transfers became routine procedures for C5, C6 avulsions. However, there is no common opinion among the BPI experts about the indications for particular method of nerve transfers concerning different conditions such as severity of the injury and denervation time.

Materials and methods: From the end of 2004 to 2008 thirty-nine adult patients had brachial plexus reconstructions at our center with follow up at least 8 months. Fourteen of them required nerve transfers for elbow flexion. Two situations in BPI were considered as an indications for these procedures: both C5, C6 avulsions and muscle denervation period exceeding 8 months. The donor nerves were ipsilateral C7, partial ulnar nerve (isolated and combined with median), intercostal nerves (ICN) and phrenic nerve. All patients had clinical and electrophysiological evaluation in 6 and 12 months after the surgery. Elbow flexion \geq M3 according to Medical Research Council scale was considered as a positive result.

Results: In all cases reinnervation of the biceps was proved clinically and electrophysiological. Although 79% of the patients received elbow flexion \geq M3. Partial ulnar and median nerve transfers failed in two cases when lower BP was involved in the injury with recovery of finger and wrist flexion to M4 at the moment of surgery. No-one in this group of patients reached elbow flexion more than M4. Controversially ipsilateral C7 transfer to musculocutaneous (MC) nerve through three 10–12 cm nonvascularized interposition nerve grafts (NG) could provide from M4+ to M5– elbow flexion in all cases. Direct three ICNs to MC or its branch to the biceps were used in the cases of total BP avulsions with 67% of positive results (\geq M3).

Conclusion: Ipsilateral C7 is the best donor nerve for elbow flexion reconstruction in cases of C5, C6 avulsion even with use of long nonvascularized NGs. In cases of C5–C7 avulsions partial ulnar and median nerve transfers to the biceps and brachialis muscle branches of MC should be utilized. Other donor nerves must be considered if lower BP were involved. Use of at least three ICNs with direct suture to MC gives reliable results in the cases of C5–T1 avulsions. Indications to nerve transfers should be extended in late cases by use of donor nerves are located nearby to the target muscles.

10.1177/1753193409106000

A0343 EVALUATION OF LIFE QUALITY IN PATIENTS OPERATED FOR SEVERE BRACHIAL PLEXUS LESIONS

B. Battiston, G. Vasario, L.G. Conforti, D. Ciclamini, P. Tos

UOD Reconstructive Microsurgery, Ortopaedic Department, CTO Hospital Turin, Via Zuretti 29 10126 Turin, Italy

Traumatic lesions of the brachial plexus are a serious concern for the surgeon who often has to solve complex evaluations and therapeutic choices. Tools to evaluate life quality are more and more used in clinical practice and in scientific research. The authors propose a subjective evaluation of the outcome in patients who underwent surgical treatment for severe brachial plexus injuries (avulsion, rupture of three or more roots).

The SF-36 is a short-form health survey (approximately only 10 minutes to be completed by the surgeon or the patient himself) with only 36 questions. It yields an 8-scale profile of functional health and well-being scores as well as psychometrically-based physical and mental health summary measures and has been proven to be a quite accurate and reproducible tool to evaluate quality of life after surgery.

The present series was drawn from the retrospective study of 25 patients with severe traumatic lesions of the brachial plexus treated between 1996 and 2005 in our Reconstructive Microsurgery Department. The SF-36 was applied both pre-operatively and at follow-up (mean FU 60 months). Sixteen patients (64%) were very satisfied (7) or satisfied (9) with their result. Nine patients (36%) were disappointed or very disappointed because of persisting pain and poor motion. Mean Physical Functioning SF-36 score was 82.8 points (SD 12.2), mean Role-Physical score was 69 points (SD 32.5) while mean Bodily Pain score was 57.8 points (SD 27.5). BPI Surgery gives good subjective results towards pain and ADL functioning even in severe lesions. The SF-36 seems to be a reliable and flexible tool to evaluate subjective results in BPI surgery and offers the possibility for future prospective and comparative studies.

10.1177/1753193409106010

A0270 THE POSSIBILITY OF REPLANTATION OF AVULSED BRACHIAL PLEXUS ROOTS TO THE ANTERIOR SURFACE OF CERVICAL SPINE - ANATOMICAL AND PHYSIOLOGICAL BASIS, OUR EXPERIENCE IN RAT MODEL

A. Astapov,¹ P. Czarnecki,¹ J. Huber,² A. Szukala,² L. Romanowski¹

¹*The Hand Surgery Department, Poznan University of Medical Sciences, Poznan, Poland,*

²*The Pathophysiology Department, Poznan University of Medical Sciences, Poznan, Poland.*

The pathogenic basis of avulsion injury of brachial plexus is the absence of proximal end of axon. The main part of post-avulsion pathology is the permanent deficit of the motor innervation. Clinical treatment in the majority of cases consists of nerve transfers and neurotisation techniques and gives intermediate outcome with the losses in donor neuromer. Currently, early replantation techniques are advised. These operative techniques must include penetration into the vertebral canal and implantation of the peripheral nerve tissue to the spinal cord tissue. In the majority of described works such replantations were carried out from the posterior access and the replantations were made into the posterolateral surface of spine. This anatomic area is not closer to motoneuron bodies and to the exit of motoneuron axons. It seems that the best place for the replantation - is the same level and the same site (sulcus ventrolateralis) - orthotopic replantation.

The aim of the research is to describe the model of direct replantation and stabilization of the upper part of the brachial plexus into the anterior surface of the cervical spine after experimental avulsion.

Material and methods: 40 male Wistar rats were operated. In general anesthesia the approach to the part of brachial plexus (C5–C6) was made by cervicosternotomy, next the approach to the anterior surface of C5-C6 segments of spine was made by hemicorporectomy of C5. The first (control) group included 12 animals with mechanical C5, C6 avulsion with hemicorporectomy of C5 only, the second group included 12 animals with mechanical C5, C6 avulsion and hemicorporectomy of C5, but with end to end reconstruction of avulsed roots by the cervical plexus, the third group included 16 animals with C5, C6 avulsion and replantation of avulsed roots back to the anterior surface of C5, C6 segments of spine. Postoperative survival was noticed in the first group 67% (8 rats survived), in the second group 58% (7 rats survived), in the third group 81% (13 rats survived). There were typical Dushchene-Erb palsy and some reversible complications in survived rats. To evaluate the efficiency of used reconstructive techniques several pre and postoperative tests were made: 1) symmetrical ladder test, 2) asymmetrical ladder test, 3) cylinder test, 4) grooming test, 5) foot print test. The time of follow up was 4 months. Additionally, after the follow-up time, during the reoperation, investigations of nerve potentials were made.

Conclusion: Using this model we obtained some functional and electro-physiological evidence of efficiency of direct anterior replantation of upper brachial plexus orthotopically into the proper spine segments.

10.1177/1753193409106005

A0015 ETIOLOGY OF THE PRONATOR SYNDROME: CORRELATION WITH SURGICAL FINDINGS

Y. Nishio, S. Kato, M. Kondo, M. Minami
Hokkaido Orthopaedic Memorial Hospital, Sapporo, Japan

Background: The pronator syndrome, high median nerve compression, where the nerve passes through the pronator teres muscle in the proximal forearm, is uncommon in comparison with carpal tunnel syndrome. Several potential sites of median nerve compression have been identified; these include the lacertus fibrosus, the pronator teres muscle and the flexor digitorum superficialis muscle, but its etiology is still controversial.

Aim: We attempted to correlate the intraoperative site of median nerve compression with the preoperative clinical features of the pronator syndrome.

Materials and Methods: We reviewed eight patients (nine limbs) treated surgically in the last ten years. The mean ages of patients was 43 years and there were one male and seven females. The chief complaint was numbness in the median nerve distribution. It is noted that five of the patients complained of paresthesia in the thumb and index finger. Four patients complained of aching discomfort in the forearm. In all patients, tenderness in the proximal part of the pronator teres muscle was positive and symptoms were enhanced during elbow motions, especially during extension in six limbs. Of these six patients, three had hyperextension of more than 10 degrees in the elbow joint. On the contrary, flexion of the elbow aggravated symptoms in two patients. No patient showed clear muscle atrophy or muscle weakness. One patient had concomitant carpal tunnel syndrome. Elbow to wrist nerve conduction tests were obtained in two patients and were normal in both.

Results: Intraoperative findings showed that intramuscular tendinous bands within two heads of the pronator teres muscle were observed in five limbs and hypertrophy of the lacertus fibrosus in three. However, in the authors' patients, the sublimis arcade showed enough space and its location was far from the tenderness site. Subsequently, the arcade was not divided. No degenerative signs of the median nerve were observed in any patients. Postoperatively, five limbs had complete relief of symptoms and three partially recovered. One patient reported no change of symptoms because carpal tunnel syndrome appeared three months later.

Conclusion: Dynamic friction between the median nerve and the intramuscular fascia beneath superficial

head of pronator teres muscle during elbow extension or impingement of the median nerve and the lacertus fibrosus during elbow flexion seemed to be etiologic factors.

10.1177/1753193409105960

A0249 THE INSIDIOUS POSTERIOR INTEROSSEOUS NERVE

C. Tiengo, V. Macchi, A. Porzionato, F. Bassetto, R. De Caro

Clinic of Plastic Surgery and Hand Surgery, Padova University, Italy

Institute of Human Anatomy and Fisiology, Padova University, Italy

The compressive syndrome of the posterior interosseous nerve (PIN) is quite an unusual event compared to the most common nerve entrapment syndromes of the forearm. Moreover the direct traumatic lesions of the PIN are often unidentified and considered improbable events due to safe anatomical course of the distal motor branch of the radial nerve in the forearm. The sub-muscular course of the PIN in the elbow and dorsal forearm regions guarantees its protection from direct trauma but at the same time makes difficult the accurate topographical location of such nerve. In the clinical practice in fact lesions of distal motor branches or their compressions are often identified and treated too late.

The aim of this study, through anatomical dissections on cadavers and the revision of the clinical cases in the last 6 years, is to provide useful details of the entire course of the PIN from the elbow region to its distal muscular ramifications. The authors clarify the superficial anatomical landmarks of the PIN, its potential entrapment sites and emphasize its pattern of ramification. In particular the distance from the division of the radial nerve at the elbow and the proximal edge of the supinator muscle is 3.2 cm; the width of the supinator muscle is 4 cm; the distance between the radial epicondyle and the proximal edge of the supinator muscle is 5.3 cm; the distance between the radial epicondyle and the distal edge of the supinator muscle is 8.4 cm; the distance between the distal edge of the supinator muscle and motor branch to ALP and EBP is 3.5 cm; the distance between the distal edge of the supinator muscle and the emergence of the posterior interosseous artery is 2.7 cm.

The revision of 36 cases of peripheral nerve entrapments of the upper limb from 2000 to 2007 showed 2 cases of

PIN compression due to lipomas and in 1 of these cases a retarded diagnosis of nerve involvement caused bad functional recovery of the wrist extension.

The functional recovery of the hand in the direct trauma or indirect compression of the PIN shows a direct relation to the precocious diagnosis and surgical management.

The accurate knowledge of the course of the PIN and its distal muscular ramifications and the potential entrapment sites may guarantee to the hand surgeon the best surgical management and functional recovery.

10.1177/1753193409105963

A0135 POSTOPERATIVE COURSE OF THE CROSS-SECTIONAL AREA OF THE MEDIAN NERVE IN PATIENTS WITH CARPAL TUNNEL SYNDROME

S. Kluge¹, B. Hennecke², J. Kreutziger³, E. Vögelin⁴
^{1,2,4}*University of Bern, Inselspital, Department for Plastic and Hand Surgery, Switzerland*

³*University of Innsbruck, Department of Anesthesiology and Critical Care Medicine, Austria*

Background: Sonographic detection of pathologic swelling of the median nerve by assessing its cross-sectional area (csa) demonstrates a possibility to diagnose CTS and appears to be convenient to patient and observer. The diagnostic effect of a ratio using 2 different ipsilateral levels has been evaluated previously but no data is available on the course of the csa after surgical decompression and its comparability to postoperative nerve conduction studies.

Aim: The aim of this prospective study was to analyse the postoperative course of the cross-sectional area of the median nerve and its relationship to postoperative distal motor latency and sensory conduction velocity.

Methods: Twenty-one wrists of patients with clinical, neurophysiologic, and ultrasonographic confirmation of a carpal tunnel syndrome were examined sonographically at six weeks and twelve weeks after surgical decompression. The csa of the median nerve was measured at the entrance of the carpal tunnel (distal level) and 2 cm proximal of the palmar wrist crease (proximal level). The results were compared with preoperative sonographic measurements and correlated to postoperative nerve conduction studies at 12 weeks after decompression.

Results: Preoperative measurements of patients with carpal tunnel syndrome showed a larger cross-sectional area of the median nerve at the distal level (14.3 mm²)

compared to the proximal level (10.2 mm^2). Six weeks after surgical decompression we found a moderate decrease of the cross-sectional area at the entrance of the carpal tunnel (13.3 mm^2) and 2 cm proximal of the distal palmar wrist crease (9.9 mm^2), respectively. Nevertheless, the preoperative finding of a positive ratio was still present postoperatively as well as it did at 12 weeks (12.4 mm^2 [distal]/ 10.0 mm^2 [proximal]) after carpal tunnel release. However, the decrease of the csa at the distal level from preoperative to 12 weeks postoperative was statistically significant ($p < 0.030$). Mean distal motor latency and sensory conduction velocity ($n = 11$) improved significantly from 39.0 ms and 5.7 m/s preoperatively to 42.3 ms ($p < 0.034$) and 4.5 m/s ($p < 0.010$) 12 weeks postoperatively.

Discussion/Conclusions: High-resolution ultrasound is a reliable tool in diagnosis of carpal tunnel syndrome. The diagnostic value of a ratio of two different ipsilateral levels has been proven to be useful in detection of a carpal tunnel syndrome. After surgery however, decrease of the cross-sectional area takes place slowly in comparison with improvement of nerve conduction studies and clinical symptoms.

10.1177/1753193409105961

A0375 RESULTS AFTER IMPLANTATION OF COLLAGENEOUS NERVE TUBES FOR SENSORY NERVE REPAIR IN THE HAND

A. Haug

Helios Klinikum Schwerin

Purpose: Investigation of therapeutic use and results after implantation of collagenous nerve tubes.

Methods: Since 2006 32 persons with acute nerve defect lesions or neuromas were included in this study. In all patients collagenous nerve tubes were implanted and detailed sensory nerve functions were investigated in affected skin areas 3, 6, 12 and 24 months following nerve repair.

Results: 32 patients aged 16–72 were investigated. So far 19 patients have been followed up at least 12 months. In this group 12 patients had acute nerve lesions and 7 neuromas. Results were better in young patients and in patients with acute nerve transections.

Conclusions: The implantation of collagenous nerve tubes seems to be a promising method to improve guidance of sensory nerve fibres and reinnervation and may therefore be an alternative to nerve transplantation in nerve defects less than 2.4 cm.

10.1177/1753193409105971

SESSION 14: ELBOW

- A0149 SURGICAL TREATMENT OF SUPRACONDYLAR AND SUPRA –
INTRACONDYLAR HUMERAL FRACTURES 85
T. Haridimos, N. Hadjinicolaou, A. Papagiavis, F. Giannoulis, E. Fandridis,
G. Apostolakis, N. Gerostathopoulos
(Greece)
- A0095 ELBOW DISLOCATIONS AND FRACTURE-DISLOCATIONS, CLINICAL
OUTCOME WITH A MINIMAL FOLLOW-UP OF 2 YEARS 85
T. Jager, F. Sirveaux, Y. Ducoulombier, O. Roche, D. Molé, P. Mansat, GEEC
(France)
- A0074 IMPROVEMENT OF THE ELBOW FUNCTION WITH EARLY MOBILIZATION
AND RIGID FIXATION OF CORONOID FRACTURE BY TENSION
BAND TECHNIQUE 86
I. Rhyou, C. Chung, B.G. Suh, K. Kim
(Korea)
- A0011 “ANDREWS”-TYPE LIGAMENOTPLASTY BY PALMARIS LONGUS FOR
TREATING TRAUMATIC INSTABILITIES OF THE ELBOW. 10 CASES 86
I. Ignatiadis, E. Pananis, D. Dovris, S. Vasilas, N. Hatzinikolaou, F. Giannoulis,
N. Gerostathopoulos
(Greece)
- A0297 PECTORALIS MAJOR TRANSPLANTATION TO RESTORE OF ELBOW FLEXION
IN WAR INJURED PARALYTIC PATIENTS 86
S. Ghahremani
(Iran)
- A0103 BRACHIALIS RE-ROUTING FOR THE RESTORATION OF ACTIVE SUPINATION
AND CORRECTION OF FOREARM PRONATION DEFORMITY 87
T. Ozkan, A. Bicer, H.U. Aydin, A. Aydin, Z. Yildirim
(Turkey)
- A0104 TREATMENT OF CUBITUS VARUS IN ADULTHOOD 87
L. Farhadi, R.SH. Kamrani
(Iran)
- A0033 CORRECTIVE DOME OSTEOTOMY FOR CUBITUS VARUS AND VALGUS IN
ADULTS 88
Y.R. Choi, S.B. Hahn, H.J. Kang
(Korea)
- A0035 DECOMPRESSION AND MINIMAL MEDIAL EPICONDYLECTOMY WITH A
SMALL INCISION FOR CUBITAL TUNNEL SYNDROME: COMPARISON TO
ANTERIOR SUBCUTANEOUS TRANSPOSITION OF THE ULNAR NERVE 89
Y.R. Choi, S.B. Hahn, H.J. Kang
(Korea)

A0196	PERCUTANEOUS REDUCTION FOR MASON II, III RADIAL HEAD OR NECK FRACTURE J.-G. Lee, H.J. Kang, M.S. Her, Y.R. Choi, S.B. Hahn (Korea)	89
A0228	ENDOPROTEZOPLASTYKA BIPOLARNA GŁOWY KOŚCI PROMIENIOWEJ TYPU KPS W MATERIALE KLINIKI. THE RESULTS OF BIPOLAR KPS REPLACEMENT ARTHROPLASTY OF THE RADIAL HEAD IN ACUTE FRACTURES M. Urban, S. Pomianowski, D. Michalik, D. Kowalski, A. Podgórski	90
A0063	OUTCOMES OF SURGICAL MANAGEMENT OF COMMINUTED RADIAL HEAD FRACTURES WITH RADIAL HEAD ARTHROPLASTY V. Tsiampa, Z. Zaharopoulos, I. Tepetzi, A. Gerakis, C. Dimitriou (Greece)	90
A0268	ESSEX-LOPRESTI INJURY – A NEW OPERATIVE APPROACH – A REPORT OF TWO CASES P. Sagiv, B. Kish, Y.S. Brin, M. Nyska	90
A0087	TREATMENT OF PROXIMAL RADIO-ULNAR SYNOSTOSIS WITH REVERSE SAUVE-KAPADJI IN 6 CASES R.-S. Kamrani, A. Saremi (Iran)	91

A0149 SURGICAL TREATMENT OF SUPRACONDYLAR AND SUPRA – INTRACONDYLAR HUMERAL FRACTURES

T. Haridimos, N. Hadjinicolaou, A. Papagiavis, F. Giannoulis, E. Fandridis, G. Apostolakis, N. Gerostathopoulos
Upper limb and Microsurgery Clinic, General Hospital "KAT", Athens, Greece

Purpose: To evaluate surgical management in patients with supracondylar and intracondylar fractures of the distal humerus.

Materials and methods: During the period from January 2002 to December 2007, 30 patients (9 female, 21 male) with a recent fracture of the distal humerus were treated. The mean age was 39.2 years (range 28–76). All patients were treated surgically. 12 fractures were supra-intracondylar and 18 fractures were supracondylar, while 3 of them were bilateral. 10 of the patients sustained a high energy trauma (6 polytrauma and 5 flail elbows), and 20 of them had a low energy trauma. All patients were treated surgically with a posterior approach, exploration of ulnar nerve and olecranon osteotomy. We used Mayo type plates for internal fixation. Range of motion (flexion – extension, pronation – supination) was measured pre- and post-operatively in all patients. Pain was assessed on a VAS (Visual Analogue Scale) pre- and postoperatively. Follow up evaluation was performed at one, three, six and twelve months after surgical treatment, with a mean time of 14.5 months (range 6–21).

Results: Excellent results were obtained in 54.5% (18 fractures) of all cases, good in 18.1% (6 fractures), moderate in 18.3% (6 fractures) and poor in 9.1% (3 fractures). We used the Mayo Elbow score for evaluation and we obtained satisfactory reduction of their pain (average improvement on the VAS 5.2). Mean duration of fracture healing was 8 weeks (range 7–11). Mean elbow range of motion for flexion was 112.40 (range 95–1300) and extension was 16.30 (range 00–250) degrees. In 2 cases there was an implant failure leading to an additional revision procedure and in one case a total elbow replacement was required. There were no infections in our series.

Conclusions: Surgical treatment in patients with supracondylar and supra-intracondylar humeral fractures with internal fixation using low profile plates, offers anatomical reduction, stability of the elbow and excellent functional results.

10.1177/1753193409106345

A0095 ELBOW DISLOCATIONS AND FRACTURE-DISLOCATIONS, CLINICAL OUTCOME WITH A MINIMAL FOLLOW-UP OF 2 YEARS

T. Jager, F. Sirveaux, Y. Ducoulombier, O. Roche, D. Molé, P. Mansat, GEEC
Clinique de Traumatologie et d'Orthopédie SINICAL Nancy, France
Service d'orthopédie et traumatologie, CHU Purpan Toulouse, France

Elbow dislocations and fracture-dislocations are quite frequent, and the last ones are often a « challenge » for the surgeon in charge.

We report the results of 229 patients, followed in 6 French teaching hospitals for at least 6 months. 153 patients were clinically reviewed. A minimal of 2 years of follow-up was found for 70 patients (mean follow-up 51 months), and 104 had complete X-ray evaluation at final follow up. Patients files were reviewed, patients had a physical examination with range of motion, strength evaluation and had a functional scoring with MEPS and Quick DASH. Elbow radiographics were done at final follow-up, and elbow arthritis was ranked according to Broberg-Morrey classification.

We focused on the effect of time on the outcome of these elbows which presented dislocation or fracture-dislocation, and on the occurrence of elbow arthritis.

At more than 2 years of follow-up, the ROM was 120.9°, with a lack of extension of 11.3°, MEPS was 88.6 and QuickDASH 14.4. We found no relevant differences between patients before or after 2 years of follow-up, for physical (ROM, strength) and functional items (MEPS). QuickDASH was better after 2 years. We did not find arthritis to be more frequent after 2 years.

In that group of patients at more than 2 years of follow-up, we found fracture-dislocations to have a bad impact on the final outcome. ROM was smaller and functional outcome only good (MEPS 84.9) instead of excellent (MEPS 93.1) for simple dislocations.

Incidence of elbow arthritis was significantly lower in cases of fracture-dislocation. ROM, functional scores, and strength are impaired in arthritic elbows. Nevertheless, functional outcome is still fair with MEPS 75.6 and ROM 106.8° for patients with arthritis graded 2 or 3 according to Broberg-Morrey classification.

Final outcome of elbow dislocation or fracture-dislocation seems to be reached quite fast, in fact before 2 years. Elbow arthritis is a problem mainly for fracture-dislocations and seems to appear early during history. It affects the final outcome, which remains still fair.

10.1177/1753193409106383

A0074 IMPROVEMENT OF THE ELBOW FUNCTION WITH EARLY MOBILIZATION AND RIGID FIXATION OF CORONOID FRACTURE BY TENSION BAND TECHNIQUE

I. Rhyou, C. Chung, B.G. Suh, K. Kim

Department of Orthopaedic Surgery, Upper Extremity and Microsurgery Center, Semyung Christianity Hospital, Pohang, Korea

Purpose: To evaluate the surgical results of the early mobilization after rigid fixation of the small coronoid fracture with tension band technique.

Methods: Eight cases of coronoid fracture were fixed with tension band technique using K-wire and wire through medial approach. All cases were Regan-Morrey type 2. According to O'Driscoll, they were classified as type tip (subtype 2) 5 cases and anteromedial types 3 case (subtype 2, one case and subtype 3, 2 cases). Associated collateral ligament injuries (6 cases) and radial head fractures (4 cases) were managed simultaneously. After immobilization for 5–7 days active ROM exercise with fitted hinge brace started till postoperative 6 weeks. Patients were assessed for pain, ROM, and functional disability using the Mayo elbow performance score (MEPS) at an average of 11 (6–28) months. Ulnar nerve symptom was also investigated.

Results: We observed solid union in all coronoid fractures without hardware failure. Average 2.2 (2–4) K-wires were used. Mean extension was 3° (0°–25°), flexion 137° (130°–140°), pronation 69° (45°–90°), supination 78° (45°–90°). Mean MEPS was 96 (65–100). Ulnar nerve symptom was found in one patient of a terrible triad taking radial head excision and residual medial instability postoperatively.

Conclusion: Tension band technique using easily obtainable, economic K-wires and wiring was strong enough to permit early elbow ROM exercise and might improve elbow function. Especially it was useful for fixation of the multiple small fragments.

10.1177/1753193409106385

A0011 “ANDREWS”-TYPE LIGAMENOTPLASTY BY PALMARIS LONGUS FOR TREATING TRAUMATIC INSTABILITIES OF THE ELBOW. 10 CASES

I. Ignatiadis, E. Pananis, D. Dovris, S. Vasilas, N. Hatzinikolaou, F. Giannoulis, N. Gerostathopoulos
Hand surgery-Upper limb and Microsurgery Dept, KAT Hospital of Athens, Greece

Aim: The aim of the presentation is to prove the importance of the medial ligamentary system of the elbow for its stability and the usefulness of the ligamentoplasty by palmaris longus tendon as reconstructive technique.

Methods-patients: 9 patients aged between 17 and 58 (17,18,28,32,35,38,40,56,58,62) 6 male, 4 female suffered the following injuries: 1) elbow luxation or subluxation with rupture of the medial collateral elbow ligament, associated with: 1) Forearm bone fractures, 2) Ulnar nerve palsy, 3) fracture of the coronoid process, 4) Fracture of the radius head, 5) fracture of the humerus with radial and musculocutaneous nerve palsy. The lesions happened since 2 week, 2 month and 2 yrs respectively. The 17 yrs old young man was injured during a weightlifting championship game and the next 4 suffered traffic and work accidents, while the 18-y-o suffered an iatrogenic ligamentary lesion, the rest of the lesions have been caused by work accidents or motor vehicle accidents.

All patients were operated by ligamentoplasty with palmaris longus by medial incision, fenestration of the medial epicondyle and olecranon and transosseus pivoting of the palmaris longus which was enforced by 2 anchor sutures.

A DON JOY functional splint was applied postoperatively, initially fixated between 110-85 degrees. The splint was removed 2 months postoperatively, while full range of motion was obtained.

Results: Follow up was between 6 and 38 months. We performed both Mayo clinic and DASH scores and grip strength evaluation. The 16-y-o boy returned to full sport activity and obtained at the elbow joint full range of motion. The second young man presents an extension defect of 15 degrees and the 56, 58, and 62-y-o women had a 25–30° of both extension and flexion deficits but they continue the therapy program. The male patient who also suffered by brachial plexus injury presents a few months postoperatively a slight medial instability recurrence.

Conclusion: The medial ligamentary system lesion with elbow instability must be repaired by medial ligamentoplasty and the well done technique followed by correct therapy program improved results.

10.1177/1753193409106387

A0297 PECTORALIS MAJOR TRANSPLANTATION TO RESTORE OF ELBOW FLEXION IN WAR INJURED PARALYTIC PATIENTS

S. Ghahremani

Iran Medical Science University, Tehran, Iran; Hazrat Fatemeh Training & Treatment Center, Tehran, Iran

We had several cases of muscle and peripheral nerve injuries resulting in loss of elbow flexion. In seven war victim patients, five with biceps brachii muscle loss and one with pure injury of the musculo-cutaneous nerve and atrophic muscle. We modified Carroll and Kleinmann's original pectoralis major muscle technique by:

1- Eliminating the parasternal incision starting from 7th sternocostal joint and continuing laterally to the 7th rib;
2- Fixation of the elbow in 90 degrees instead of 135 degrees; and then adopted it for use in all seven patients to restore elbow flexion. The entire pectoralis major muscle with the rectus sheath was transplanted to the tendon of hypertrophic scar.

Summary of patient history (chart follows, can not be inserted in the online abstract system).

Results: Motion and power were well restored in five patients, satisfactory in one patient and unknown in the other case, since the patient was lost to follow up.

10.1177/1753193409106388

A0103 BRACHIALIS RE-ROUTING FOR THE RESTORATION OF ACTIVE SUPINATION AND CORRECTION OF FOREARM PRONATION DEFORMITY

T. Ozkan, A. Bicer, H.U. Aydin, A. Aydin, Z. Yildirim
*Istanbul University, Istanbul Faculty of Medicine
Dept. of Plastic, Reconstructive, and Aesthetic Surgery,
Division of Hand Surgery, Turkey
VKV American Hospital, Division of Hand and
Microsurgery, Istanbul, Turkey*

Introduction: Treatment of complex palsies of the upper extremity has many challenges. Tendon transfers are indicated in the restoration of motor functions when conservative options fail in upper extremity palsies. We would like to share our experience on a recently introduced motor option for complex upper extremity palsies, brachialis muscle, deployed for the restoration of active supination in the forearm.

Patients: A total of eight cases with an average age of 8.1 years (5–11) were operated. Four cases were obstetrical brachial plexus palsy patients, three cases were cerebral palsy patients, and one patient had both conditions. All patients had a brachialis muscle power of 5. Mean follow up time was 11 months (8–15).

Method: To dissect the brachialis tendon, a curved zigzag incision is made over the cubital fossa. The tendon of the brachialis muscle is isolated as a motor. Leaving the insertion intact, the brachialis tendon is splitted

sagittally along its course in the cubital fossa. The radial tendon slip is transected along the musculotendinous junction and freed extensively. The tendon slip is then passed posteriorly around the neck of radius through the interosseous membrane and delivered anteriorly again through the membrane around the neck of radius. The rerouted tendon and the proximal tendon slip are then reattached to each other while forearm is in full supination, and elbow is in semiflexion, in this way, a "belt-pulley" mechanism is used to transmit the vertical pull of the muscle as a rotational force around radius.

Results: Active and passive ranges of acquired movements were measured on digital photographs using the ImageJ 1.34s software. While the mean preoperative forearm pronation was 65.6°, active pronation decreased postoperatively by 15°. The mean forearm active supination was 5° preoperatively, a mean active supination gain of 52.5° was achieved with this technique.

Conclusion: The use of brachialis muscle as a motor for active supination of forearm is a new concept. Our preliminary results showed that this hidden motor can be a useful alternative in cases where well known methods are not available.

10.1177/1753193409106118

A0104 TREATMENT OF CUBITUS VARUS IN ADULTHOOD

L. Farhadi, R.SH. Kamrani
*Milad Hospital, Tehran University of Medical Science,
Iran*

Treatment of Cubitus Varus in Adulthood, Report of 14 cases

Background: Cubitus varus is a now rarely encountered, previously common complication of the pediatric humeral supracondylar fractures. Despite good function, it remains to be a serious cosmetic problem. French osteotomy is a well known treatment of cubitus varus in children, but in adults stable fixation cannot be achieved by this technique. We reviewed our adult patients with cubitus varus who were treated with closing wedge osteotomy and stable internal fixation to check whether remaining malrotation of the humerus decreases the final outcome of the operation.

Methods: We reviewed our adult patients with cubitus varus as a sequel of pediatric humeral supracondylar fracture. Inclusion criteria were: age more than 18 years, cubitus varus with a history of supracondylar fracture in childhood and the desire of the patient to correct

the deformity. Exclusive criteria were neurologic deficit, Volkman contracture and follow-up less than 3 months. The patients underwent an internally fixed closing wedge lateral osteotomy through a posterior approach. Tension band wiring for one patient and two reconstruction plates for eleven patients were used. No post-operative immobilization was used. The patients were followed until a plateau in physical rehab and radiologic union were achieved.

Result: Between March 2003 to September 2006 fourteen patients underwent operation. 11 males and 3 females with cubitus varus of mean 22(12–35) degrees were operated and followed for mean 7(3–14) months. Mean age was 24 (18–38). Postoperative humero-ulnar angle of 0 to 25 degrees valgus (mean 12 degrees valgus) were obtained. We had four major complications: hardware failure (1), elbow instability which became obvious after correction of the varus of the elbow (1), one ulnar nerve palsy which improved spontaneously after 9 months and one case of elbow range of motion loss. 11 patients were satisfied with the result. Three patient mentioned residual varus in spite of good elbow correction in clinic when the elbow was looked at from the anterior and the shoulder was externally rotated.

Conclusion: Cubitus varus can be treated effectively with humeral osteotomy and internal fixation. The result in adults is not as good as in children. Complications are not a rarity and very good preoperative planning is mandatory for this procedure in adults. Rotation of the malunion may not be corrected and the patient must be warned of possible remaining varus with the limb in neutral shoulder rotation.

10.1177/1753193409106390

A0033 CORRECTIVE DOME OSTEOTOMY FOR CUBITUS VARUS AND VALGUS IN ADULTS

Y.R. Choi, S.B. Hahn, H.J. Kang
Department of Orthopaedic Surgery, Yonsei University College of Medicine, Korea

Cubitus varus or valgus is a complication after fracture of the elbow in children. Cubitus varus is widely recognized as a result of malunion of supracondylar fractures and cubitus valgus can result from malunion or nonunion of lateral condylar fractures.

Many reports have described various osteotomy techniques and their results for correction of these 3-dimensional deformities using methods such as cross-pin fixation, plating, and external fixation. Because each

technique has its own advantages and disadvantages, there is no consensus on which is better in terms of final result, especially in adults. Therefore, selection of surgical technique depends on the surgeon's preference and experience.

Between January 1998 and April 2005, among a total of 19 patients, 16 with cubitus varus and 3 with cubitus valgus deformities received corrective dome osteotomy. All cubitus varus deformities resulted from malunion of distal humeral supracondylar fracture and all cubitus valgus deformities resulted from malunion of distal humeral lateral condylar fracture. There were 15 male and 4 female patients with a mean age of 31.1 years (range, 16–50 years). The average follow-up period was 41 months (range, 36–95 months). Two patients exhibited tardy ulnar nerve palsy, 1 with cubitus varus and the other with cubitus valgus.

Among 19 adult patients, corrective dome osteotomy was performed for cubitus varus and valgus deformity. The average postoperative carrying angle in 16 patients with cubitus varus was 6.1° (range, 1–10°) with an average correction of 24° (range, 5–36°). The average improvement in LPI was 23.2% from 15.6% (range, 9–21%) to –7.6% (range, –20–4%). The average preoperative deformity of internal rotation with cubitus varus was 14.6° (range, 5–35°), and 7 cases had combined internal rotation deformity greater than 10° in comparison to the angle of rotation checked in the normal side. In these patients, the average postoperative angle of internal rotation was 10.8° (range, 8–13°) from 22.7° (range, 11–35°). The average postoperative carrying angle in 3 patients with cubitus valgus was 6.7° (range, 6–7°) with an average correction of 29.3° (range, 29–30°). The average improvement in MPI was 29.7% from 31% (range, 29–33%) to 1.3% (range, 0–4%).

The average ROM was 136.8° (range, 120–155°) preoperatively and 128.1° (range, 101–147°) postoperatively. The average preoperative/postoperative flexion contracture and further flexion were 0.8° (range, –10–6°)/2.7° (range, –5–10°) and 137.6° (range, 120–150°)/130.8° (range, 101° to 142°), respectively. Two patients had hyperextension (5° and 10° in each patient) preoperatively and hyperextension improved in each patient by 5° postoperatively.

None of the patients had unsightly scarring or prominent lateral condyle in cubitus varus or prominent medial condyle in cubitus valgus on clinical assessment.

We believe that corrective dome osteotomy with secure fixation using plates and screws is a reliable option for cubitus varus or valgus deformity in adults.

10.1177/1753193409106393

A0035 DECOMPRESSION AND MINIMAL MEDIAL EPICONDYLECTOMY WITH A SMALL INCISION FOR CUBITAL TUNNEL SYNDROME: COMPARISON TO ANTERIOR SUBCUTANEOUS TRANSPOSITION OF THE ULNAR NERVE

Y.R. Choi, S.B. Hahn, H.J. Kang
*Department of Orthopaedic Surgery, Yonsei University
College of Medicine, Korea*

Several different surgical techniques and their results have been described for treatment of cubital tunnel syndrome such as simple in situ decompression of the cubital tunnel, anterior transposition of the ulnar nerve, and medial humeral epicondylectomy with decompression of the ulnar nerve. However, there is no consensus which is superior to the others.

In this study, we asked whether the clinical results of ulnar nerve decompression and minimal medial epicondylectomy with a small incision are comparable to those of anterior subcutaneous transposition of the ulnar nerve known as one of standard procedure for cubital tunnel syndrome.

Between April 2002 and May 2006, the patients who underwent decompression of the ulnar nerve and minimal medial epicondylectomy with a small incision (Group I) or anterior subcutaneous transposition of the ulnar nerve for cubital tunnel syndrome (Group II), and who were available at two-years or more, were included in this study. Out of 56 patients with cubital tunnel syndrome, 29 were in group I and 27 were in group II. The mean age at the time of the operation was 48.9 years and the mean follow-up period was 36.4 months. Segmental conduction study showed ulnar neuropathy at the elbow segment and normal at axillary and forearm segments.

In group I, all but one patient showed improved motor and sensory functions at the last followup. According to the Wilson and Krout criteria, nine had excellent results, 12 had good results, seven had fair results, and one had poor result. No patient had valgus instability, medial elbow pain, weakness of the flexor-pronator muscles, or anterior subluxation of the nerve. Only two patients complained of mild medial elbow pain postoperatively, but the symptoms disappeared spontaneously. The average length of the operation associated scar was 34.6 (range, 30–43) mm in the group.

In group II, according to the Wilson and Krout criteria, six had excellent results, 13 had good results, six had fair results, and two had poor result at the last followup. Four patients had the painful neuromas of the medial antebrachial cutaneous nerve at the final follow-up. One patient had experienced deterioration of the ulnar

nerve symptoms with intrinsic muscle wasting after the operation. The symptoms relieved slowly, but the patient complained the residual symptoms and the surgical result of the patient was poor. The average length of the operation associated scar was 90.9 (range, 70–150) mm in the group.

The surgical results of the two groups were not significantly different; however, the incision size and incidence of complications at the final follow-up showed statistically significant differences.

We conclude that decompression and minimal medial epicondylectomy with a small incision seems to be more recommendable than anterior subcutaneous transposition of the ulnar nerve for cubital tunnel syndrome.

10.1177/1753193409106394

A0196 PERCUTANEOUS REDUCTION FOR MASON II, III RADIAL HEAD OR NECK FRACTURE

J.-G. Lee, H.J. Kang, M.S. Her, Y.R. Choi, S.B. Hahn
*Department of Orthopedic Surgery, Yonsei University
College of Medicine, Seoul, Korea*

Purpose: The purpose of this study was to analyze the clinical results of the treatment of Mason type II, III radial head or neck fractures with percutaneous reduction using a periosteal elevator or small bone impactor.

Materials and methods: Between May 2001 and February 2007, 9 patients with Mason type II, III radial head or neck fracture were treated by percutaneous reduction with 1 cm sized minimal incision. The average age of the patients was 29 (11 to 59) years old and average duration of follow up was 14 months. The percutaneous reduction was performed under the fluoroscopy using a periosteal elevator or small bone impactor. The 6 of 9 patients received the only cast immobilization postoperatively without any internal fixation. The other 3 patients were treated by cast immobilization with additional percutaneous Kirschner's wire fixation or transverse PRUJ fixation for prevention of redisplacement or subluxation of radial head. Average cast immobilization period was 4 weeks. We evaluated the radiological results and Mayo Elbow Performance Index.

Results: All patients obtained the bone union. The initial average angulation of radial neck was 36.4 degrees (30 to 48). And the average angulation at last follow up was 7.5 degrees (2 to 15). The average flexion of elbow at last follow up was 126.3 degrees (120 to 135). The average extension was 8.1 degrees (0 to 10). Mayo Elbow Performance Index results were excellent in all cases.

In the complication, every case of the temporary posterior interosseous radial nerve palsy and minimal cubitus valgus were noted.

Conclusion: In the treatment of Mason type II, III radial neck or head fractures, the percutaneous reduction using a periosteal elevator or small bone impactor was an effective method of treatment.

10.1177/1753193409106395

A0228 ENDOPROTEZOPLASTYKA BIPOLARNA GŁOWY KOŚCI PROMIENIOWEJ TYPU KPS W MATERIALE KLINIKI. THE RESULTS OF BIPOLAR KPS REPLACEMENT ARTHROPLASTY OF THE RADIAL HEAD IN ACUTE FRACTURES

M. Urban, S. Pomianowski, D. Michalik, D. Kowalski, A. Podgórski

Klinika Chirurgii Urazowej Narządu Ruchu i Ortopedii CMKP, SPSK im. prof. A. Grucy w Otwocku. Kierownik Kliniki, prof. dr hab. n. med. Stanisław Pomianowski

The purpose of this study was to evaluate the ten-year outcomes of bipolar KPS radial head arthroplasty. Between 1997 and 2008 one hundred two patients (seventeen nine female and twenty three male; mean age, fifty-four years) with an unreconstructible comminuted radial head fracture and associated elbow injuries were treated with a bipolar KPS radial head arthroplasty. Follow-up ranged from 6 months to 10 years (mean 4 years). Assessment of the results was based on Mayo Elbow Performance Index. 71 very good, 20 good, 7 fair, 4 bad results were achieved according to MEPI. An arthroplasty with a bipolar KPS radial head is a safe and effective option for the treatment of unreconstructible radial head fractures associated with other elbow injuries.

10.1177/1753193409106396

A0063 OUTCOMES OF SURGICAL MANAGEMENT OF COMMUNUTED RADIAL HEAD FRACTURES WITH RADIAL HEAD ARTHROPLASTY

V. Tsiampa, Z. Zaharopoulos, I. Tepetzis, A. Gerakis, C. Dimitriou

Orthopaedic Department, Hippokration General Hospital of Thessaloniki, Greece

Background: The treatment of comminuted radial head fractures (Mason type III and IV) is challenging and

includes open reduction and internal fixation or radial head arthroplasty. Radial head arthroplasty is an alternative solution with comparable results with those reported after open reduction and internal fixation. The purpose of this study is to evaluate the two-year functional outcome of 15 patients in whom an unreconstructible radial head fracture had been treated with arthroplasty.

Methods: During the years 2003 and 2008 fifteen patients [mean age 63 yrs (46–72)], with comminuted radial head fractures Mason-Johnston type III and IV and associated elbow injuries (elbow dislocations, olecranon fractures) were treated with a pyrocarbon head prosthesis. Among those patients, 6 had an associated olecranon fracture and 3 elbow dislocation. Early ROM within a safe arc had been initiated. The surgical approach was either a lateral or posterior. Any associated injuries were treated accordingly. (Ulnar plating, re-attachment of coronoid fragment, repair of MCL and LCL). An extension-splinting program begun as soon as stability improved, and a splint was worn at night for 10 to 12 weeks. The patients with associated elbow fracture-dislocation have been prescribed a 6-week course of indomethacin to minimize the risk of heterotopic bone formation.

Results: The functional outcome was evaluated using Broberg and Morrey score, according to which the results were good to excellent. Patient satisfaction was high at 3, 5 months and remained high at two years. There was no infection, no wound problems and no pain. Only one revision was performed. All elbow joints except the revised one remained stable.

Conclusions: The treatment of comminuted radial head fractures with pyrocarbon prosthesis is a safe and effective option. The elbow stability is restored, the elbow motion is preserved and the relative length of the radius is maintained. The prosthesis, apart from acting as a spacer, provokes mechanical stability to valgus stress.

10.1177/1753193409106398

A0268 ESSEX-LOPRESTI INJURY – A NEW OPERATIVE APPROACH – A REPORT OF TWO CASES

P. Sagiv, B. Kish, Y.S. Brin, M. Nyska
Meir Medical Center Kfar Saba, Israel and Tel Aviv University Sackler Medical School

Essex-Lopresti injury is an uncommon injury of the forearm. It consists of a fracture or dislocation of the

radial head, rupture of the interosseous membrane, and a dislocated distal radio-ulnar joint (DRUJ). The main injury is the tear of the interosseous membrane and it is usually not diagnosed immediately.

The injury is named after Peter Essex Lopresti, who reported 2 cases in 1951. The same injury was reported before by Curr and Coe in 1949. The mechanism of injury is usually falling on an outstretched hand. A longitudinal force is transmitted through the wrist to the radial head which is fractured, and the interosseous membrane is ruptured. The DRUJ is dislocated and the radius migrates proximally. The extent of the injury is often missed if the wrist is not examined. Up to 5% of radial head fractures are associated with an injury to the interosseous membrane. After the injury the patient experiences ulno-carpal and elbow pain, with restriction of movements of both joints.

Eduards and Jupiter classified the injury into three types: Type I: fracture of the radial head with large displaced fragments, minimal or no comminution, amenable to interfragmentary fixation. Type II: fracture with severe comminution requiring radial head excision and prosthetic replacement. Type III: old injury with irreducible proximal migration of the radius managed by either ulnar shortening or radial head prosthetic replacement or a combination of both.

We treated two patients using a type of internal fixation as a powerful tool to reduce and maintain the longitudinal relationships in the forearm.

10.1177/1753193409106399

A0087 TREATMENT OF PROXIMAL RADIO-ULNAR SYNOSTOSIS WITH REVERSE SAUVE-KAPADJI IN 6 CASES

R.-S. Kamrani, A. Saremi
Tehran University of Medical Sciences, Lorestan University of Medical Sciences, Iran

Background: Proximal radio-ulnar synostosis (PRUS) is a rare but disabling condition. Risk factors of PRUS are open high energy trauma, burn, head trauma and extensive dissection in open reduction. PRUS reduces the rotation of the forearm. Traditional treatment is removal of the heterotopic ossification, but recurrence is frequent. Reverse Sauve-Kapanji is a newly proposed technique for treating this problem.

Method: Patients with post-traumatic proximal radio-ulnar synostosis underwent the reverse Sauve-Kapandji operation. Inclusion criteria were: PRUS with at least 6 months of elapsed time after primary trauma, rotation of the forearm less than 30 degrees in supination and pronation and at least 6 months follow-up. Exclusive criteria were spasticity of the limb and uncooperative patient.

Result: Between March 2006 to September 2007 six patients underwent operation. There were five males and one female at the age range of 23 to 45 years old. Sum of pronation and supination of the affected forearm increased from 16(0–40) to 108(90–140) degrees. We had no complications such as infection or radial nerve injury. We had one recurrence. The patients had no complaint of pain. Grip power was 53(42–63 pounds) in operated side compared with 78(70–84 pounds) on normal side.

Conclusion: We believe that reverse Sauve-Kapandji is a simple and effective technique for treatment of the PRUS. We prefer this technique to removal of heterotopic ossification in all kinds of PRUS.

10.1177/1753193409106402

SESSION 15: MICROSURGERY

- A0385 LECTURE: "RECENT ADVANCES IN THE MICROSURGICAL RECONSTRUCTION OF FINGER INJURIES" 94
F. del Piñal
(Spain)
- A0197 TRANSPOSITION ISLAND FLAPS BASED ON DIGITAL PERFORATORS IN COVERING FINGER DEFECTS 94
A. Georgescu, I. Matei, F. Ardelean, I. Capota
(Romania)
- A0221 NONMICROSURGICAL REPLANTATION OF FINGERTIP USING EPIDERMAL CONTACT TECHNIQUE 94
P. Paavilainen, S. Vilkki, H. Goransson
(Finland)
- A0285 REVERSED NEUROVASCULAR HOMODIGITAL ISLAND FLAP IN RECONSTRUCTION OF FINGER TIP AMPUTATIONS 95
F. Layeghi, M. Farzad
(Iran)
- A0231 INTEROSSEOUS POSTERIOR FLAP VERSATILITY 95
G. Pivato, G. Berto, P. Cortese, L. Pegoli, G. Pajardi
(Italy)
- A0123 ACUTE INJURIES OF THE HAND IN CHILDREN AND ADOLESCENTS: EPIDEMIOLOGY AND RESULTS OF THE TREATMENT 95
A. Zyluk, I. Walaszek
(Poland)
- A0273 RECONSTRUCTION OF HAND AND FOOT USING ANTEROLATERAL THIGH FASCIAL FREE FLAP 96
K.W. Kim, J.S. Kim, D.C. Lee, S.H. Ki, S.Y. Roh, J.W. Yang
(Korea)
- A0125 SUPERTHIN ILIAC FREE FLAP FOR RECONSTRUCTION OF UPPER EXTREMITY DEFECTS 96
F. del Pinal, F. Garcia-Bernal, H. Ayala, L. Cagigal, A. Studer, J. Regalado
(Spain)
- A0199 EMERGENCY TOE TRANSFER IN FINGERS RECONSTRUCTION 97
A. Georgescu, I. Matei, I. Capota, F. Ardelean, O. Olariu
(Romania)
- A0308 LONG-TERM FUNCTIONAL RESULTS OF FINGERS AND HAND REPLANTATION 97
G.A. Nazaryan, V.G. Chichkin, E.I. Garelik, T.Y. Sukhinin
(Russia)

- A0215 TRANSIENT BONE RESORPTION FOLLOWING FINGER REPLANTATION: A REPORT OF 3 CASES 98
S. Lucchina, H. Becker, C. Fusetti, A.Y. Shin
(*Switzerland, USA*)
- A0069 LIMB REPLANTATION WITH TWO ROBOTS: A FEASIBILITY STUDY 98
P. Liverneaux, C. Taleb, E. Nectoux
(*France*)

A0385 LECTURE: "RECENT ADVANCES IN THE MICROSURGICAL RECONSTRUCTION OF FINGER INJURIES"

F. del Piñal

This has been changed (there was a debate that has been cancelled in the initial program) and stands correct as it is now (the Associated Editor).

A0197 TRANSPOSITION ISLAND FLAPS BASED ON DIGITAL PERFORATORS IN COVERING FINGER DEFECTS

A. Georgescu, I. Matei, F. Ardelean, I. Capota
University of Medicine "Iuliu Hatieganu" Cluj-Napoca, Romania

Introduction: Perforator flaps for covering finger defects are already well known and usually employed. The possibility of harvesting flaps based on digital perforators located at DIPJ was described by Koshima, for covering very distal finger defects.

Material and method: We will try to present in this paper the advantages of using these transposition island flaps based on perforators emerging from the digital arteries, at any level of the fingers, including the thumb.

In our service were practised 12 transposition island perforator flaps for covering tissue defects in fingers, from which 4 were for the thumb. In 2 cases we used the perforator flap as a cross-finger flap, to cover a defect on an adjacent finger.

The transposition flaps have an oval shape, are harvested from one side of the finger, without sacrificing the digital artery. After the subfascial undermining of the flap on its entire surface, the vascular pedicle being composed only by the perforator, the flap can be rotated 90–180° and can cover dorsal and volar finger defects. The flap's donor site is directly sutured.

Results: These transposition flaps had an uneventful evolution, with complete integration of the flap and good quality functional recovery. In 2 cases we registered a minute partial necrosis, which spontaneously healed. In conclusion, we consider that the perforator island transposition flaps have the advantages of using the tissues of the same finger in reconstruction, not damaging another area, they do not require main vessels sacrifice, and the donor site can be directly closed.

10.1177/1753193409105904

A0221 NONMICROSURGICAL REPLANTATION OF FINGERTIP USING EPIDERMAL CONTACT TECHNIQUE

P. Paavilainen, S. Vilkki, H. Goransson
Hand and Reconstructive Department, Tampere University Hospital, Finland

The pocket principle to reattach an amputated fingertip was suggested by Brent in 1979. Various methods have been described where the fingertip has been left in the subcutaneous pocket in chest, abdominal, inguinal or thenar area. Thenar pocketing is the most acceptable for patients but IP joint stiffness has been describe as a problem. Our modified technique was to use epidermal to epidermal contact instead subcutaneous pocket which allows more options for finger position.

Between 2007 and October 2008 we treated 20 patients (23 fingers) with epidermal pocket technique. All patients had sustained complete fingertip amputation between lunula and distal third of medial phalanx. After bone fixation and skin suture the Guillian knife was used to de-epithelize the pulp of the replanted fingertip and pocket area. The "pocket" area was chosen from neighbor fingers or thenar, depending which was the easiest to hold for the patient. Technique will be shown in presentation. Six patients left home at the operation day and all the rest day after. Detachment of the fingers was done three weeks later as a day surgery procedure.

Five fingers out of 23 developed total necrosis. Only volar pulp survived (20–50%) in five patients. Subtotal survival (50%–80%) was in five and full length was achieved with eight fingers. Slight PIP joint flexion contracture was noted in 5 patients, but this improved with physiotherapy. Better survival was noticed (not statistical) to correlate distal amputation level, short interval between injury and operation (<2 hours) and clean cut injuries. Donor side morbidity was minimal.

Survival rate in our technique was close to previous reported materials with subcutaneous technique. The benefit of our modification is a more convenient position of the finger which decreases PIP joint stiffness with minimal donor side morbidity. The method can offer an alternative salvage procedure for fingertip amputations without suitable vessels available for microsurgery replantation.

10.1177/1753193409106123

A0285 REVERSED NEUROVASCULAR HOMODIGITAL ISLAND FLAP IN RECONSTRUCTION OF FINGER TIP AMPUTATIONS

F. Layeghi, M. Farzad

Milad Hospital, Tehran, University of welfare and Rehabilitation Sciences, Iran Hand Rehabilitation Center, Iran

Objective: Reverse neurovascular homodigital island flap which based on the anastomoses between the radial and ulnar digital arteries have been used for Reconstruction of Finger tip amputations.

Materials: 17 finger tip Amputations (15m, 2F) have been reconstructed by technique of Reverse neurovascular homodigital island flap with loupe (4.3x) magnification and regional anesthesia.

Results: Only one case had partial ischemia and necrosis, all other flaps (16) have survived. Sensory recovery was satisfactory in 13 patients with mean 2 point discrimination of 8mm. In 4 patients sensory recovery was poor. Flexion contracture in PIP and DIP joints were seen in 3 patients. No complaints or complications due to Sensory deficit in donor site were seen.

Conclusion: Reverse neurovascular homodigital island flap is an ideal one stage technique for reconstruction of selected Finger tip Amputations.

10.1177/1753193409105907

A0231 INTEROSSEOUS POSTERIOR FLAP VERSATILITY

G. Pivato, G. Berto, P. Cortese, L. Pegoli, G. Pajardi
Multimedica Hospital, Hand surgery Departement, Via Milanese 300, Sesto San Giovanni, Milan, Italy

We are reporting our experience of 73 interosseous posterior flaps performed in the last 5 years to correct upper limb defects. We would like to underline how versatile this flap is, both in the way it may be harvested and the way it can be used. The flap was harvested as fascio-cutaneous flap, pure fascial flap, osteofasciocutaneous flap, with exteriorized pedicle, as a free flap, distally based reverse-flow flap, direct-flow flap. It was used for volar and dorsal traumatic hand defects, fingers dorsum coverage, first web reconstruction, thumb coverage, elbow coverage.

This flap has many advantages: not sacrificing one of the main arteries of the hand, good skin quality, adaptable shape, large skin paddle dimension, constant anatomy,

not too heavy for the donor site. We consider as disadvantages only the harvesting difficulties, an adequate learning curve is mandatory to perform this flap. When feasible, IOP flap, represents our first choice for resurfacing the defects of the upper limb from the elbow to the fingers.

10.1177/1753193409105905

A0123 ACUTE INJURIES OF THE HAND IN CHILDREN AND ADOLESCENTS: EPIDEMIOLOGY AND RESULTS OF THE TREATMENT

A. Zyluk, I. Walaszek

Department of General and Hand Surgery, Pomeranian Medical University in Szczeci, Poland

Hand injuries in children and adolescents are relatively common. Over a period of 3 years (2006–2008), a total of 152 patients aged below 18 years (children and adolescents) with acute trauma to the hand were identified and operated on in our institution. The injuries included amputations, complex lacerations and tendon divisions. Nineteen patients had amputations of 27 fingers and 2 patients had amputated hands at wrist level. A mean age of these patients was 13 years (range 1.5–17). Left hand was affected in 13, right in 8. Amputated digits included thumb in 6, index in 6, middle in 7, ring in 4 and little in 4 patients. In 6 patients more than one finger was amputated. Successful replantation was performed in 9 cases (43%), in 4 (19%) replantation failed and in 8 patients amputated digits (38%) were not suitable to replantation.

Nine patients had complex lacerations, including division of tendons, nerves and arteries: 5 at wrist level and 2 in fingers. All structures were successfully repaired and functional results were satisfactory in 8 of these nine patients.

Forty one patients had isolated tendon injuries: 18 had 20 flexor tendons divided and 23 had 25 extensor tendons divided. Affected digits included: 11 thumbs, 12 indices, 11 middles, 6 rings and 5 little. All tendons were repaired and treated with early active motion regime. Rupture of the repair was noted in 4 patients (10%) and satisfactory active range of motion (more than 75% of normal) was achieved in 33 patients (80%).

The injuries were most frequently caused by circular saws, but fairly common by agricultural or industrial machinery which was operated by children or adolescents. This is a common practice in rural regions of Poland.

We found no specific difficulties in the treatment of children, except of longer in-patient time, higher requirements for anaesthesia and post-operative care. Technical difficulties were noted at microsurgical repair in little children.

10.1177/1753193409106120

A0273 RECONSTRUCTION OF HAND AND FOOT USING ANTEROLATERAL THIGH FASCIAL FREE FLAP

K.W. Kim, J.S. Kim, D.C. Lee, S.H. Ki, S.Y. Roh, J.W. Yang

Department of Plastic and Reconstructive Surgery, Kwangmyung Sung-Ae General Hospital, Kyungki-do, Korea

Purpose: Large soft tissue defects of hand and foot with exposure of bone, tendon and muscle are ideally reconstructed with microvascular free tissue transfer. Provision of thin and pliable tissue and adequate coverage of tendon-gliding surface is necessary for achieving acceptable results. We discuss our experience with anterolateral thigh fascial free flap with split-thickness skin graft for reconstruction of soft tissue defects of hands and foot.

Methods: Between November 2003 and August 2008, ten patients with full-thickness soft tissue defects of hands and foot were reconstructed by means of a composite anterolateral thigh fascial free flap. There were soft tissue defects in 9 hands and 1 foot with wounds associated with trauma ($n=8$), scar contracture ($n=1$) and necrosis due to ischemia ($n=1$). The patients' average age was 39 years (ranged from 26 to 57). With similar methods for the free anterolateral thigh flap, flaps were harvested from the anterolateral thigh as adipofascial flaps with only a small sheet of fascia and subcutaneous fatty tissue above it. Fascia and skin of donor site was closed directly and delayed split-thickness skin graft was performed to resurface the adipofascial flaps in all the cases.

Result: All flaps survived completely. The size of the transferred flap ranged from 2×4 cm to 5×8 cm. Thin flap coverage was possible without secondary debulking operations. Secondary surgeries were tenolysis, arthroplasty and scar contracture release at the skin level. It left minimal donor site morbidity with linear scar. In one case, thigh muscle herniation in donor site was developed. It was asymptomatic and surgical intervention was not performed.

Conclusion: Anterolateral thigh fascial free flap provides thin and pliable tissue which can establish a tendon-gliding mechanism, minimal bulk, minimal donor site morbidity and short operation time with two team approach in donor- and recipient-site. The disadvantages of this technique are the need for a skin graft and muscle herniation of donor site. The anterolateral thigh fascial free flap should be considered as an alternative option for a coverage of the hand and foot defects.

10.1177/1753193409105906

A0125 SUPERTHIN ILIAC FREE FLAP FOR RECONSTRUCTION OF UPPER EXTREMITY DEFECTS

F. del Pinal, F. Garcia-Bernal, H. Ayala, L. Cagigal, A. Studer, J. Regalado

Private Practice and Hospital Mutua Montañesa, Santander, Spain

Purpose: Thin pliable skin flaps are ideal for covering flexion creases and for hand defects where cosmetic issues are an important consideration. Our purpose is to present our experience in using the iliac flap (a lateral variant of the groin flap) raised as a superthin flap, in order to provide pliable skin for the elbow and wrist flexion creases and for smooth adaptation to the dorsum of the hand.

Methods: Ten free iliac flaps were used. Five flaps were used for primary coverage in trauma cases, while the rest to treat or prevent flexion contractures. Flaps were centered on the anterosuperior iliac spine and dissected from lateral to medial in a suprafascial plane until the medial edge of the sartorius was reached where the superficial branch of the superficial circumflex iliac artery is located. The vessel is tracked medially as required. Flap size ranged from 12×5.5 to 18.5×8 cm. During elevation care was taken to include as little fat as possible, but in some cases formal microsurgical defatting was required. No secondary surgery for flap thinning has been required.

Results: Eight flaps were elevated on the main vessels and one in a perforator. All flaps survived without vascular complications. Full range of motion was obtained at the elbow when the flap was used at that level and 45° of active extension at the wrist.

Conclusions: The flap has a very thin dermis with minimal panniculus that can be thinned, making it ideal to cover flexion creases or the dorsum of the hand. Despite the fact that anatomical variations are common in the inguinal region, the flap can be expeditiously and safely elevated.

If needed, pedicle length can be up to 8–10 cm. The donor site is comparable to a full thickness skin graft harvested from the groin. The donor artery however can be very small.

10.1177/1753193409105903

A0199 EMERGENCY TOE TRANSFER IN FINGERS RECONSTRUCTION

A. Georgescu, I. Matei, I. Capota, F. Ardelean, O. Olariu
University of Medicine "Iuliu Hatieganu" Cluj-Napoca, Romania

Introduction: The reconstruction of fingers by using toe transfer is already very well known. We will try to demonstrate that in traumatic amputation of the fingers and especially of the thumb, when the amputated parts are missing or are too damaged to be used, the toe or toes transfer is possible to be done also in emergency.

Material and methods: We present our experience with 21 cases, generally part of a complex hand trauma, 17 for thumb reconstruction, 3 for long fingers reconstruction and one for both long fingers and thumb reconstruction. We used the great toe in all the thumb reconstructions (all great toe in 5 cases, wrap-around in 3 cases and trimmed in 10 cases), the second toe in two cases for reconstructing the third finger, the toe block of second and third toes in two cases, and the second toe from both feet in one case. In one case we performed a double toe transfer including the great toe from one foot and a digital block from the other one. We based our transplant on the dorsalis pedis artery in 20 cases and on the plantar artery in one case. The recipient artery was the dorsal branch of the radial artery in 14 cases, the superficial palmar arch in one case, the first dorsal intermetacarpal artery in one case, the radial artery of a concomitant free chinese flap in 3 cases, and the branch for the great toe in two cases. The recipient vein was the cephalic vein in all the cases.

Results: All the transfers were successful. In one patient the revision of the anastomoses was necessary. The sensitive recovery was very good in 90% of cases and satisfactory in 10%. The range of mobility was, in all cases, sufficient for a satisfactory function of the hand. The patients were able to return to work in 2 to 4 month, 55% in the same job.

Conclusions: The toe-to-hand transfer remains the best method in the reconstruction of hand fingers, and especially of the thumb. The emergency reconstruction

seems to be as safe as the secondary one is, and has also a big advantage from psychological point of view.

10.1177/1753193409106121

A0308 LONG-TERM FUNCTIONAL RESULTS OF FINGERS AND HAND REPLANTATION

G.A. Nazaryan, V.G. Chichkin, E.I. Garelik, T.Y. Sukhinin
Department of Plastic Reconstructive Surgery & Microsurgery, Clinical Hospital No 71, Moscow, Russian Federation

Nowadays the replantation of fingers and hand has become the standard surgical procedure in all regional microsurgery centers. The indications for replantation with ideal functional and aesthetic results were considered due to the level and mechanism of injury, terms of ischemia, contamination, patients' profession, psychological status and willingness of patient for long period of hospitalization and treatment, to refrain from smoking and drinking alcohol for several weeks and adherence to a precise rehabilitation protocol. The decision to proceed with replantation of an amputated part can only be made by an experienced microsurgeon or hand surgeon. Most reports in literature offered different schemes for evaluation of functional results outcomes after fingers and hand replantations. The main disadvantages of these schemes are that they are focused only on single hand function criteria and vice versa hand function assessed in complex, which is not sufficient for interpretation the degree of recovery for single anatomic functional system. Ten years (1997–2007) follow-up study evaluated 203 patients with successfully replanted fingers (167), segments (14) and hand (16) after total and subtotal amputations. Long-terms functional results were evaluated by basic parameters: hands' biomechanics (total active movement- TAM, measurement of flexion deficits, finger opponens, grip and pinch strength), sensibility (Weber two-points discrimination test, cold intolerance), cosmetics. Functional outcome of replanted segments were evaluated by Disabilities of the Arm, Shoulder & Hand (DASH), whereas quality of life by Short Form General Health Survey (SF-36) questionnaires accordingly. Subjective results were excellent in 13, good in 142, fair in 36 and poor in 12 patients. The outcome of the achieved replantation reached an overall DASH score of 17.0. The majority of patients had returned to their previous occupation or be employed after re-education. Thus the combination of basic parameters, functional outcome measurement by

DASH and quality of life by SF 36 questionnaires represents the valuable comparative tool to evaluate long-terms functional and cosmetic results after fingers and hand replantation.

10.1177/1753193409106124

A0215 TRANSIENT BONE RESORPTION FOLLOWING FINGER REPLANTATION: A REPORT OF 3 CASES

S. Lucchina, H. Becker, C. Fusetti, A.Y. Shin
Hand Surgery Unit, Surgical department, Locarno's Regional Hospital, 6600 Locarno, Switzerland
Division of Hand and Microvascular Surgery, Department of Orthopaedic Surgery, Mayo Clinic, Rochester, MN 55905, USA

Background: Radiographic changes consisting of alterations in mineral content, osteopaenia or destructive neuropathy that occur following successful finger replantation have already been described. We report our experience in four fingers in three individuals in whom bone changes developed in the first three months postoperatively with complete “restitution ad integrum”

Aim: To improve surgeons' awareness of this condition and to emphasize the importance of early recognition, to avoid inappropriate surgical treatment with bone substitutes.

Methods: Three patients 21–49 yo (ave. 36 yo) sustained a clean-cut amputation of four fingers. The first patient had an amputation at the base of the middle phalanx of the index finger and the second patient at the base of the proximal phalanx of the ring finger. The third had an amputation at the base of the first metacarpal bone and at the base of the proximal phalanx of the small finger in a five finger amputation. In the first case, two dorsal veins and two palmar digital arteries and nerves were reanastomosed. In the second case, 1 palmar artery and 1 dorsal vein were reanastomosed. In the third case at the thumb, two dorsal veins and two palmar digital arteries and nerves were reanastomosed. At the small finger one dorsal vein, one palmar

digital artery and two digital nerves were reanastomosed. Bone fixation was achieved with two and three K-wires or tension-band wiring. Replantation was successful in all cases. Three weeks after replantation the X-rays showed rapid development of osteopaenia in the juxta-articular region and metaphyses of the bone. These changes were followed by subperiosteal, intracortical and endosteal bone resorption. No further surgical procedures or splintage were needed and hand therapy was not discontinued. At 10–13 weeks (ave. 12) postoperatively, the X-rays showed a complete “restitution ad integrum” with new periosteal bone formation

Conclusions: We suggest that the radiographic changes after finger replantation are transient, first evident subperiosteally and progressing centrally. They may reflect small-vessel compromise and microinfarction and transient hyperemia secondary to neurovascular damage or to sympathetic progressive recovery.

10.1177/1753193409106122

A0069 LIMB REPLANTATION WITH TWO ROBOTS: A FEASIBILITY STUDY

P. Liverneaux, C. Taleb, E. Nectoux
Department of hand surgery, Strasbourg university hospital, Illklich, France

The aim of this study is to assess the feasibility of limb replantations and transplantations by telesurgery. The material consisted in a large white pig and two surgical robots (DaVinciS1 telemanipulators). The procedure consisted in a trans-humeral cross-section of the left thoracic limb, which was secondarily replanted. Results showed good vascular permeability, while the operator's physiological tremor was suppressed.

Our results seem to demonstrate that telesurgery could improve limb replantation and transplantation management, especially regarding operative precision.

10.1177/1753193409106119

SESSION 16: CARPUS 2

- A0146 MID TERM RESULTS USING CUÉNODS OSTEOLIGAMENTOPLASTY AND LIMITED DORSAL CAPSULODESIS FOR TREATMENT OF CHRONIC SCAPHOLUNATE DISSOCIATION 101
K. Kalb, J. van Schoonhoven, K.-J. Prommersberger
(Germany)
- A0109 “TREATMENT OF SCAPHOID INSTABILITY WITHOUT COLLAPSE” (DYNODESIS): A 15-YEAR OUTCOME STUDY 101
H. Seradge, W. Parker, C. Baer, A. Seradge
- A0217 EXTENSOR CARPI RADIALIS BREVIS LIGAMENTOPLASTY AND DORSAL CAPSULODESIS FOR THE TREATMENT OF CHRONIC POSTTRAUMATIC SCAPHOLUNATE INSTABILITY 102
E. Papadogeorgou, S. Fairbank, C. Mathoulin
(France)
- A0314 STAGE II SLAC AND SNAC WRIST: PROXIMAL ROW CARPECTOMY VERSUS FOUR-CORNER FUSION 102
G. Pilato, A. Sinigaglia, P. Punzetto, A. Bini
- A0136 THE EFFECT OF RSL FUSION ON WRIST MOVEMENT AND THE SUBSEQUENT EFFECTS OF DISTAL SCAPHOIDECTOMY AND TRIQUETRECTOMY 103
M.J. Berkhout, M.N. Shaw, L.J. Berglund, R.A. Berger, K.-N. An, M.J.P.F. Ritt
(The Netherlands, USA)
- A0177 RESULTS AFTER RADIO SCAPHOLUNATE FUSION WITH OR WITHOUT RESECTION OF THE DISTAL SCAPHOID POLE 104
M. Muehldorfer, P.H. Ha, K.J. Prommersberger, J. van Schoonhoven
(Germany)
- A0051 LUNO CAPITATE ARTHRODESIS FOR DEGENERATIVE OSTEOARTHRITIS OF THE WRIST 104
A. Ferreres, M. Garcia-Elias, R. Plaza
(Spain)
- A0020 EVALUATION OF RESECTION OF THE SCAPHOID 105
Y. Taniguchi, T. Kitano, T. Shimoe, S. Iwata, Y. Asai, M. Yoshida
(Japan)
- A0075 IS COMPUTER-ASSISTED SURGERY USEFUL FOR TOTAL WRIST PROSTHESIS? 105
S. Facca, A. Gherissi, P. Liverneaux
(France)
- A0052 MIDTERM RESULTS OF 22 UTW ARTHROPLASTIES 106
A. Ferreres, F.L. Muñoz, A. Lluch
(Spain)

A0359	CLINICAL EXPERIENCES WITH RE-MOTION TOTAL WRIST PROSTHESIS P. Borelli	106
A0283	FINDINGS OF MULTICENTER STUDY INTO A NOVEL CERAMIC WRIST JOINT PROSTHESIS (MBW) [®] J. Felderhoff, M. Schönberger, M. Lehnert	107
A0327	LUNATE TITANIUM IMPLANT ARTHROPLASTY IN KIENBÖCK'S DISEASE T. Viljakka, S. Vilkki (<i>Finland</i>)	107
A0280	SCAPHO-CAPITO-HAMATO-TRIQUETRAL FUSION IN ADVANCED KIENBÖCK'S DISEASE: PRELIMINARY REPORT S.-W. Song, M.K. Bae, S.K. Rhee, J.C. Park (<i>Korea</i>)	107
A0279	LIMITED WRIST FUSION FOR KIENBÖCK'S DISEASE S.-W. Song, M.K. Bae, S.K. Rhee, S.M. Lee, S.H. Kang (<i>Korea</i>)	108

A0146 MID TERM RESULTS USING CUÉNODS OSTEO-LIGAMENTOPLASTY AND LIMITED DORSAL CAPSULODESIS FOR TREATMENT OF CHRONIC SCAPHOLUNATE DISSOCIATION

K. Kalb, J. van Schoonhoven, K.-J. Prommersberger
*Klinik für Handchirurgie, Rhön Klinikum AG, Salzburger
Leite 1, D-97616 Bad Neustadt/Saale, Germany*

Purpose: Until now treatment of chronic scapholunate dissociation remains an unsolved problem, as no single procedure yields satisfying results in all cases. Reconstruction of the biomechanically essential dorsal part of the scapholunate ligament using a bone-ligament-bone autograft is an interesting therapeutic option, but until now there are no valid results to be found in the literature. Therefore we analyzed our mid term results with Cuénods procedure, which is our favoured method of bone-ligament-bone reconstruction.

Method: Between 2000 and 2002 15 men with a mean age of 41 years were operated in our hospital using Cuénods procedure. 11 of these patients could be reexamined with a mean follow-up time of 80 months (minimum: 71, maximum: 87 months). One of these 11 patients had had a dynamic, the others a static instability before the operation. Follow-up examination consisted of a clinical and radiological evaluation including a DASH-Score and a modified MAYO-Wrist-Score.

Results: Clinical results were very satisfying. The modified Mayo-Wrist score was excellent with an average of 87 points (minimum: 65, maximum: 100 points). 92% of patients had an excellent or good result. The mean DASH-Score was 13 points (minimum: 0, maximum: 42 points). The mean pain level was 15 using a visual analogue scale ranging from 0 to 100. 5 out of 11 patients had no pain even with strenuous work. The mean arc of flexion - extension was 53-0-51°. The mean grip strength was equal to the opposite hand. Only one patient had to change his occupation. All patients would like to have the same procedure again, if they had to face the preoperative situation again. Contrasting to the excellent clinical results the radiological results were less satisfying. All patients showed at least mild degenerative changes. We found a recurrent scapholunate gap in 4 out of 11 cases. On the other hand no patient needed further treatment at the time of follow up.

Conclusions: Cuénods osteoligamentoplasty yields excellent clinical mid term results, although radiological examination shows insufficiency of the bone-ligament-bone autograft in some cases and at least mild degenerative changes in all patients. Further investigations are necessary to find out the best indications for this procedure, which at this moment is our method of

choice in dynamic scapholunate dissociation without useful remnants of the ligament.

10.1177/1753193409106404

A0109 “TREATMENT OF SCAPHOID INSTABILITY WITHOUT COLLAPSE” (DYNODESIS): A 15-YEAR OUTCOME STUDY

H. Seradge, W. Parker, C. Baer, A. Seradge
Orthopedic Institute

Introduction: Partial or complete scapholunate interosseous ligament (SLIL) tears without fixed deformity of the scaphoid (dynamic instability) alter wrist kinematics causing chronic wrist pain, reduced function and eventually a SLAC wrist deformity. Long-term outcomes for existing surgical treatment of this condition have been less than satisfactory. We conducted a 15-year outcome study of a tendon transfer reconstruction (dynodesis) for treatment of scaphoid instability without fixed deformity.

Methods: Patients with clinical presentation of scaphoid instability without fixed collapse (chronic pain, weakness, instability and decreased range of motion for over 5 months) underwent arthroscopic evaluation using the W.B. Geissler grading system. Extensor carpi radialis longus (ECRL) tendon transfer to the flexor carpi radialis (FCR) through the distal pole of the reduced scaphoid, dynodesis, was performed on 105 wrists. Twenty-eight patients (29 wrists) met the inclusion criteria for a minimum follow-up of 15 years. 97% had Grade III or IV tears. Outcomes were assessed with standard DASH questionnaires and Cooney's modification of the Green & O'Brien clinical wrist evaluation.

Results: Post-operative grip strength improved an average of 48% ($p < 0.0001$). DASH scores were improved by 68.5% ($p < 0.0001$). The mean active wrist flexion-extension arc increased 2 degrees and the ulnar-radial arc was reduced by 6 degrees. Ninety-three percent (93%) of patients reported improvement in activities of daily living and 90% reported significant pain relief. Green & O'Brien's clinical evaluation scoring showed significant improvement in hand and wrist function with 73% reporting good to excellent results ($t_{29} = 9.57$, $p < 0.0001$). Ninety three percent (93%) of the patients recommended the procedure.

Conclusion: This procedure provided long-term pain relief, improved grip strength and hand function in patients with scaphoid instability without collapse.

10.1177/1753193409106405

A0217 EXTENSOR CARPI RADIALIS BREVIS LIGAMENOTPLASTY AND DORSAL CAPSULODESIS FOR THE TREATMENT OF CHRONIC POSTTRAUMATIC SCAPHOLUNATE INSTABILITY

E. Papadogeorgou, S. Fairbank, C. Mathoulin
Institut de la Main, Paris, France

Chronic scapholunate instability, which is the most common form of carpal instability, leads to altered wrist kinematics that eventually result in the predictable pattern of progressive degenerative change typical of scapholunate advanced collapse (SLAC). It also presents a challenging management dilemma since there is no perfect treatment choice for this complex problem. The purpose of our study is to present a novel surgical technique that includes both an ECRB ligamentoplasty and a dorsal capsulodesis. We performed a retrospective review of 32 patients with chronic post-traumatic scapholunate instability who were operated upon by the senior author between 2000 and 2005. Chronic injury was defined as wrist pain caused by scapholunate dissociation present for longer than 3 months. There were 23 men and 9 women, with a mean age of 39 years (range: 20–55) at the time of the surgery. The average time from injury to surgery was 30.56 months (range: 4–75 months). Twenty three of the patients had conservative treatment with a cast, whereas 9 patients had no previous treatment. The average length of follow-up evaluation was 50 months (range: 27–67). All of the patients had a complete clinical and radiological evaluation preoperatively. Twenty four out of the 32 patients also had an arthroscan. Pre or intraoperative arthroscopic evaluation was carried out in all cases in order to identify the extent of the scapholunate dissociation, to precisely identify the stage according to the Geissler classification and to diagnose the possible presence of degenerative arthritic changes. Seventeen of the patients had stage 4 and 15 stage 5 scapholunate dissociation according to the Garcia Elias classification. The post-operative wrist range of motion was generally improved except for wrist flexion which was compromised but only by approximately 4°. In 20 out of 29 patients the DISI deformity was corrected with the surgical treatment. Grip strength was also improved postoperatively. Pain was measured by using a 0–4 patient grading scale. Before surgery 20 patients gave their pain a grade of 4 and the remaining patients gave a grade of 3. After surgery 12 patients had no pain at all (grade 0), 12 had mild pain (grade 1), 4 patients had grade 2 and 4 patients had grade 3 pain. There were no patients with grade 4 pain postoperatively. Based on the Mayo wrist scoring,

16 patients had excellent results, 8 patients had good results, 3 patients had fair results, and 5 patients had poor results. Complications occurred in 8 patients and included limitation of wrist range of motion, complex regional pain syndrome, a radial nerve neuroma and an osteosynthesis staple failure. In conclusion our technique which combines ECRB ligamentoplasty with dorsal capsulodesis is a reliable option for the successful surgical treatment of chronic post-traumatic scapholunate instability.

10.1177/1753193409106406

A0314 STAGE II SLAC AND SNAC WRIST: PROXIMAL ROW CARPECTOMY VERSUS FOUR-CORNER FUSION

G. Pilato, A. Sinigaglia, P. Punzetto, A. Bini

Background: four-corner fusion (FCF) and proximal row carpectomy (PRC) are effective surgical procedures to treat symptomatic collapse caused by SLAC or SNAC wrist, and have been both used to reduce pain and preserve functional range of motion.

Regarding PRC, improved results have been attributed to the palmar approach (Bedeschi et al., 1984; Luchetti et al.; Pilato et al., 2003). Recently, growing interest has been focused on FCF and some studies have expressed concern about the complication rate of the procedure in terms of delayed union, nonunion and impingement. These may occur following fixation with traditional techniques (Wyrick 1995; Cohen and Kozin 2001) but seem more common after dorsal circular plate fixation (Goldfarb 2004; Vance, 2005).

Aim of study: the purpose of the paper has been to compare in a retrospective view the results of PRC and FCF performed in two groups of ten patients affected by wrist arthritis of same radiographic severity (SLAC or SNAC wrists without midcarpal involvement).

Methods: the patients were affected by SNAC wrist with isolated radio-scaphoid involvement in 11 cases and stage II SLAC wrist in nine cases. All patients complained of pain, reduced strength and loss of motion. PRC was performed by volar approach. FCF utilized different methods of fixation (K wires, staples, dorsal circular plate). The average follow up period was 50 months (range, 12–84 mo). All patients underwent clinical assessment and radiographic examination. Pain was evaluated by VAS score. Wrist motion was measured by a goniometer and grip strength using a Jamar dynamometer. X-rays were analyzed to define time for union in FCF patients and joint alignment in PRC

patients. Final X-rays were examined also to detect osteoarthritis progression. Minami modification of Mayo wrist score was used to evaluate FCF, and Mayo wrist score to evaluate PRC.

Results: patient satisfaction after FCF was excellent in 7 cases and good in 3; after PRC was excellent in 7 cases, fair in 3. VAS decreased postoperatively in 90% of patients. Flexion-extension arc averaged 75° in FCF and 96° in PRC. Grip strength averaged 98% of the opposite wrist after FCF and 78% after PRC. Fusion was achieved in all FCF patients, and breakage of fixation devices was never observed.

According to evaluation method after FCF the results were excellent for 9 patients and good for 1; after PRC were excellent for 6 patients, good for 2 and fair for 2. Failures were due to pain in 1 case after PRC and impingement in 1 case after FCF.

Conclusions: PRC has several advantages, including an earlier mobilisation, pain relief and restoration of functional wrist motion, with high overall patient satisfaction. In comparison FCF is a technically-demanding procedure, but can lead to a better restoration of grip strength. Job requirements appear important to define surgical indication in stage II SLAC and SNAC wrist: we now prefer to use FCF in heavy workers with high functional demands.

10.1177/1753193409106407

A0136 THE EFFECT OF RSL FUSION ON WRIST MOVEMENT AND THE SUBSEQUENT EFFECTS OF DISTAL SCAPHOIDECTOMY AND TRIQUETRECTOMY

M.J. Berkhout, M.N. Shaw, L.J. Berglund, R.A. Berger, K.-N. An, M.J.P.F. Ritt

*Department of Plastic, Reconstructive and Handsurgery, VU university hospital, Amsterdam, The Netherlands
Department of Orthopedics, Biomechanics Lab, Mayo Clinic, Rochester MN, USA*

Introduction: The radioscapholunate arthrodesis is a salvage procedure indicated in the case of traumatic or degenerative osteoarthritis of the radiocarpal joint, involving the lunate facet of the radius. Remaining movement of the wrist joint will take place in the midcarpal joint. This cadaver study focuses on range of motion changes due to radioscapholunate arthrodesis and surgical techniques to improve the range of motion. At the same time these techniques might show other long-term benefits, such as diminishing mechanical stress

which might otherwise cause development of midcarpal osteoarthritis.

We tested the hypotheses that (1) RSL-fusion would diminish the amplitudes of movements of the wrist in all directions, (2) range of motion in the RSL-fused wrist would improve after scaphoidectomy, (3) range of motion would further improve after triquetrectomy and (4) RSL-fusion would cause a significant change in kinematics between the hamate and the triquetrum.

Methods and procedures: Six fresh frozen cadaver forearms were prepared and placed in a custom made frame with the elbow in 90 degrees flexion and the forearm in neutral position, the hand pointing upwards. The wrist flexors and extensors were attached to pneumatic pulleys and the wrist was loaded with a total of 100 N. Range of motion measurements were taken using a magnetic tracking device (Polhemus) with four separate sensors that were placed in the distal radius, third metacarpal, triquetrum and hamate. A sequence of surgical steps was carried out and measurements (maximum flexion/extension, radial/ulnar deviation and circumduction) were taken in the intact situation and after each step of surgery. These steps were subsequently: RSL-fusion, distal scaphoidectomy and triquetrectomy. For the fusion we used two 2.4 LCP distal radius plates. The data analysis was done using Motion Monitor.

Results: RSL-fusion reduced total wrist motion (3 MC/Rad) in the F/E axis to an average of 49% of F/E in the unfused wrist. Subsequent distal scaphoidectomy and triquetrectomy augmented F/E from 49% to respectively 76% and 88% of the unfused situation.

RSL-fusion reduced R/U deviation to an average of 78% of R/U deviation in the unfused wrist. Subsequent distal scaphoidectomy and triquetrectomy augmented R/U deviation to respectively 84% and 103% of the unfused situation.

There is good statistical evidence for these differences (*t*-test, sign test).

Discussion: Coming back to our hypotheses, we conclude that RSL-fusion diminishes the amplitudes of movements of the wrist in all directions; range of motion in the RSL-fused wrist improves after scaphoidectomy; range of motion further improves after triquetrectomy (88% of original F/E and 100% of original R/U deviation), and RSL-fusion causes a significant change in kinematics between the hamate and the triquetrum.

Whether these results can be reproduced in the clinical situation has yet to be shown by future research.

10.1177/1753193409106408

A0177 RESULTS AFTER RADIOSCAPHOLUNATE FUSION WITH OR WITHOUT RESECTION OF THE DISTAL SCAPHOID POLE

M. Muehldorfer, P.H. Ha, K.J. Prommersberger, J. van Schoonhoven

Clinic for Hand Surgery, Germany

Between 4/02 and 6/07 61 patients with posttraumatic radiocarpal osteoarthritis were treated with radioscapulunate (RSL) fusion. Of these, 30 had the distal scaphoid pole resected (group A), and 31 underwent RSL fusion without this additional procedure (group B). During follow up, in 14 of the 61 patients (28%), the RSL fusion was converted to a complete wrist arthrodesis (6/A und 8/B) at a mean of 15 (4–35) months postoperatively. The remaining 47 patients were invited for a review. Of these, 35 (20/A, 15/B) returned for a clinical and radiological examination at an average 28 months postoperatively (10–47 months).

Results: There was no significant difference between groups A or B for any of the following clinical criteria: The DASH score averaged 43 points for group A and 44 for group B. The modified Mayo wrist score was 56 (25–93) points on average for both groups. Wrist extension averaged 28° (A) and 29° (B); flexion, 25° (A) and 22° (B); ulnar deviation, 17° (A) and 15° (B); and radial deviation 12° (A) and 10° (B). Grip strength was 23 kg on average for both groups (56% of the opposite side). Pain averaged 5 points for group A and 4 points for group B on the visual analogue scale (0–10). In group A, 16 patients (80%) felt an improvement of pain at rest; and 17 patients (85%), with activities, as compared to their preoperative condition. In group B, all patients felt an improvement of pain with rest; and 14 patients (93%), with activities.

After distal scaphoid pole resection, 16 of 20 patients showed ossifications at the resection site. Due to impingement between the trapezium and the scaphoid, 5 Patients had cysts at the proximal trapezium, 4 patients had osseous appositions, and another patient had both, following insufficient scaphoid resection.

At follow up, three patients had a non-union between the radius and the scaphoid. None of those had the distal scaphoid pole resected. Besides, another three patients, who were converted to complete wrist arthrodesis, had a radioscapuloid non-union without a resection of the distal scaphoid pole.

Conclusion: RSL fusion is a treatment option for radiocarpal osteoarthritis to preserve a functional range of motion. No significant advantage for wrist

movement could be seen after resection of the distal scaphoid pole. Although numbers are small, radioscapuloid non-union was only seen in patients without resection. Long-term results are needed to assess the effects for the development of midcarpal osteoarthritis.

10.1177/1753193409106380

A0051 LUNO CAPITATE ARTHRODESIS FOR DEGENERATIVE OSTEOARTHRITIS OF THE WRIST

A. Ferreres, M. Garcia-Elias, R. Plaza

Institut Kaplan, Hand Unit Hospital Clinic Universitari, Barcelona, Spain

Introduction: Advanced degenerative osteoarthritis of the wrist secondary to SNAC or SLAC has been traditionally treated by means of scaphoidectomy plus midcarpal fusion (“four corners”) or limiting fusion to lunocapitate joint. First row carpectomy can also be indicated if the capitate’s head maintains a good cartilage.

Material and method: We have reviewed 17 patients (5 women and 12 men), out of 23, that were operated on because a stage III of a SNAC or SLAC wrist between 1995 and 2000. Mean age at surgery was 47 years (22–66).

Through a dorsal approach ligament preserving, the scaphoid was excised and lunate was fused to the capitate to stabilize the midcarpal joint. After removing the cartilage of the distal lunate and proximal capitate, the position of the lunate was corrected as much as possible and fused to the capitate. The hamate was included in the fusion if it had surface for the lunate (type II lunate). The mobility between lunate and triquetrum was always preserved.

The only bone graft used came from the excised scaphoid. Only the distal part if SNAC was the original disease.

Evaluation was carried out with the following parameters: Mobility, grip strength, DASH questionnaire, Mayo wrist score, and radiological evaluation, which included, radio-lunate angle, carpal height, lunate coverage and preservation of the radio-lunate joint.

Results: Ninety-four per cent of wrists attained a solid fusion at an average of 10 weeks after surgery. One was converted to total wrist fusion because of early osteoarthritis at the radio-lunate joint. Radial deviation is the only motion that improved after surgery. Average grip strength reached 65% of the contralateral wrist.

Radio-lunate angle was corrected significantly and carpal height and lunate coverage did not change. DASH score averaged 7.65 points (0–45) Only one case over 40. According to Mayo wrist score, there were 1 excellent, 5 good, 8 satisfactory and 3 poor functional results. Mean 68 points.

Discussion/conclusion: Making reference to recent studies on mechanoreceptors of wrist ligaments, preserving triquetrum motion and all its ligaments will preserve wrist proprioception. Compared with results of four corners fusion, limiting fusion to lunate and capitate permits obtaining the same level of satisfaction and results and are maintained at long term.

10.1177/1753193409106381

A0020 EVALUATION OF RESECTION OF THE SCAPHOID

Y. Taniguchi, T. Kitano, T. Shimoe, S. Iwata, Y. Asai, M. Yoshida

Department of Orthopaedic Surgery, Wakayama Medical University, Wakayama Japan

Introduction: In 1949, Dwyer described cases with resection of the scaphoid with good clinical outcome. Recently there have been a few reports to support this technique. The purpose of this study was to evaluate the clinical results of resection of the scaphoid.

Materials and methods: We reviewed 8 patients who had undergone a resection of scaphoid. There were 4 male and 4 female patients, whose ages ranged from 28 to 78 years. The right hand was involved in 5 patients and the left hand in 3 patients. Preoperative diagnoses were scaphoid nonunion in 6 patients, Preiser's disease in 2 patients. Surgical procedure included resection of the distal scaphoid in 5 patients and total scaphoid resection in 3. Follow-up period ranged from 4 months to 7 years and 9 months. The mean duration of follow-up was 2 years and 10 months. At the follow-up examination, the patients were evaluated both clinically and radiographically.

Results: 6 patients had no pain postoperatively. 2 patients had only mild pain after strenuous activity. After surgery, wrist pain was significantly relieved. 6 patients returned to their preoperative work within 6 weeks. However, 2 elderly female patients had carpal tunnel syndrome that required surgical carpal tunnel release. Wrist range of motion improved from 100.6° before surgery to 124.7° after surgery. Grip strength improved from 19.6 kg before surgery to 24.0 kg after surgery. After surgery, both range of motion and grip strength

improved significantly. The mean carpal height ratio decreased from 0.52 to 0.47 and the mean radiolunate angle decreased from -19.7° to -28.9° . That indicated deterioration of carpal collapse and DISI deformity.

Discussion: There are several studies in the literature regarding the distal scaphoid resection for scaphoid nonunion. Malerich recommended the distal scaphoid resection for long-standing scaphoid nonunions with advanced collapse wrist deformity. Soejima reported that this operation for scaphoid nonunion with arthritis produced a satisfactory clinical outcome. Ruch described that this technique remains a valuable treatment option. In this study, the advantages of this technique included minimal invasion, relief of pain, and improved range of motion. However, postoperative radiographs showed that carpal collapse and DISI deformity deteriorated. Therefore, scaphoid resection is indicated under selected conditions and a longer follow-up is required to ascertain that the good clinical results remain unchanged with time.

10.1177/1753193409106382

A0075 IS COMPUTER-ASSISTED SURGERY USEFUL FOR TOTAL WRIST PROSTHESIS?

S. Facca, A. Gherissi, P. Liverneaux
Department of Hand Surgery, Strasbourg University Hospital, Ilkkirch, France

Total joint replacement appeals more and more regularly to computer-assisted surgery, whether it is in the knee or in the hip. Applications begin to be born in surgery of the upper limb in particular for shoulder prostheses. We wanted to know what the specifications for the implantation of the total wrist prostheses by computer-assisted surgery could be.

The objective of any total wrist prosthesis is to set up a K-wire in the axis of the radius to serve as axis in the various guides of cutting distal radius. To determine this axis, the conventional techniques used, according to the types of prostheses, either outside morphological marks, or a fluoroscopic intuitive guide. These techniques contain the stumbling block to propose no direct location of the axis of the radius.

Our series contained 6 total prostheses of wrist. After a dorsal approach, a wide arthrotomy, the distal radius was exposed. A device of location containing 3 markers was fixed to the surface of the radius. Fluoroscopic images of antero-posterior and lateral views were realized, then fitted in a fluoroscopic navigation system. The ideal axis of the radius was determined

then virtually directly to the screen of the computer. Once the surgical drill was calibrated, the K-wire was put in the axis of the radius by following the indications of the computer. The tools of cutting guide was then threaded on the K-wire. Then, the procedure was pursued according to the conventional technique. In each of our three cases operated under fluoroscopic navigation, the K-wire was exactly along the axis of the radius.

In conclusion, during the implantation of a total wrist prosthesis, it seems more logical to determine first the axis of the radius, what allows the fluoronavigation, rather than to base itself on a location outside or intuitive as in the conventional techniques. We think that this preliminary study allowed us to show the interest of computer-assisted surgery in this indication. The ideal position of the carpal part of the prosthesis and its screws remains to be determined during the next study.

10.1177/1753193409106077

A0052 MIDTERM RESULTS OF 22 UTW ARTHROPLASTIES

A. Ferreres, F.L. Muñoz, A. Lluch
*Institut Kaplan and Hand Unit Hospital Clínic
Universitari, Barcelona, Spain*

Introduction: We have reviewed 22 patients consecutively treated with a UTW[®] arthroplasty.

Material and method: Nineteen patients suffered from rheumatoid arthritis (including one lupus, one unspecific spondilo-arthropathy and one chondrocalcinosis). Three had osteoarthritis, secondary to advanced Kienböck's disease in 2 cases and one after trauma. Average follow-up was 38 months with a minimum of 18 months and a maximum of 6 years and 6 months. Patients were reviewed radiologically and clinically using the Disabilities Arm Shoulder Hand (DASH), Patient Related Wrist Evaluation (PRWE) and Satisfaction questionnaires.

Results: The average ROM in flexion-extension was 71° and 28° in radio-ulnar inclination. Radiographic changes were observed in 4 patients. There was a slight loosening of the screw inside the index metacarpal, without signs of osteolysis in the trapezoid in 2 of them. In the other 2 patients a slight subsidence of the carpal component on the ulnar side was observed. Two patients showed osteolysis at the level of the radial styloid, without loosening of the radial implant, which was interpreted as a sign of "stress shielding".

Mean DASH score was 41 over 100 (range 9–71) and the results of the PRWE test were 19.9 over 50 (range 0–35)

for pain and 31.1 over 100 (range 0–45) for activities. Seventy five per cent of patients were satisfied or very satisfied with the procedure.

Discussion/conclusion: Distal stabilization of previous wrist implants was performed with stems driven into the metacarpals, which eventually became loose after resorption of the carpal bones. Distal fixation of the UTW component is accomplished by flat and total bearing on the distal carpal row, which needs to be reinforced with bone grafts and an intercarpal arthrodesis. The short central stem and the ulnar and radial screws provide further stability in rotation, mainly during early post-operative period. The condylar insert, manufactured with UHMWP, initially had a toric shape (UTW I[®]) and later changed to ellipsoid (UTW II[®]) with the purpose of obtaining a wider area of contact in the plane of flexion/extension thus decreasing long term polyethylene wear. These results allow us to recommend this procedure for patients affected with rheumatoid arthritis or osteoarthritis with wrist joint destruction. Although longer follow-up is needed, mid term results are encouraging. Nevertheless, the results of the questionnaires are below normal because patients suffering from rheumatoid arthritis present with other hand alterations, mainly destruction of the metacarpo-phalangeal joints, which restricts their daily life activities.

10.1177/1753193409106076

A0359 CLINICAL EXPERIENCES WITH RE-MOTION TOTAL WRIST PROSTHESIS

P. Borelli

The experience of the author with RE-MOTION Total Wrist System (SBJi) is reported.

During the month of January 2008 4 wrist prosthesis were implanted.

The first patient, male, 50 years old, suffering from severe rheumatoid arthritis at the right wrist, was already treated with wrist total fusion at the contralateral wrist. The second patient, female, 64 years old, had reumatoid arthritis at the left wrist.

The third patient, male 48 years old, had SNAC at the right wrist.

The fourth patient, male, 46 years old, had SNAC at the left wrist.

A cast or a protective splint was used for two weeks. Active mobilization was allowed at 2 weeks and early rehabilitation using a particular splint was started at 3 weeks to increase power and endurance.

It could be shown that a solid osteointegration of the prosthesis can be achieved.

The most important prerequisite is to place the prosthetic components correctly.

Patient satisfaction, pain, daily activities, motion, grip, strength and radiographs were evaluated.

The overall result, up till now, has been excellent in 2 and good in 2 wrists.

Keywords: Total, wrist, non cemented prosthesis

10.1177/1753193409106125

A0283 FINDINGS OF MULTICENTER STUDY INTO A NOVEL CERAMIC WRIST JOINT PROSTHESIS (MBW)[®]

J. Felderhoff¹, M. Schönberger², M. Lehnert³

¹*Marthin Luther Krankenhaus Berlin*

²*Krankenhaus Bückeberg*

³*Charlottenburger orthopädisch handchirurgisches Centrum*

The Implantation of the MBW[®] ceramic wrist joint prosthesis is an operative procedure with a high patient outcome. Between January 2002 and December 2008, 63 wrists (SLAC-wrist, SNAC-wrist and radiocarpal arthrosis after fracture of the distal radius) were treated by implantation of a novel ceramic wrist joint prosthesis. The follow up was after a mean time of 59,3 months after operation.

The DASH score was on average 19,7 (5–36,3). The visual pain analogue scale following exercise was on average 3.3 (0–8). The verbal pain analogue scale following exercise was on average 2.1 (0–4). Comparing grip strength with the unoperated hand we measured 27 to 37 kg.

There was one complication (postoperatively Luxation). We were able to find a loosening of the distal part of the Prosthesis in 2 cases.

All patients would like to be operated on in the same operative procedure again on account of contentment.

10.1177/1753193409106386

A0327 LUNATE TITANIUM IMPLANT ARTHROPLASTY IN KIENBÖCK'S DISEASE

T. Viljakka, S. Vilkki

Tampere University Hospital, Hand and microsurgery Department, Finland

We have used titanium lunate implant in ten patients in Kienböck's stages III-IV since year 2002. Follow-up study of the first six patients was done after 4.2(3.5–4.7) years, and the next will be in year 2009.

At first follow-up three patients were painful. The movements and grip power were slightly better than preoperatively. Total movements were 76% and power grip 85% compared to the contralateral side. Four patients continued their manual work, one was unemployed and one retired because age. Results in Mayo screening were good in 2, fair in 2 and poor in two patients. Five patients were satisfied on the result. With regard to complication one patient had a bone cyst in the distal radius.

Based on the first follow-up study this treatment gave acceptable results and is a possible option if the lunate is severely compromised. In heavy manual workers the benefit may be limited without work arrangements.

10.1177/1753193409106389

A0280 SCAPHO-CAPITO-HAMATO-TRIQUETRAL FUSION IN ADVANCED KIENBÖCK'S DISEASE: PRELIMINARY REPORT

S.-W. Song, M.K. Bae, S.K. Rhee, J.C. Park
Department of Orthopedic Surgery, The Catholic University of Korea, Seoul, Korea

Background: The treatment of advanced Kienböck's disease is still problematic, especially, if there is severe fragmentation of the necrotized lunate. Although there have been several classical techniques to solve the problem, as far as we know, there is still no absolute satisfactory answer to that. We performed scapho-capito-hamato-triquetral (SCHAT) fusion for the advanced Kienböck's disease to prevent the further carpal collapse, to preserve the remaining radiocarpal wrist motion, and to make the load sharing of ulnocarpal joint to decrease load concentration at radioscapoid joint in case of the limited intercarpal (midcarpal) fusion.

Aim(s): We present the preliminary short term results of SCHAT fusion in Lichtman stage IIIb or IV Kienböck's disease.

Methods: The results of six cases, operated and followed since November 2004, were analyzed retrospectively. The indication of SCHAT fusion was the advanced Kienböck's disease, in Lichtman stage IIIb or IV, with severe fragmentation of lunate. The fragmented lunate was not possible to reduce and fix by any other techniques, so excised completely, through the posterior interligamentous approach. Posterior interosseous nerve was always excised also, to decrease the late arthritic pain. Scaphoid was positioned in neutral, and then the intercarpal joints between scaphoid and capitate, capitate and hamate, and hamate and triquetrum, were removed, only in the mid-portion of their joints. The outline of the each intercarpal joint was kept intact, to prevent the changes

of biomechanical alignment of carpal bones. The resected joints were filled with fresh cancellous bones from the autogenous iliac crest, and fixed with multiple K-wires, to make an “inverted U-shape” carpal bone block. Short arm splint and/or cast were applied for 8 weeks, and then K-wire removal and ROM exercise were followed. The clinical results were evaluated by ROM, grip strength, visual analogue pain score (VAS), and carpal height ratio and the progression of arthritis on radiocarpal joint were evaluated radiologically.

Results: There were 3 cases in each Stage IIIb and IV, men and women, and right and left wrist. Mean follow-up period was 16.3 (range 3–24) months, and mean age at the time of operation was 51 (range 33–66) years. Two cases were minus ulnar variance, and 4 cases were neutral variance. VAS score was improved from preoperative 6 to postoperative 3.8, and grip strength, compared to the opposite side, was also improved from preoperative 42.7% to postoperative 61.2%. The flexion-extension range of motion of the wrist was decreased from 97° to 78°, and radioulnar deviation was not changed significantly (from 42° to 39.1°). There was no further carpal collapse, but in 1 case, there was some progression of arthritis at radio-scaphoid joint. Fusion was achieved in all cases.

Discussion/Conclusions: From this short term follow-up results, SCHAT fusion was considered as one of the favorable salvage procedures for the advanced Kienböck’s disease. However, biomechanical study using cadaver, long-term follow-up & accumulation of a higher number of cases would be needed to confirm its usefulness in the future.

10.1177/1753193409106391

A0279 LIMITED WRIST FUSION FOR KIENBÖCK’S DISEASE

S.-W. Song, M.K. Bae, S.K. Rhee, S.M. Lee, S.H. Kang
Department of Orthopedic Surgery, The Catholic University of Korea, St Mary’s Hospital, 62, Yoido, Youngdeungpo, Seoul, Korea

Background: Treatment of Kienböck’s disease is problematic. Although revascularization procedure is one of the important treatment principles, limited intercarpal fusion for the deviation of axial load to lunate is also required.

Aim: To evaluate clinical outcomes of triscaphe (STT), scapho-capitate (SC) and scapho-capito-hamato-triquetral (SCHAT) fusion in the advanced Kienböck’s disease.

Methods: Thirty patients of Lichtman stage III and IV were treated with the limited wrist arthrodesis. STT & SC fusion for stage IIIa and IIIb, and SCHAT fusion for IIIb and IV were done, according to the preoperative radiologic and intraoperative articular surface findings. Mean follow-up period was 30.2 (range 6–108) months and mean age at the time of their operation was 34.8 (range 23–57) years. There were 10 cases of STT fusion, 15 cases of SC fusion and 5 cases of SCHAT fusion. For assessment of treatment results, wrist ROM, grip strength, VAS (visual analog pain score) and any radiologic changes of wrists at last follow-up.

Results: VAS score was 4.3 for STT, 3.5 for SC, 4.5 for SCHAT, and grip strength, compared to the opposite side, was 71% for STT, 78% for SC, 65% SCHAT. The sum of range of motion of the wrist was 97.5° for STT, 113.3° for SC, 90° for SCHAT. There was no change of carpal height ratio for all cases, but 2 of 10 STT fusions showed degenerative change of radiocarpal joint. In all cases except one SC fusion were united.

Conclusions: Limited wrist arthrodesis in advanced Kienböck’s disease was regarded as a valuable method and showed acceptable clinical results in STT & SC fusion. However, SC fusion was thought as more favorable than STT fusion in respect to pain relief and complication rate. SCHAT fusion was thought to be a possible salvage procedure for Stage IV Kienböck’s disease.

10.1177/1753193409106392

SESSION 17: DUPUYTREN & CONGENITAL

- A0204 EFFICACY AND SAFETY OF INJECTABLE CLOSTRIDIAL COLLAGENASE (AA4500) IN PATIENTS WITH DUPUYTREN'S DISEASE: RESULTS OF A PHASE 3 TRIAL 111
L.C. Hurst, M. Badalamente, P. Blazar, R.N. Hotchkiss, F.T. Kaplan, R. Meals, J. Rodzvilla (USA)
- A0225 FAT GRAFTING DUPUYTREN'S CONTRACTURE FOLLOWING THOROUGH PERCUTANEOUS RELEASE 111
S.E.R. Hovius, X. Smit, R.K. Khouri (The Netherlands, USA)
- A0043 REVISITED MICROANATOMY OF THE PALMAR APONEUROSIS AND SURGICAL RELEVANCE 112
C. Tiengo, L. Lancerotto, C. Stecco, V. Macchi, F. Bassetto, R. De Caro (Italy)
- A0216 PERCUTANEOUS NEEDLE FASCIOTOMY IN DUPUYTREN'S DISEASE 112
A.G. Pereira, M. Massada, J. Ramos, R. Coelho, R. Lemos (Portugal)
- A0141 A RETROSPECTIVE STUDY OF DUPUYTREN'S CONTRACTURE SURGERY OUTCOMES. LONG TERM FOLLOW-UP 113
A.G. Olea, A.D. Porras, J. Bustillo, R. Martín (Spain)
- A0111 THE RADIAL LATERO-DIGITAL FLAP TO COVER PALMAR SKIN DEFECTS AFTER DUPUYTREN FASCIECTOMY 114
A. Gohritz, E.-M. Liodaki, O. Tsirogianni, K. Knobloch, P.M. Vogt (Germany)
- A0016 THE POLLEXOGRAPH FOR MEASURING PALMAR ABDUCTION: RELIABILITY AND RESULTS IN HYPOPLASTIC THUMB PATIENTS 114
M. de Kraker, R.W. Selles, H.M. Molenaar, T.A. Schreuders, H.J. Stam, S.E. Hovius (The Netherlands)
- A0168 POLLICIZATION OF INDEX FINGER AS THE METHOD OF RESTORATION PREHENSILE FUNCTION OF THE HAND 115
A.J. Protasewicz
- A0261 NONVASCULARISED MIDDLE TOE PHALANX TRANSFER IN THE TREATMENT OF CONGENITAL HYPOPLASIA AND APLASIA OF FINGERS 115
L. Kaczmarek (Poland)
- A0175 DISTRACTION LENGTHENING TECHNIQUE IN TREATMENT OF CONGENITAL MALFORMATION 116
G. Pajardi, C. Novelli, C. Parolo, A. Ghezzi

A0250	DO EXCISED ACCESSORY DIGITS REQUIRE SPECIALITY FOLLOW-UP? A. Rose, Z. Hassan, P. McArthur (UK)	116
A0059	THE BONE PLASTY BY MICROSURGICAL AUTOTRANSPLANTS IN CHILDREN WITH CONGENITAL AND ACQUIRED DEFORMITIES IN UPPER LIMBS S. Golyana, A.B. Oreshkov, R.N. Polozov, A.V. Govorov (Russia)	117
A0307	GROWTH DIAGRAMS FOR INDIVIDUAL FINGER STRENGTH IN CHILDREN MEASURED WITH THE RIHM H.M. (Ties) Molenaar, R.W. Selles, S.P. Willemsen, S.E.R. Hovius, H.J. Stam)	117
A0008	SURGICAL TREATMENT FOR TRIGGER THUMB IN CHILDREN OLDER THAN 5 YEARS S.-H. Han, D.G. Song (Korea)	118
A0213	MICROSURGICAL RECONSTRUCTION ADACTYLOUS HAND U. Padhaisky, S. Miachkovsky	118

A0204 EFFICACY AND SAFETY OF INJECTABLE CLOSTRIDIAL COLLAGENASE (AA4500) IN PATIENTS WITH DUPUYTREN'S DISEASE: RESULTS OF A PHASE 3 TRIAL

L.C. Hurst¹, M. Badalamente¹, P. Blazar², R.N. Hotchkiss³, F.T. Kaplan⁴, R. Meals⁵, J. Rodzvilla⁶
¹*SUNY at Stony Brook, Stony Brook, New York*
²*Brigham & Women's Hospital, Boston, Massachusetts*
³*Hospital for Special Surgery, New York, NY*
⁴*Indiana Hand Center, Indianapolis, Indiana*
⁵*University of California Los Angeles, Los Angeles, California*
⁶*Auxilium Pharmaceuticals, Malvern, Pennsylvania*

Introduction: Dupuytren's disease, a progressive fibrotic disorder, affects 3% to 6% of adult Caucasians. In its later stages, Dupuytren's disease causes joint contractures, disfigurement and often substantially limits hand functionality. The most common treatment option is surgery. Previous clinical studies suggested that injection of Clostridial collagenase (AA4500) "an investigational, enzymatic treatment option for advanced Dupuytren's disease" was effective in correcting joint contracture. Herein, the results of a recent, phase 3, double-blind study of injectable Clostridial collagenase in a large patient population is reported.

Methods: In total, 306 evaluable patients with joint contractures of $\geq 20^\circ$ in metacarpophalangeal (MP) joints, proximal interphalangeal (PIP) joints, or both, were enrolled in Collagenase Option for Reduction of Dupuytren's (CORD) I, which was a randomized, double-blind, placebo-controlled, multicenter phase 3 trial, between September 2007 and December 2007. Patients were randomized 2:1 to treatment with up to 3 Clostridial collagenase (0.58 mg) or placebo injections into the affected cord at 30 day intervals. Follow-up occurred 1 day, 1 week, and 1 month after each injection. The day after injection, investigators manipulated injected cords. Primary end point was correction to 0° – 5° of normal extension 30 days after the last injection. Cords affecting subsequent joints could be injected if the primary end point was achieved with up to 3 injections. Twenty-six secondary end points including range of motion, average reduction in contracture, and percent reduction were evaluated and adverse events were collected. Statistical analyses included Cochran Mantel Haenszel (CMH) and ANCOVA tests.

Results: Primary joints ($n = 306$; 202 MP, 104 PIP) had a mean baseline contracture of $50^\circ \pm 20^\circ$. Significantly more joints treated with collagenase than placebo (64.0% vs 6.8%; $P < 0.001$) met the primary end point (0° – 5° of normal extension). Median time to achieve the primary

end point was 56 days for collagenase-treated joints. All 26 secondary end points were met with statistical significance ($P < 0.002$). For example, significantly more collagenase-treated than placebo-treated joints achieved a $\geq 50\%$ reduction in joint contracture from baseline (84.7% vs 11.7% , $P < 0.001$), with a significantly greater average percent reduction in contracture of 79.3% (from 50° to 12°) vs 8.6% (from 49° to 46°), respectively ($P < 0.001$). No change was observed in full flexion with either treatment. Overall, arc of motion was significantly improved with collagenase compared with placebo treatment: 44° to 81° vs 45° to 50° , respectively ($P < 0.001$). Most commonly reported adverse events were localized edema, pain, swelling, bruising, and pruritus, and transient lymph node swelling and pain. Three serious adverse events were deemed related to collagenase treatment: 2 tendon ruptures and 1 complex regional pain syndrome. No significant changes in grip strength, no clinically significant systemic allergic reactions, and no nerve injuries were observed.

Conclusion: Results of this phase 3 trial demonstrate injectable Clostridial collagenase significantly improved MP and PIP joint contractures in the majority of patients who participated in the trial and was generally well tolerated.

10.1177/1753193409106024

A0225 FAT GRAFTING DUPUYTREN'S CONTRACTURE FOLLOWING THOROUGH PERCUTANEOUS RELEASE

S.E.R. Hovius, X. Smit, R.K. Khouri
Department of Plastic and Reconstructive Surgery, Erasmus MC – University Medical Center Rotterdam, The Netherlands
Miami Hand Center, Florida, USA

Introduction: Percutaneous needle release of Dupuytren's contracture has the advantage of prompt recovery but has the drawback of high recurrence. Along with contracture of the fascia, fat atrophy is a hallmark of this disease. We report our experience with a new technique in which we refined percutaneous release of fibrotic cords and combined it with subdermal fat grafting.

Materials & methods

Technique: Using steady extension force, a meticulous subdermal dissection of the cord is performed through multiple superficial nicks along the entire contracture band. This technique disintegrates the cord and separates it from the dermis. The resulting space is grafted with a loose lipoaspirate. One week postoperatively, patients were allowed to use the hand.

Patients: This procedure was performed on 23 hands in 20 patients. We treated the complete spectrum of Dupuytren's disease including recurrences.

Results: Full extension was achieved in 18 hands and the remaining had less than 15° lag at the completion of the procedure. At 2 weeks, all patients recovered use of the hand. At one month, most striking findings were softness of the hand, absence of scarring and full functional recovery. Three patients had a transient neuropraxia and one had a reflex dystrophy. At 12 months average follow up (range 6–24), there were two recurrences and 11 with a slight 10–15° recurrence. All patients were very satisfied with the result.

Conclusions: We describe a new, safe and minimally invasive approach to the treatment of Dupuytren's contracture. This technique differs from standard percutaneous release in two major points: (1) full dermal separation and disintegration of the cord along its entire span, and (2) subdermal fat grafting to provide padding and to prevent scarring and recurrence. Fat grafting after thorough percutaneous fasciotomy seems to change the biology of the disease and to rejuvenate the hand.

10.1177/1753193409105909

A0043 REVISITED MICROANATOMY OF THE PALMAR APONEUROSIS AND SURGICAL RELEVANCE

C. Tiengo¹, L. Lancerotto¹, C. Stecco², V. Macchi², F. Bassetto¹, R. De Caro²

¹*Clinic of Plastic Surgery, University of Padova, Italy*

²*Section of Anatomy, Department of Human Anatomy and Physiology, University of Padova, Italy*

Introduction: Dupuytren's disease is a largely diffused pathology of the palmar aponeurosis with still unclear pathogenesis; the only option for treatment is surgery. All major studies on the anatomy of the fasciae of palm of the hand were conducted between the '50 and the '80 of the last century, while in the last decades attention concentrated on biomolecular aspects. On the other hand surgically relevant open questions may find an answer in the sophisticated tridimensional structure of the aponeurosis.

Methods: 10 hands of 7 subjects, fresh or fixed with formalin or according to Thiel's method, were studied through dissection at the operating microscope. Samples were collected for histological – immunohistochemical analysis (haematoxylin-eosin, azan-Mallory, van Gieson, S-100).

Results: The longitudinal fibres of the palmar aponeurosis were in continuity with the palmaris longus tendon

and with the deep layers of the subcutaneous tissue, while the transverse fibres, sited deeply, appeared a specialization of the deep fascia of the hand. Histologically, Wood-Jones longitudinal fibres, Skoog's transverse, the septa of Legueu-Luvara, and McGrouther's vertical fibres were identified. Loose connective tissue isolates the longitudinal fibres and separates them from the transverse layer, permitting a limited independency of sliding. The longitudinal fibres are distributed in one layer, not three as classically described in literature, and concentrate over the flexor tendons. The fibres of the septa of Legueu-Juvara are continuous with the transverse fibres and direct deeply to attach to the deep fasciae and metacarpal bones. Vertical fibres connect the dermis to the longitudinal layer. In particular, on the ulnar side of tendons they are more concentrated and run through both the longitudinal and transverse layers to anchor the dermis to the septa of Legueu-Juvara, while on the radial side they terminate superficially to the transverse layer, configuring a distinction between ulnar complete septa of Legueu-Juvara and radial incomplete septa. Nervous terminations, especially Pacini's corpuscles, are richly present in the transverse layer of the palmar aponeurosis, and concentrate especially at the intersection of the three systems of fibres at Legueu-Juvara septa. In the fingers the disposition of the fascial planes identified correspond to the classical description given by McFarlane.

Discussion and conclusion: The disposition of the layers of the fascial structures of the palm and digits, however peculiar due to high local specialization, can be correlated to the general structure of the subcutaneous tissue. In the palm, the longitudinal layer is a specialization of the deep layers of the subcutaneous tissue, the transverse layer of the deep fasciae, separated by a layer of loose connective tissue. Therefore, Dupuytren's disease could be described as a pathology of the fibrous component of the subcutaneous tissue. The anatomical barrier between the two layers may explain the difficulty of Dupuytren's disease in involving the transverse layer. On the other hand, the vertical fibres of the ulnar complete septa of Legueu-Juvara create a gap in this barrier through which the disease can find its way and are a potential site of incomplete surgical excision.

10.1177/1753193409106126

A0216 PERCUTANEOUS NEEDLE FASCIOTOMY IN DUPUYTREN'S DISEASE

A.G. Pereira, M. Massada, J. Ramos, R. Coelho, R. Lemos

Centro Hospitalar do Porto, Portugal

Introduction: Dupuytren's contracture is a controversial topic and has been the subject of many debates since it was first described. There are several surgical modalities available that vary according to their invasiveness, outcome, complications, time of recovery and overall patient satisfaction. The purpose of this study was to evaluate the percutaneous needle fasciotomy (PNF) in short-term in regard to these aspects.

Material and methods: This is a retrospective study of 27 patients (with a total of 36 rays) that were treated with PNF under general anaesthesia during the period between March/05 and June/08. In this sample, 85% of the patients were men and the mean age was 56 years (42–81). The study included the consultation of the patients files (registering the deformity before and after the surgery) and the evaluation of the residual deformity at a mean follow-up time of 18 months. The minor (small tears and transient paresthesias) and major (infection, skin slough, transected artery or flexor tendon, digital nerve injury and hematoma) complications and patient satisfaction were also evaluated.

Results: The mean pre-op deformity was 99° (50–185) that improved to 34° (12–70) in the immediate post-op. Only one patient (3.7%) was re-operated after the initial procedure. The mean deformity after the mean follow-up period of 18 months was 45° (12–85). With regard to the complications, were registered 3 cases (8.3%) of transient paresthesias and 5 (13.8%) of small skin tears that resolved within 2 weeks. Major complications were not seen. All the patients, besides one, were satisfied with the result, recommend it, and would repeat the procedure if it was necessary.

Discussion: Since the beginning the preferred surgical treatment regime for Dupuytren's disease have undergone a complete pendulum movement. Although the limited fasciectomy (LF) is the most popular modality at present, the rise of non-invasive techniques also touched Dupuytren's contracture and the repopularized Cooper aponeurotomy using a percutaneous needle technique is gaining strength again. The results of this study, similar to others already published, shows that PNF proved to be a valid alternative procedure to LF because of its limited invasiveness, good outcome, limited number of complications, quick recovery and overall patient satisfaction.

Conclusions: In short-term, the PNF proved to be an excellent alternative to LF, although are necessary more long-term clinical trials that compare both techniques in relation to another main concern, the recurrence.

10.1177/1753193409106132

A0141 A RETROSPECTIVE STUDY OF DUPUYTREN'S CONTRACTURE SURGERY OUTCOMES. LONG TERM FOLLOW-UP

A.G. Olea, A.D. Porras, J. Bustillo, R. Martín
Hospital Universitario de la Princesa, Madrid, Spain

Purpose: To determine the result of surgical treatment of Dupuytren's disease based on Tubiana's classification and the rate of complications appeared in a cohort of 84 cases with a minimum follow-up of 5 years.

Material and methods: A retrospective analysis was performed on a list of 160 operated hands in 136 patients. Finally, we were able to collect and check 84 cases of Dupuytren's contracture (64 patients) who had had surgery by 2 surgeons in the same operating theatre with a mean follow-up period of 8.0375 years. We studied the outcomes using the Tubiana's classification by measuring the hands before surgery and after a minimum of five years follow-up. We also studied the complication rate, as well as other subjects like bilateral affection rate, familiar and personal antecedents, heavy, mild or light hand activity, sex distribution and finger affection.

Results: Starting from a cohort of 84 cases, preoperatively we had 5 hands with grade N, 24 grade I, 33 grade II, 10 grade III and 12 hands grade IV.

After at least 5 years our results became: 45 patients without affection, 15 grade I, 8 grade II, 2 grade III and 14 grade IV. Complications occurred in 24 patients, fifteen patients had 1 complication and 6 patients had more than one. These complications included 5 patients with nerve injury, 1 with an arterial injury and one patient that needed interphalangeal arthrodesis. Postoperative complications included 2 patients with palmar haematoma, 8 patients with wound infection, 6 patients with sympathetic dystrophy, 6 patients with skin slough and in 2 cases we had to amputate the fifth digital radius. Reoperation occurred in 6 of 64 patients.

Conclusions: Surgical treatment provided patients a functional hand in most of cases. Considering Tubiana's Nodule and I grade as a functional hand, we reached a rate of 71.5% of functional hands starting from a 65% of non-functional hands (grades II, III and IV) valuing furthermore that this is a chronic and progressive disease. In cases slight or mild, surgical correction maintains along. Most affected finger was ring, but the most heavily affected was little. In all patients that required reoperation two or three fingers were seriously affected. The complication rate was a similar to other series, only 6.25% were severe.

10.1177/1753193409105908

A0111 THE RADIAL LATERO-DIGITAL FLAP TO COVER PALMAR SKIN DEFECTS AFTER DUPUYTREN FASCIECTOMY

A. Gohritz, E.-M. Liodaki, O. Tsirogianni,
K. Knobloch, P.M. Vogt

Plastic, Hand and Reconstructive Surgery, Medizinische Hochschule Hannover, Germany

A radial latero-digital flap (RLF) was used during a period of 6 years on 33 hands in 31 patients with a mean age of 65.5 years to cover palmar flexion crease skin defects in severe (Iselin stage III: $n = 14$, stage IV: $n = 5$) or recurrent finger contracture ($n = 7$) due to Dupuytren disease. Follow-up time averaged XY months.

Overall, 30 of the 33 flaps healed uneventfully. There were no major complications. Two cases of flap tip necrosis occurred and one flap underwent complete necrosis due to infection and required full thickness skin grafting.

In conclusion, the RLF is a straightforward, reliable method to cover skin defects of the palmar aspect of the metacarpo-phalangeal joint in severe or recurrent Dupuytren disease. Compared to skin grafting, cross finger, palmar or ulnar flaps, the RLF provides a minor donor defect, allows primary closure with immediate mobilisation and avoids sensitive scars on the ulnar hand border if performed on the little finger.

10.1177/1753193409106128

A0016 THE POLLEXOGRAPH FOR MEASURING PALMAR ABDUCTION: RELIABILITY AND RESULTS IN HYPOPLASTIC THUMB PATIENTS

M. de Kraker, R.W. Selles, H.M. Molenaar,
T.A. Schreuders, H.J. Stam, S.E. Hovius
*Erasmus Medical Center Rotterdam, The Netherlands
Department of Plastic and Reconstructive Surgery
Department of Rehabilitation Medicine*

Introduction: Although palmar abduction is a key parameter of hand function, it is rarely measured in standard clinical care since a reliable instrument to measure palmar abduction is lacking. In the past, different measurement devices have been developed to measure palmar thumb abduction. However, most have limitations complicating use in daily practice. We therefore developed a new simple device; the Pollexograph-thumb and Pollexograph-metacarpal. In a first study we assessed intra- and inter rater reliability of 6 palmar abduction measurement methods: conventional goniometry, the American Society of Hand Therapists-method, the American

Medical Association-method, the Inter Metacarpal Distance, the Pollexograph-thumb and the Pollexograph-metacarpal in 25 adults. This study showed that for measurements of conventional goniometry, the American Society of Hand Therapists-method and the American Medical Association-method, ICC's showed only moderate reliability. However, intraclass correlation coefficients of the Pollexograph-thumb, the Pollexograph-metacarpal and Inter Metacarpal Distance indicated good to excellent reliability (ICC's between 0.71 and 0.92). These last 3 methods also showed excellent reliability in 101 children that were assessed. In these healthy children and adults we also studied normative data (means, ranges and standard deviations(=SD)) for comparison with patients. Palmar abduction angles in children measured with the Pollexograph-thumb and Pollexograph-metacarpal were similar to the values found in adults. The goal of this study was to assess palmar abduction after surgical intervention (e.g. tendon transfer) in patients with a hypoplastic thumb and study intra rater reliability of the Pollexograph-thumb and Pollexograph-metacarpal.

Methods: In 21 patients with a hypoplastic thumb we measured mean palmar thumb abduction and assessed intra rater reliability of the Pollexograph-thumb and Pollexograph-metacarpal. Intra rater reliability was expressed in intraclass correlation coefficients (ICC) and smallest detectable differences (SDD).

Results: Intra rater reliability of the Pollexograph-thumb and Pollexograph-metacarpal indicated excellent reliability with ICC's of 0.98–0.99. SDD's ranged from 4.5 to 5 degrees for active and passive measurements. In hypoplastic thumb patients, mean active and passive palmar abduction measured with the Pollexograph-thumb was 48.5o (range 24–78o, SD = ±14). When compared to the data of healthy adults that we reported earlier, the mean palmar abduction angle was smaller (mean in healthy subjects 62o), while the range of values in the hypoplastic thumb patients was large (range in healthy subjects 40–76o, SD = ±6). Mean range of motion measured with the Pollexograph-metacarpal 36.5o (range 16–72o, SD = ±12). This was again smaller compared to 49o (range 32–64, SD = ±6) measured in healthy subjects.

Conclusions: We found that the Pollexograph-thumb, Pollexograph-metacarpal and the Intermetacarpal Distance are the most reliable measurement methods for palmar abduction in healthy adults and children. In hypoplastic thumb patients both the Pollexograph-thumb and Pollexograph-metacarpal showed excellent reliability for assessing palmar thumb abduction. However, mean palmar abduction in hypoplastic thumb patients is much smaller than in healthy subjects, on average 14 degrees. Moreover, the measured range for

palmar abduction is much larger in patients with a hypoplastic thumb than in healthy subjects.

10.1177/1753193409106056

A0168 POLLICIZATION OF INDEX FINGER AS THE METHOD OF RESTORATION PREHENSILE FUNCTION OF THE HAND

A.J. Protasewicz

Pollicization is the reconstruction method of the prehensile function of the hand. It is mainly performed in congenital deformities – thumb absence, radial club hand, polydactyilia and mirror hand and can be also performed after injury (thumb amputation). 132 children with radial club hand (RCH) – 190 hands were treated in Department of Orthopaedics, Traumatology and Hand Surgery, Poznan University of Medical Sciences. Complete radius aplasia (Bayne IV type) was most common – 124 hands. Thumb aplasia (Blauth V type) was in 85 cases. Pollicization was performed in 35 cases. I assessed hand function after pollicization of radial finger by clinical examination, range of movements, TAM (total active motion), sensation, hand prehension test, 4 type grasp strength (grip strength, key pinch, tripod, tip pinch). The strength of the hand grasp was examined with electronic dynamometer. All types of sensation were correct in all cases, TAM of new thumb was 89 degrees. The patients after pollicization got the average result 70%, realization of the functional test. Majority got very good and good result. Average value of grip strength was 16% standard, for key pinch 12% standard, for tripod 13% standard, for tip pinch 13% standard.

It was affirmed, that the function of hand improves with age. Hand after pollicization has good function with decreased strength and aesthetics is satisfactory. I also want to presented some clinical cases after pollicization performed in congenital diseases, and indication and contraindication to performing this procedure.

10.1177/1753193409106057

A0261 NONVASCULARISED MIDDLE TOE PHALANX TRANSFER IN THE TREATMENT OF CONGENITAL HYPOPLASIA AND APLASIA OF FINGERS

L. Kaczmarek

Department of Traumatology, Orthopaedics and Hand Surgery, Poznan University of Medical Sciences, Poland

Introduction: Congenital hypoplasia and aplasia of fingers results in decrease of hand function and deformity. The methods of surgical intervention include external fixators with distraction, bone grafting and subperiosteal toe phalanx transfer. The latter is often associated with lack of phalanx growth and bone resorbition. Extraperiosteal toe phalanx transfer with growth plate and collateral ligaments can be used to eliminate these problems.

Aims: The aims of the research were to assess:

- usefulness of toe middle phalanx in fingers hypoplasia
- correlations between phalanx length increase and gender, age
- influence of the transfer for foot function and development

Material and methods: The research included 44 patients with congenital hypoplasia and aplasia of fingers treated in Department of Traumatology, Orthopaedics and Hand Surgery at Poznan University of Medical Sciences in 1987–2000. 158 phalanges were transferred. The age at the operation was from 7 months to 9 years (average 27 months), 25 female and 19 male. Minimal follow-up was from 2 to 14 years (average 56 months). Three groups according to patient's age were formed: less than 13 months, 13 to 24 months, older. Two groups were specified according to operation method: with and without collateral ligaments reconstruction. In the follow-up length increase, range of motion and stability of the joint formed, finger axis and hand function were evaluated. Plain X-rays with grid were used to measure length and width both transferred phalanx and metacarpal. Dynamic electronic pedobarography with PEL 38 was used to evaluate foot function. The last phase of gait was analyzed to assess the moment of finger load and localize the point of maximal load. Some specific ratios were calculated. Cosmetic values, structure and function both hand and foot operated were assessed with questionnaire. Activities of daily life were specially included.

Results and conclusions:

1. Extraperiosteal free toe middle phalanx transfer improves function and appearance of hand with congenital hypoplasia and aplasia of fingers.
2. Toe phalanx transfer gives increase in length and stability of hypoplastic finger.
3. Non-vascularized toe phalanx has a possibility to growth.
4. Growth of phalanx transferred correlates with:
 - age only in the first year,
 - size of phalanx at the operation.

5. Toe middle phalanx grafting does not influence the function of foot.

10.1177/1753193409106060

A0175 DISTRACTION LENGTHENING TECHNIQUE IN TREATMENT OF CONGENITAL MALFORMATION

G. Pajardi, C. Novelli, C. Parolo, A. Ghezzi
Plastic Surgery Institute, University of Studi of Milan, Hand Surgery Unit, Policlinico Multimedica IRCCS

Distraction lengthening is a relatively old technique used for interesting lengthening procedure in traumatic and congenital cases since De Bastiani described it in 1987. Concerned with malformations, this technique has several indications for the lengthening of different bony structure. The most common purposes are well known; phalanx lengthening such as in symbrachydactyly, or in constriction band syndrome; metacarpal lengthening such as in brachymetacarpia conditions; forearm bone lengthening such as in congenital radial or ulnar club hand.

Other indications are much rarer. For example the severe case of radial club hand, in which the early conservative treatment is not sufficient to elongate the soft tissue in preparation to the radialization, could take profit of this technique in order to correct soft tissue retraction in the bowing of the wrist. In this case is indicated the use of an apparatus modified in order to provide the possibility of lengthening and to obtain also an angular correction, producing a distraction and medialization of the carpus towards the ulna. In this case this progressive distraction and realignment is a propedeutic procedure for wrist centralization.

Other uncommon uses are for the treatment of particular cases of metacarpal synostosis. There are some precise cases (type K, as described by G Foucher) in which the correct treatment aims to lengthen the smaller fused metacarpal, and contemporaneously to distract in order to detach the involved metacarpal from the near one.

Other uncommon conditions are cases of severe symbrachydactyly with adactylous or monodactylous hand. In these cases the correct indication could be the toe-to-finger transfer, single or double, in order to provide a pinch, In some cases parents are reluctant and refuse the proposed technique, so that the sole remaining procedure is the free phalanx transfer, single or double. These cases could lately be improved by lengthening of the transferred phalanx, by progressive distraction lengthening.

Between 1989 and 2007 we treated with distraction lengthening 33 patients and 38 hands affected by different congenital malformation. The specific congenital condition which affected the patients were: 13 cases of longitudinal defect (radial or ulnar club hand, 12 cases for forearm bone lengthening and one case for carpal distraction), 4 cases of brachymetacarpia, 11 cases of symbrachydactyly, 2 cases of Apert syndrome, 1 case of metacarpal synostosis, 2 cases of delta phalanx

Secondarily to the different district we have had an increase in lengthening of the concerned bone of 87%, relating to the hand bone and of 46% relating to the forearm bone. Time of treatment averages about 6.6 months. The time for the consolidation was equal to the time required for the complete bone lengthening.

Several complications could emerge such as pain; disruption or mobilization of pins; pin infections; tendinous complications such as retraction or adhesions; delay of healing, which in only 4 cases requires bone graft. We have not had cases in which we were obliged to remove the apparatus.

In conclusion progressive distraction lengthening is a precious technique for the complete management of several congenital conditions.

10.1177/1753193409106058

A0250 DO EXCISED ACCESSORY DIGITS REQUIRE SPECIALITY FOLLOW-UP?

A. Rose, Z. Hassan, P. McArthur
Royal Liverpool Children's NHS Trust, Alder Hey, UK

Polydactyly is a common congenital anomaly of the upper limb. No formal guidance currently exists regarding an appropriate follow-up pattern following excision of simple Stelling Type I accessory digits.

A retrospective case-note study of 40 patients who underwent excision of simple accessory digits over a 2 year period. Post-operative complications and follow-up trends were noted.

All patients were followed-up post excision. 34 in the dressing clinic, 3 in the congenital hand clinic and 3 in peripheral clinics. Average time to initial follow-up was 11.2 days (range 1–20). 35 cases healed well with no complications. 5 minor complications were noted – 2 unconfirmed wound infections, 2 with minor wound dehiscence and 1 minor wound bleed. No further surgical interventions were required. 14 patients were discharged at initial dressing clinic follow-up. 26 had further clinic review arranged, 22 of these at the congenital hand clinic. All 26 were discharged following this second review

with no further complications noted. Average time to discharge was 86 days (range 7–360).

An initial dressing clinic review within 14 days of the procedure is warranted to pick up minor complications requiring non-surgical intervention. Minor complications can be reviewed again in the dressing clinic prior to discharge. The practice of further speciality clinic follow-up appears unnecessary and results in a significant delay to discharge.

10.1177/1753193409106059

A0059 THE BONE PLASTY BY MICROSURGICAL AUTOTRANSPLANTS IN CHILDREN WITH CONGENITAL AND ACQUIRED DEFORMITIES IN UPPER LIMBS

S. Golyana, A.B. Oreshkov, R.N. Polozov,
A.V. Govorov

The Turner Scientific and Research Institute for Children's Orthopedics, Saint-Petersburg, Russia

A current problem of children's orthopedics is reconstruction of bones and joints of limbs with congenital and acquired conditions. Traditional methods of replacement of bones, in many cases, do not give positive results, especially when there is a combination of bones, muscles and soft tissues defects. Besides the basic lack of the given methods, there is the impossibility of the growth of the restored segment as not one of these methods provides restoration of the growth plate not existing from the moment of birth or destroyed due to a pathological influence. The method of microsurgical grafting of bones has opened new possibilities for replacement of defects of a bone tissue as it has allowed to restore the bone tissue without subsequent reorganization of a transplant. The transplant supplied by blood can have the growth plate continuing to function, it may be taken together with significant on volume complex of the tissues including the skin, subcutaneous fatty tissue, fasciae, muscles and nerves what allows, at one intervention, to remove all components of the defect of the limb that exist.

At the department for reconstructive microsurgery and hand surgery in The Turner Scientific and Research Institute for Children's Orthopedics, from 1998 up to present time, there were 94 children in which microsurgical graftings of bone transplants were carried out. 54 from them had congenital malformations, and 40 had acquired defects.

For grafting, we have used:

- diaphysis of fibula,
- a fragment of radius together with the radial cutaneous fascial flap,

- a lateral part of the scapula as a isolated bone graft or together with a thoracodorsal flap when replacing defects of bone diaphyses,
- I and II metatarsal bones for reconstruction of distal or proximal epimetaphyses of bones,
- one or two ribs together with a thoracodorsal flap to replace extensive defects of soft tissues and bones,
- iliac crest to replace significant on size bone defects.

Performing microsurgical graftings of tissue complexes we consider as very important point the prevention of possible functional disorders at the donor site. In this connection, at the same time with restoration of the basic defect, we made reconstructive interventions at the site of taking of the bone transplant.

Radiological examination has shown that after microsurgical autografting of epimetaphyseal segments of bones the function of the growth plate was preserved. Subsequent growth of the grafted transplant is though complex process upon which following factors may influence: changes in blood supply and innervation, functional loading with the subsequent hypertrophy due to activity.

Long-term results of the treatment were available for 79 operated patients with follow up from six months to nine years. An analysis of functional and cosmetic condition of operated limb and the donor site was carried out.

The data obtained after the evaluation of results of the treatment have shown the good prospects for the use of microsurgical transplantations of tissue complexes in severe defects of bones in children with congenital and acquired deformities as well as a possibility of early surgical management of such patients.

10.1177/1753193409106127

A0307 GROWTH DIAGRAMS FOR INDIVIDUAL FINGER STRENGTH IN CHILDREN MEASURED WITH THE RIHM

H.M. (Ties) Molenaar^{1,2}, R.W. Selles^{1,2},

S.P. Willemsen³, S.E.R. Hovius¹, H.J. Stam²

¹*Department of Plastic and Reconstructive Surgery*

²*Department of Rehabilitation*

³*Department of Biomedical Statistics*

Introduction: Important aspects of normal hand function are the power grip, key grip and pinch grip, all of which are different motor skills. When measuring a motor skill such as grip strength, a combination of extrinsic and intrinsic hand muscles strength is measured. However, some movements of the hand are regulated

predominantly by intrinsic hand muscles. When dealing with congenital malformation, neurodegenerative diseases, or trauma, measuring general grip strength does not give the most complete picture of a patient's motor capabilities. The Rotterdam Intrinsic Hand Myometer (RIHM) is capable of measuring the strength of the individual fingers or thumb. At present, no reference values for the RIHM in children have been reported. In contrast to the classical table format, we developed an intuitive diagram in which strength is plotted against age to easily discriminate between treatment effect and growth. The aim of this study was to present normative data for the RIHM in an intuitive and easily accessible way by creating growth diagrams for individual finger strength and thumb strength.

Materials and methods: The RIHM is a dynamometer that measures strength by means of muscle resistance in a break-test. A total of 101 children, between 4 and 12 years old, were included in this study. With the RIHM, we measured abduction of the index and little finger as well as thumb palmar abduction, thumb opposition and thumb flexion in the metacarpal phalangeal (MCP) joint. In addition, we recorded hand-dominance, gender, height and weight. All measurements were performed in a randomized order by the same researcher.

Results: We developed statistical models for drawing growth curves using estimated centiles for each measurement. Separate models for the dominant and nondominant hand of boys and girls were developed as well as a combined model. Because there was no significant difference in strength between boys and girls, we combined both sexes for each growth diagram. A total of 10 growth diagrams present the five different measurements for the dominant and nondominant hands separately.

Discussion: In certain pediatric patient groups (congenital malformations, neuromuscular disorders), the RIHM will add useful information for the assessment of their hand function. Measuring both intrinsic and extrinsic hand muscles of such a child gives valuable insight into how their hand function compares to the development of children with normal hand function. Even though the growth diagrams are modeled on cross sectional data and do not take longitudinal data in to account, they offer a good model to follow individual finger strength development over time. Because the diagrams give observers a practical tool for tracking multiple strength measurements of a growing child over time, they might be suitable for inclusion in a patient dossier.

10.1177/1753193409106061

A0008 SURGICAL TREATMENT FOR TRIGGER THUMB IN CHILDREN OLDER THAN 5 YEARS

S.-H. Han, D.G. Song

Bundang CHA hospital, College of medicine, Pochon CHA University, Sunnam, Korea

Background: Trigger thumb is a relatively uncommon problem in infants and children, and there are controversies about spontaneous resolution and surgical treatment. When this condition is not relieved with conservative treatment, surgical release of the A1 pulley is widely accepted as the most appropriate method. Nevertheless, there is no agreement on the age at which operation is indicated and there are different opinions about the results by the age of surgery. To determine any remaining motion problem after surgery, especially in older children, we clinically reexamined patients who had undergone surgical release for trigger thumb in children older than 5 years.

Methods: Authors retrospectively reviewed 20 patients, 27 cases who underwent surgical release of the A1 pulley for trigger thumb at the age older than 5 years. Mean age at the surgery was 6.95 years old and average follow up period was 4 years and 9 months. Preoperative symptoms, recovery of range of motion and postoperative complications were investigated.

Results: All patients had flexion contracture of interphalangeal joint of thumb and Notta's nodule was palpated in 9 cases. There was intermittent triggering in 7 cases and average symptoms' duration was 4 year 10 months. After A1 pulley release, flexion contracture was relieved in all cases and 25 cases showed less than 5 degree of extension lag within one day postoperatively. Range of motion was full at the last follow up visit and there were no recurrences or other complications.

Conclusion: Authors' satisfactory surgical treatment result for trigger thumb in children older than 5 years, showed that age of the patients when the surgical treatment is done does not affect the outcome in the treatment of congenital trigger thumb.

10.1177/1753193409106055

A0213 MICROSURGICAL RECONSTRUCTION ADACTYLOUS HAND

U. Padhaisky, S. Miachkovsky

The Republican centre of plastic and reconstructive microsurgery, BY

Adactylos hand reconstruction represents a major reconstructive challenge. The majority of such patients

are young, healthy and active people, society bears huge material losses. The most widespread method of restoration of function to the adactylous hand is toe autotransplantation.

We carried out the analysis of treatment of 138 patients with adactylous hand which were under supervision in the Republican centre of plastic and reconstructive microsurgery during the period with 1986 for 2006. We used the classification, which basis ability to opposition and capture lies in our work. Thus it is possible to allocate 4 types of adactylous hand:

1. type – opposition does not suffer, defect purely cosmetic;
2. type – opposition is possible, but efficiency of capture can be improved with the help of autotransplantation;
3. type – is absent in one of two opposed parts of a hand;
4. type – there are no components opposition.

In our work were used “classical” autotransplantations: first toe, a longitudinal segment of first toe, 2nd toe and the block of 2–3rd toes, however in some cases it was necessary to modify autotransplantation.

The following kinds of operations are performed:

- autotransplantation the second toe in a position of fingers of a hand – 39;
- autotransplantation the block of the second and third toes in a position of long fingers of a hand – 22;
- autotransplantation the second toes of both feet in a position of long fingers of a hand – 24;
- autotransplantation longitudinal segment of the first toe in a position of the first finger of a hand – 52;
- autotransplantation longitudinal segment of the first toe and the fourth finger on other hand – 1.

The general principles of the organisation of microsurgical change are known. All patients after the completed operations are happy not only with the received cosmetic result, but also most importantly with the functional result. Thus about 50% of patients could return to work to their previous employment.

Conclusion: Toes can restore lost pinch and grip. In some cases autotransplantation of a finger of contralateral hand, may be necessary to return lost function of the hand.

10.1177/1753193409106131

SESSION 18: RHEUMATOID & TUMOURS & VARIOUS

A0386	LECTURE: PATHOMECHANICS AND TREATMENT OF THE RHEUMATOID SWAN NECK DEFORMITY A.L. Lluch (<i>Spain</i>)	122
A0263	METACARPAL SHORTENING OSTEOTOMY FOR THE METACARPOPHALANGEAL RHEUMATOID ARTHRITIS V. Gasiunas, S. Valbuena, D.L. Viet (<i>France</i>)	122
A0037	PRE-IMPLANTATION TESTS AND CLINICAL FOLLOW-UP OF A CONSTRAINED FINGER JOINT IMPLANT H. Håkanson, E.S. Wernersson, A. Björkman, G. Lundborg (<i>Sweden</i>)	122
A0219	RADIOLOGICAL EVOLUTION AFTER RADIOLUNATE ARTHRODESIS IN RHEUMATOID WRIST G. Herzberg, Y. Izem (<i>France</i>)	123
A0005	ARTHRODESIS OF THE WRIST WITH THE USE OF HOFFMANN EXTERNAL FIXATOR W. Elkazzi, L. Conod, D. Mouraux, C. Robert, F. Schuind (<i>Belgium</i>)	123
A0310	RADICAL TUMOUR RESECTION IN THE UPPER EXTREMITY AND REPLANTATION OF THE HAND TO THE UPPER ARM. ANALYSIS OF FUNCTIONAL RESULTS H. Piza, E. Baur, A. Wenger, T. Engelhardt, D. Estermann (<i>Austria</i>)	124
A0291	AN UNUSUAL METASTASIS: CASE REPORT AND REVIEW OF THE LITERATURE P. Vostrel, J.V. Aaken, M. Sadowski, J.-Y. Beaulieu (<i>Switzerland</i>)	124
A0340	SURGICAL APPROACH OF THE HAND OSSEOUS TUMORS I. Visa, B. Baldea (<i>Romania</i>)	124
A0195	TREATMENT OF GIANT-CELL TUMOR IN DISTAL RADIUS WITH FREE VASCULIZED FIBULAR HEAD GRAFT Y. Tomori, M. Sakuraba, A. Kawai, S. Onoda, Y. Beppu, K. Chuman, F. Nakatani (<i>Japan</i>)	125
A0316	GIANT LIPOMAS OF UPPER EXTREMITY I. Iriberri, M. del Valle, J.E. Colombo, E. Rodriguez, S. Solsona, I. Casado (<i>Spain</i>)	125

- A0042 WRIST FASCIAL ANATOMY: IS EVERYTHING KNOWN? 125
L. Lancerotto, C. Tiengo, C. Stecco, V. Macchi, F. Bassetto, R.D. Caro
(Italy)
- A0174 ECONOMICAL MANAGEMENT IN CARPAL TUNNEL RELEASE. COMPARISON 126
OF ENDOSCOPIC RELEASE (AGEE) VERSUS OPEN RELEASE
G. Pajardi, G. Berto, L. Pegoli, G. Pivato
(Italy)

A0386 LECTURE: PATHOMECHANICS AND TREATMENT OF THE RHEUMATOID SWAN NECK DEFORMITY

A.L. Lluich

Institut Kaplan, Barcelona, Spain

no abstract received

A0263 METACARPAL SHORTENING OSTEOTOMY FOR THE METACARPOPHALANGEAL RHEUMATOID ARTHRITIS

V. Gasiunas, S. Valbuena, D.L. Viet

Institut de la Main, Paris, France

Surgical procedure of shortening metacarpal osteotomy, metacarpal head volar displacement, radial collateral ligament reinsertion and centralization of the extensor apparatus in mild rheumatoid arthritis can give a good mid-term clinical outcome.

The technique of shortening metacarpal osteotomy was first described in 1950 by Otto C. Kestler. Afterwards several other authors described their surgical techniques and clinical outcomes.

Methods: Nineteen metacarpophalangeal joints in 7 patients, one male and six female, were included in this retrospective analysis. Average age was 45.33 years. All patients had rheumatoid arthritis history of medical treatment with a mean duration of 17.64 years. Preoperative evaluation included X-ray analysis (Larsen Score Radiographic Status, dynamic x-rays: reduction of volar subluxation in AP X-ray view in exaggerated ulnar finger deviation) and clinical classification (Wilson and Carlblom). Surgical procedure implied shortening metacarpal osteotomy and metacarpal head volar displacement. The shortening was performed with a proximal step-cut osteotomy leaving the volar bone edge 3 to 5 millimetres longer. This volar bone edge was trimmed and nailed in the centre of the metacarpal head putting it volarly and increasing the contact surface and thus, the consolidation possibilities. In our opinion it was extremely important to reinsert collateral radial ligament and centralize the extensor apparatus.

This surgical procedure was followed by a physical therapy program, which was essential for functional outcome.

Mean follow up was 38.5 months.

We evaluated mobility, ulnar drift, pain, recurrence of the deformity and complications for each joint postoperatively.

Results: Data collection was performed by reviewing the medical records, and a medical interview was done in all the cases. Results were classified as excellent, good, regular and poor according to radiological and clinical findings. We obtained 15.79% of excellent, 42.11% of good, 26.32% of regular and 15.79% of poor results.

Fourteen (73.68%) of the joints still had full correction of the deformity radiologically, and 5 (26.31%) joints showed recurrent deformity with ulnar deviation or volar subluxation or both in the final follow-up. Statistically we found a correlation between the final results and the preoperative clinical state of Wilson & Carlblom ($p > 0.05$); between the preoperative Larsen score and the final result ($p < 0.02$) and between the preoperative reduction of volar subluxation in exaggerated ulnar deviation and the final result ($p < 0.01$).

We present our technique of the metacarpal shortening osteotomy and its indication in treatment of the mild metacarpophalangeal rheumatoid arthritis.

Surgical indications are based on the AP X-rays and X-rays with ulnar exaggerated deviation of the fingers as 78.57% of the joints which showed a reduction of volar subluxation in AP X-ray view in ulnar finger deviation had an excellent or good final results.

A longer follow-up period would be needed to validate this surgical technique for the treatment of mild rheumatoid arthritis deformity. In the case of unsatisfactory outcome a prosthetic surgery is still possible probably in better conditions because of the correction of ulnar drift during the first surgical procedure.

10.1177/1753193409106088

A0037 PRE-IMPLANTATION TESTS AND CLINICAL FOLLOW-UP OF A CONSTRAINED FINGER JOINT IMPLANT

H. Håkanson^{1,2}, E.S. Wernersson², A. Björkman³, G. Lundborg³

¹*Department of Biotechnology, University of Lund, Sweden*

²*Bioimplant Scandinavia AB, Malmö, Sweden*

³*Department of Hand Surgery, Malmö University Hospital, Sweden*

Introduction: Artificial implants must be thoroughly evaluated before they are used in patients. When performing such tests it is important to recreate the environmental conditions in which the device should be implanted. This has been done for a constrained artificial finger joint. The implant system consists of two bone anchored titanium screws and a replaceable implant ball joint made of medical graded steel and polymer. The joint

can be bent vertically in -10 to $+90$ degrees and horizontally in ± 10 degrees. This implant system can be used in a primary procedure in patients for instance with rheumatoid disease, osteoarthritis and trauma. The joint implant can also be used in replacement procedures. The purpose of this study is to verify the mechanical properties of the system and to report about initial clinical tests.

In vitro evaluation: Endurance tests were performed in test equipment that flexes the joint in a preset angle (90 degrees) at preset frequency. In the endurance test the joint is exposed to strain by either pull or push forces. Furthermore the test equipment can move the joint in oblique positions. The equipment was developed and designed at GS Laboratory. Tests were performed in air at room temperature and in physiological saline and Ringer's solutions at body temperature. Today more than 500 000 cycles has been achieved without any malfunction of the joint. The wear of the joints was measured throughout the tests. So far any effect of the wear on the artificial finger joint emerged in various solutions have not been detected. Complementary tests of the resistance to large pull and push forces has been measured for loads more than 200 N. The Finite Element Method (FEM) has been used to design the joint implant system in order to assure that the joint can withstand the applied forces in the hand.

In vitro evaluation: The system has been implanted in four patients. The first four artificial joints were implanted in June 2008, at the Department of Hand Surgery, at Malmö University Hospital, Sweden. Further operations are planned at Malmö University Hospital and at other Swedish clinics. The patients with new implants are evaluated clinically and radiologically at regular intervals. Patients have been pain free and with good ability to move the fingers. Results from the in-vitro evaluation and the follow-up of the in-vivo evaluation will be presented at the conference.

References

Joyce, TJ, Unsworth, A, 2002, A test procedure for artificial finger joints, Proc Instn Mech Engrs, (216) J Engineering in Medicine, 105–110.

Finger joint, constrained, in-vitro tests, in-vivo tests, mechanical load, endurance

10.1177/1753193409106086

A0219 RADIOLOGICAL EVOLUTION AFTER RADIOLUNATE ARTHRODESIS IN RHEUMATOID WRIST

G. Herzberg, Y. Izem
Hospices civils de Lyon, France

Introduction: Radiolunate arthrodesis (RLA) in rheumatoid arthrosis wrist (RA) was introduced by Chamay in 1983. Only a few series are available regarding the radiological results of this operation. We retrospectively looked at our results.

Methods: Between 1988 and 2007, 45 patients sustained RLA for RA. Average age 53, 90% female. 32 wrists were considered for this review. The average follow-up was 8.5 years (mini 3, maxi 19 years). 75% Larsen stage 3 and Larsen-Alnot stage 3. The Simmen classification could not be used in every patients. RLA was associated to ulnar head resection in all cases. Pre and post-op criteria were carpal collapse, ulnar translation, radial inclination, and sagittal translation of the carpus.

Results: 100% healing was observed; a scallop sign was observed in 56%. Carpal collapse increased (Youm's index 0.49 to 0.44), ulnar and palmar translation of the lunate was significantly reduced but radial inclination of the carpus was not. Only 44% of patients were Larsen 3 at follow up which indicates a deterioration with time.

Discussion: This long term study confirms that RLA in RA was successful to realign the carpus (i.e. specifically the lunate and first row) of these RA wrists. However the improvement of radial inclination and palmar translation of the second row was modest. The results of this study suggest that an ECRL to ECRB transfer should be added to RLA in RA wrists with significant pre op radial inclination of the carpus.

10.1177/1753193409106087

A0005 ARTHRODESIS OF THE WRIST WITH THE USE OF HOFFMANN EXTERNAL FIXATOR

W. Elkazzi, L. Conod, D. Mouraux, C. Robert, F. Schuind

Hôpital Erasme, Université libre de Bruxelles, Brussels, Belgium

Total wrist arthrodesis remains the last salvage procedure in the case of painful degenerative posttraumatic osteoarthritis. It is also the procedure of choice in selected primary indications including stage IV Kienböck's disease and advanced destructive rheumatoid arthritis. Controversy remains over the best surgical technique. The current recommendations are rigid fixation by a dedicated dorsal plate and bone autograft. Staples, screws, intramedullary Steinman pin or Kirschner wires are still used. The use of external fixation has to our knowledge only been mentioned by Schuind et al in 1995. It allows perfect positioning of the wrist, according to the precise needs of the patient, and avoids a "massive" implant under the extensor tendons,

a cause of frequent tenosynovitis after plate fixation. Twenty two patients have been operated using a triangular Hoffmann configuration. Bone graft was used in all cases. There has been neither tendon rupture nor extensor tenosynovitis and bone healing was obtained in most cases within three months. Six patients could be evaluated at 7 years follow-up: the mean VAS score was 3, the average DASH questionnaire was 39 and the grip strength was 64% of the contralateral side. Our results seem to be similar in terms of pain and function to plate fixation with less major complications such as metal failure or extensor tenosynovitis.

10.1177/1753193409106397

A0310 RADICAL TUMOUR RESECTION IN THE UPPER EXTREMITY AND REPLANTATION OF THE HAND TO THE UPPER ARM. ANALYSIS OF FUNCTIONAL RESULTS

H. Piza, E. Baur, A. Wenger, T. Engelhardt, D. Estermann

Univ. Klinik Plast. Rekonstr. Chirurgie, Med. Univ. Innsbruck., 6020 Innsbruck, Anichstr. 35, Austria

We describe two male patients with malignant soft tissue tumours of the forearm and elbow joint. Radical tumour resection involved removal of the elbow joint. Neither of the patients consented to upper arm amputation, but agreed to undergo replantation of the amputated distal third of the forearm together with the hand to the stump of the upper arm. The tendons of the forearm were attached to the three muscles of the upper arm, and the distal nerves were coapted with the nerve trunks of the upper arm. However the reconstructive procedures carried out in these two patients were anatomically different. In the first patient we had quite a different outcome than in the second due to a different postoperative protocol. In the second patient we started with early intensive mobilisation and reintegration of the replanted hand in the body-scheme. This resulted in the rapid gain of extremely good functional results. That patient is now able to employ his replanted hand quite effectively in his daily life activities as a farmer.

10.1177/1753193409106092

A0291 AN UNUSUAL METASTASIS: CASE REPORT AND REVIEW OF THE LITERATURE

P. Vostrel¹, J.V. Aaken², M. Sadowski³, J.-Y. Beaulieu¹
¹*Service de chirurgie orthopédique et traumatologie de l'appareil moteur, Unité de chirurgie de la main,*

University Hospitals of Geneva, Switzerland

²*Clinique de la Longeraie, Lausanne, Switzerland*

³*Service d'orthopédie, Hôpital de Nyon, Switzerland*

Only 0.3% of patients with cancer develop acrometastases, which is known to be a pre-terminal event associated with dissemination of the primary tumor. With regard to the hand, 50% of metastases are associated with lung carcinoma and 15% with breast cancer. The distal phalanx is the most common site followed by the proximal phalanx and then the middle phalanx. We describe a patient with a lesion of the distal phalanx secondary to a metastasis of a squamous cell carcinoma of the esophagus.

A 63 year old man with metastatic spinous cell carcinoma of the upper third of the esophagus (stage T4N1M1) presented with a non-healing lesion of the distal phalanx of the long finger of his non dominant hand. He stated that a month before, his finger had been crushed in a door. Examination revealed a tender distal phalanx with a crack in the nail from which a drop of pus was draining from a subungueal hematoma. X-rays revealed a round lytic lesion without involvement of the joint. For pain relief it was decided to amputate the phalanx through the proximal interphalangeal joint. Histopathology confirmed the diagnosis of a metastasis from a poorly differentiated carcinoma. The patient died one month later.

The diagnosis of acrometastases is difficult because it often resembles other inflammatory conditions. The differential diagnosis which includes felon, osteomyelitis, gouty arthritis, rheumatoid arthritis and others will be discussed. Digital metastases can be the first presenting sign of an underlying tumor and to avoid incorrect diagnosis, X-rays must be done routinely as part of the initial evaluation. When performing surgery, histology must be obtained. Radiotherapy may be used to relieve pain. Treatment is considered palliative.

10.1177/1753193409106090

A0340 SURGICAL APPROACH OF THE HAND OSSEOUS TUMORS

I. Visa, B. Baldea

Emergency County Clinic Hospital, Brasov, Romania

Introduction: Tumors of the hand have some characteristics: low morbidity, excellent possibility for clinic and imagistic diagnosis and the best settlement through the surgical approach.

Aim: The paper presents our recent experience in approaching the osseous tumors of the hand where the surgical planning is to remove the tumor and to afford an almost normal function of the affected segment. **Method.** Between 1999–2000 we operated 20 osseous tumors having the following locations: PP – 13 cases, DP – 3 cases, DIP joint – 3 cases, Trapezius – 1 case. The symptoms in chronological order were: local inflammation, swelling, painful low mobility of the adjacent joint, a minor trauma in the near past. In the surgical planning we took into account: the tumor's extension, the location of the tumor and its invasion to the adjacent joint. We used the following surgical procedures: single tumor removal – 9 cases, reconstruction with cortico – cancellous bones – 5 cases, arthrodesis after tumor removal – 2 cases, ray amputation – 4 cases. Postoperative histological examination offered us the chance of a correct prognosis. Excepting the cases where movements had been limited by the arthrodesis of the affected joints, the normal function was conserved.

Comments – Conclusions: Our entire patients have been treated surgically after clinical and radiological evaluation. Removal of the tumor has to be done deep into the healthy bone and the reconstruction must result in a good functional outcome. In all cases histological examination confirmed the diagnosis and allowed a correct prognosis.

10.1177/1753193409106094

A0195 TREATMENT OF GIANT-CELL TUMOR IN DISTAL RADIUS WITH FREE VASCULIZED FIBULAR HEAD GRAFT

Y. Tomori, M. Sakuraba, A. Kawai, S. Onoda,
Y. Beppu, K. Chuman, F. Nakatani
National Cancer Center East & Central Hospital, Japan

Objective: To evaluate the result of free vascularized fibular head graft for wrist reconstruction, following wide resection of giant-cell tumors of the distal end of the radius.

Material and methods: From 1999 to 2008, free vascularized fibular head graft was performed for wrist reconstruction in 3 patients, following wide resection of giant-cell tumors of distal end of the radius. There were 1 male and 2 females. 1 patient of 3 was a local recurrence after tumor curettage and bone graft in the other institution. The other 2 patients had a first time operation in our institution. Free vascularized fibular head grafts were harvested with the anterior tibial vessel. At the same time, biceps femoris tendon was harvested with fibular head for fixation of the grafted bone.

Results: The postoperative follow-up period ranged from 2 to 91 months. There was radiographic evidence of bone union in 2 patients, and there was no graft bone resorption. Local recurrence occurred in no patient. Distant metastasis occurred in 1 patient. Of the 3 patients, 1 patient was died because of propagation of the disease (multiple lung metastases). Two patients are alive and apparently disease-free at the time of follow-up after surgery.

Conclusion: In our study, free vascularized fibular head graft for wrist reconstruction is a function-preserving procedure.

10.1177/1753193409106089

A0316 GIANT LIPOMAS OF UPPER EXTREMITY

I. Iriberry, M. del Valle, J.E. Colombo, E. Rodriguez,
S. Solsona, I. Casado
*Hospital de l'Esperit Sant, Santa Coloma de Gramenet,
Barcelona, Spain*

We present the revision of our cases of giant lipomas (defined as greater than 5 cm. diameter) of the upper extremity. We include all cases operated on between 2000–2008.

We have studied 16 cases of giant lipomas in hand, forearm and arm.

We assess clinical situation (someone with nerve compression signs), complementary explorations (ECO, MRI), surgical findings and the results of biopsy.

10.1177/1753193409106093

A0042 WRIST FASCIAL ANATOMY: IS EVERYTHING KNOWN?

L. Lancerotto¹, C. Tiengo¹, C. Stecco², V. Macchi²,
F. Bassetto¹, R.D. Caro²
¹*Clinic of Plastic Surgery, University of Padova, Italy*
²*Section of Anatomy, Department of Human Anatomy
and Physiology, University of Padova, Italy*

Introduction: Notwithstanding the wrist and palm being a region of high surgical interest, there is not yet a full agreement on the anatomy of its fascial planes and conflicting descriptions are found in the literature. In particular, there is uncertainty as to the definition of flexor retinaculum and of superficial or volar palmar ligament, not differentiated by many authors, and on the relationships between the palmaris longus tendon and the palmar aponeurosis with the fascial planes.

Methods: 30 forearms of 19 cadavers (15 fresh, 2 formalin-fixed, 2 embalmed according to Thiel's method) were studied through dissection with the operating microscope. Samples were collected for histological - immunohistochemical analysis (haematoxylin-eosin, azan-Mallory, van Gieson, S-100). 10 MR of the region were examined for in vivo correlation.

Results: In the wrist two fibrous structures were identified under the subcutaneous tissue: one more superficial, in continuity proximally with the antebrachial fascia of which it seemed a specialization, and one deeper, with ligamentous appearance and forming the roof of the carpal tunnel. Histologically, the first had fascial characteristics, with multi-layered structure, organization of the layers along different directions, and elastic fibres between the layers; the second a ligamentous appearance, being made up of dense unidirectional collagenous fibres. The most superficial structure was also highly innervated. Two corresponding different structures were identified at the MR. The palmaris longus tendon was situated proximally deep to the antebrachial fascia, then in the lower third of the forearm it perforated the antebrachial fascia (at 4.7 ± 1.7 cm from the bityloid line) moving to a suprafascial plane, and terminated inserting in the palmar aponeurosis. The palmar aponeurosis could be divided in two layers: the superficial one, in continuity with the palmaris longus tendon, formed by longitudinal fibers and adherent to the skin, the deep one formed by transverse fibers and continuous laterally with the deep fascia of the hand.

Discussion and conclusion: The palmaris longus muscle presented a peculiar behaviour perforating the antebrachial fascia. This may lead to new hypothesis on its development and function. In the wrist two different fascial structures could be clearly identified. In the literature, when such an arrangement is accepted, the superficial one is known as palmar ligament and the deep one as flexor retinaculum. On the contrary, our anatomical and histological observations correlate the deep structure to ligaments and suggest for it a mechanical function, while the superficial one is similar to the other retinacula of the body. Therefore, for clarity, it may be suggested that the superficial should be denominated "flexor retinaculum" and the deep "transverse carpal ligament". The flexor retinaculum being highly innervated is suggestive of a sensory function; its sparing may be opportune when intervening in the carpal tunnel and a reconstruction may be considered in post-traumatic lesions.

10.1177/1753193409106400

A0174 ECONOMICAL MANAGEMENT IN CARPAL TUNNEL RELEASE. COMPARISON OF ENDOSCOPIC RELEASE (AGEE) VERSUS OPEN RELEASE

G. Pajardi, G. Berto, L. Pegoli, G. Pivato
*Plastic Surgery Institute, University of Studi of Milan,
Hand Surgery Unit, Policlinico Multimedica IRCCS, Italy*

Carpal tunnel syndrome (CTS) is still today the most common nerve entrapment syndrome in upper extremity. When indicated, surgery is the elective treatment and consists of opening the volar carpal ligament. Endoscopic carpal tunnel release is the gold standard procedure in treatment of CTS in the Hand Surgery Department of Policlinico Multimedica of Milan. The authors describe their experience on 18.410 carpal tunnel decompressions, by the endoscopic procedure, treated from January 1990 to April 2008. According to the literature endoscopic carpal tunnel release (ECTR) technique is superior in terms of grip strength recovery and scar tenderness, and contemporaneously reducing patients' discomfort; this could be translated into subsequent earlier return to work activities. Comparing the long term outcomes of traditional technique (open carpal tunnel release- OCTR) and ECTR, at about 2 years, differences are not relevant.

On the contrary, at the earlier follow-up at 6 months, the endoscopic technique provide better results in term of morbidity reduction related with smaller incision at the wrist, and faster recovery, due to smaller time of strength recovery. Analyzing the significant series of patients, who have been treated in the last 15 years, and focusing the reduced number of complications and recurrences, we can affirm that this technique could be taught to young doctors in training in our Department. Data shows that the learning curve is reasonable and little time is required to become confident with the technique.

Recently more interest has been oriented to health costs. We compared the cost of ECTR versus OCTR. We analyzed the price of operative instruments, operating room occupation, preoperative exams, materials and secretarial expenses.

We produced a Mathematical Formula to analyze the cost. We realize that the most relevant cost in carpal tunnel procedure is not the instrument, but the operating room occupation.

Thanks to the augmented speed of endoscopic procedure, about 12 minutes compared to 20 minutes needed for OCTR, the ECTR allows us to operate about 1/3 of patients more for operative session, reducing conspicuously the most important cost of the procedure.

The average life of instruments, over 5,000 interventions, can reduce significantly the costs of the materials. The major propension of patients to mininvasive procedure provides more ambulatory access

In conclusion: endoscopic carpal tunnel is clinically and economically advantageous compared with traditional techniques.

10.1177/1753193409105975

SESSION 19: VARIOUS

- A0108 HAND- AND WRIST MALPRACTICE CLAIMS IN THE NETHERLANDS: 1993–2008 130
B.M. Delavary, J. Cremers, M.J.P.F. Ritt
(*The Netherlands*)
- A0192 PRESSURE EXERTED BY FINGER TRAPS 130
E. Spurrier, A. Khanna, G. Pathak
(*UK*)
- A0034 VARIANTS OF USE OF TISSUE COMPLEXES WITH AXIAL BLOOD SUPPLY FROM PERONEAL ARTERY IN PEDIATRIC ORTHOPEDICS 131
A. Govorov, S. Golyana
(*Russia*)
- A0176 COMPLICATED ELECTRIC BURNS. USING OF TISSUE EXPANDERS AFTER BURNS 131
A.J. Protasewicz
- A0184 RADIATION EXPOSURES ASSOCIATED WITH THE USE OF A MINI C-ARM IMAGE INTENSIFIER IN HAND SURGERY 132
A. Barnard, D. Armstrong, M. Arundell, S. Evan, F.D. Burke
(*UK*)
- A0319 THE AETIOLOGY AND PROGNOSIS OF CLAVICLE FRACTURES IN A COMBINED URBAN-RURAL PRACTICE 132
B.J. O'Neill, K.M. Hirpara, D. O'Briain, C.M. McGarr, T.K. Kaar
(*Ireland*)
- A0372 COST BENEFIT ANALYSIS FOR DAY CASE UNIT VERSUS INPATIENT TREATMENT FOR MINOR TRAUMA CASES 132
R. Gupta, C. Roslee, R. Khokhar, A. Tavakkolizadeh, D. Simon, J. Sinha
(*UK*)
- A0281 CARPAL TUNNEL RELEASE WITH SINGLE MINI-OPEN INCISION PROXIMAL TO WRIST CREASE 133
S.-U. Lee, S.W. Song, S.K. Rhee, S.H. Kang
(*Korea*)
- A0258 DYNAMIC AND QUASI-DYNAMIC ACQUIRED IN VIVO CARPAL KINEMATICS 133
M. Foumani, S.D. Strackee, R. Jonges, B. Carelsen, L. Blankevoort, G.J. Streekstra
(*The Netherlands*)
- A0044 ULNAR NERVE COMPRESSION NEUROPATHY IN GUYON'S CANAL 134
E. Gudemez, A. Gulgonen
(*Turkey*)
- A0336 AESTHETIC AMPUTATION OF THE MIDDLE FINGER USING A CAPITO-HAMATE OSTEOTOMY 134
J. Szalewicz-Szpunar, M. Beustes-Stefanelli, D.L. Viet
(*France*)

A0131	MEASUREMENT OF PALMAR ANGULATION IN METACARPAL NECK FRACTURES USING ULTRASOUND B. Hennecke, S. Kluge, B. Juon, A. Jenzer, M. Traub, E. Vögelin (<i>Switzerland</i>)	135
A0324	THE DAD (DYNAMIC JOINT DISTRACTOR) IN THE MANAGEMENT OF COMPLEX DIGITAL FRACTURES G. Delia, F. Catalano, G. Risitano, M. Colonna, F.S. d'Alcontres (<i>Italy</i>)	136
A0208	EXPERIMENTAL HISTOLOGICAL VIEW OF PERFORATORS I. Matei, S. Geuna, A. Georgescu, P. Tos, B. Battiston, G. Ronchi, F.D. Scipio, I. Capota, F. Ardelean (<i>Romania, Italy</i>)	136
A0347	IS CARPAL TUNNEL DECOMPRESSION AN OFFICE PROCEDURE? S. Beeharry (<i>France</i>)	136

A0108 HAND- AND WRIST MALPRACTICE CLAIMS IN THE NETHERLANDS: 1993–2008

B.M. Delavary¹, J. Cremers², M.J.P.F. Ritt¹

¹*Department of Plastic and Reconstructive surgery, VU University Medical Centre, P.O. Box 7057, 1007 MB Amsterdam, The Netherlands*

²*MediRisk, P.O. Box 8409, 3503 RK Utrecht, The Netherlands*

Background: Hand injury can cause severe morbidity, inability to work and a decrease in quality of life. Besides the negative consequences for the patient, hand injury is not only costly to the medical community, but also to the community at large. FESSH is continuously aiming to stress the significance of hand surgery as a separate subspecialty and the importance of educating other physicians. For obvious reasons, it is important that hand injuries are initially treated by adequately trained physicians. In this respect, figures concerning hand and wrist malpractice claims in Europe are of great importance, however scarce. The aim of this study was to analyze hand and wrist injury related liability claims filed at “MediRisk” in order to identify causes and potential preventability of such claims. **Methods:** A retrospective study was performed at “MediRisk”, the biggest insurer for medical malpractice in the Netherlands. The majority of hospitals in the Netherlands is insured by MediRisk. Data was collected systematically from all medical liability claims filed between 1 January 1993 and 1 January 2008. **Results:** Between 1993 and 2008 a total of 743 claims were filed at MediRisk. The number of claims is constant over the past years, varying between 52 and 76 claims each year. 86.3% of the claims have been settled. Of the total, 557 (75%) claims were addressed to general surgery, 109 (14.7%) claims were addressed to orthopedic surgery and 60 (8.1%) of the claims were addressed to plastic surgery. The majority of claims (64.9%) involved treatment at the emergency department (ED). Most claims involved the diagnosis of wrist fractures (22.2%) followed by cutting injuries (19.4%) and fractures of the finger (13.6%). Residents were involved in 323 (43.5%) of the claims. Of the 481 cases at the emergency department 59.5% was treated by residents. Most claims were filed because of inaccurate treatment (34.8%), followed by missed diagnosis (33.8%) and errors during intervention (13.5%). Cutting wounds most frequently resulted in missed diagnosis (40.6%). In 74.5% of cases the diagnosis was missed by residents. 66.7% of missed tendon injuries were missed by general surgery residents. Liability was accepted in 185 (24.9%) cases. The percentage of accepted claims was the highest in the general surgery

(26.4%) and orthopedic surgery group (23.9%). The majority (89.2%) of all accepted claims on the ED included treatment by the general surgery department. In 93.2% of accepted liability claims at the ED general surgery residents were involved. The total cost of handling these claims was ‘4,769,525.

Conclusion: The cost of liability claims concerning hand or wrist injury is high and most claims could have been prevented easily. Claims primarily concerned treatment by general surgery residents on the ED. Most commonly these residents are the least experienced and least competent physicians to judge and treat hand injuries. At least better training of these residents and more supervision seems indicated. This paper adds to the notion that hand injuries should be treated by surgeons with adequate knowledge and experience, and whenever indicated by a hand surgeon preferably.

10.1177/1753193409106134

A0192 PRESSURE EXERTED BY FINGER TRAPS

E. Spurrier, A. Khanna, G. Pathak
Peterborough District Hospital, UK

It is common practice in wrist arthroscopy to suspend the patient’s arm using Chinese finger traps, and to distract the wrist joint by applying weight to the arm at the elbow. It is possible that this may apply significant pressure to the fingers, and potentially damage the digital nerves. We examined the pressure applied by finger traps and consider the risk this poses to the digital nerves.

Methods: Standard finger traps were suspended from a spring balance and the author’s fingers inserted along with a length of rubber tubing. The tubing was filled with saline and connected to a digital compartment pressure monitor. The hanging mass was gradually increased and the pressure in the rubber tubing noted. This pressure was taken as analogous to the pressure affecting the neurovascular bundle.

Results: Pressure increases linearly with increasing mass. A pressure of 500mmHg has been suggested as necessary to cause nerve injury. Using a non-invasive technique it was not possible to accurately measure the absolute pressure acting on the digital nerves. However an increase in pressure was noted with increasing suspended mass.

Conclusions: Increasing hanging mass on the arm is associated with a rise in pressure within a finger trap. It is unclear whether this pressure will eventually be sufficient to injure the digital nerves, but it would be prudent to

reduce the mass used and minimise the time for which it is applied in order to reduce potential risk. Where possible, fluid insufflation should be used rather than hanging mass to distract the carpus during wrist arthroscopy.

10.1177/1753193409105980

A0034 VARIANTS OF USE OF TISSUE COMPLEXES WITH AXIAL BLOOD SUPPLY FROM PERONEAL ARTERY IN PEDIATRIC ORTHOPEDICS

A. Govorov, S. Golyana
The Turner Scientific and Research Institute for Children's Orthopedics in Saint-Petersburg, Russia

The first mention of use of flaps from the area of the peroneal artery was in 1975. Thus, G. Taylor described the blood supply of the fibula. Only in 1979 was the simplified way of taking of a vascularized segment of bone described. The peroneal artery and branches spreading from it supplies a significant tissue complex allowing to form the bone and musculocutaneous flaps. An advantage of the musculocutaneous flaps on the lower leg is insignificant and uniform thickness, and this allows their use for grafting to hand and foot to replace the soft tissue defects. The bone graft is presented more often by fibular diaphysis, however, in a children's practice sometimes there is a necessity for an epimetadiaphyseal transplant. For the latter, an additional source of blood supply is needed: this is the arterial branch departing from the anterior tibial artery which feeds the fibular head together with the growth plate.

At the department for reconstructive microsurgery and hand surgery in The Turner Research Institute for Children's Orthopedics, for the period from 1998 to 2008, 23 transplantations of tissue complexes supplied by peroneal artery had been carried out. The age of child patients was from 3 to 17 years.

In 12 of 23 patients, the sequelae of acute hematogenous osteomyelitis were observed, in 7 – the sequelae of trauma, three children had a fibrous dysplasia, one child had a marked ulnar club hand. There were 21 bone grafts and only two musculocutaneous grafts. As to bone grafts, mainly the grafting of fibular diaphysis was performed, there were 18 such patients operated on. In other three the transplanting of an epimetadiaphyseal graft of the fibula was performed.

The uniqueness of these operations is that two sources of blood supply are used. The blood supply of such grafts

allows to preserve the growth plate which is very important for a growing child patient.

The musculocutaneous flaps were used to replace the soft tissue defects in forearm and hand. These flaps corresponded in thickness and form to the recipient area. Thus, the autografts from exterior lower leg supplied by peroneal artery are effective and perspective for their use in children's orthopedics. In reconstruction of bone and soft tissue defects in limbs in children the given tissue complexes carry out their necessary function and frequently are optimal and irreplaceable as to requirements placed upon them.

10.1177/1753193409106133

A0176 COMPLICATED ELECTRIC BURNS. USING OF TISSUE EXPANDERS AFTER BURNS

A.J. Protasewicz

Burns to the hand are common. Most are small and confined to the upper limb but some are part of a major burn. Management after hand burn is very important – a high priority is function restoration/reconstruction.

One of the special types of the burns is an electrical burn in which there is usually considerably deeper damage than is evident to external inspection. High voltage injuries cause direct damage to blood vessels and muscle necrosis with the rapid onset of compartment syndromes. Involvement in the hand may result in swelling in multiple compartments. Fasciotomy needs to include decompression of the median and ulnar nerves, release of palmar spaces including the intrinsic muscles. Management of severe burns or high voltage injuries is aggressive debridement of all necrotic tissues, including damaged vessels and nerves and muscles. Reconstruction of these structures should be undertaken if the limb is considered salvageable and the function of the hand has to be preserved/reconstructed. Reconstruction of the hand function is multi stages surgery process. Good tissue cover should be achieved in the first stage of reconstruction. Tissue expanders can be used. I would like to present some clinical cases of complicated burns, and high voltage burns. Using expander – indication and contraindication and complication during this procedure. I would like to present the management provided to hand function restoration – nerve, tendons reconstructions after severe burns.

10.1177/1753193409106452

A0184 RADIATION EXPOSURES ASSOCIATED WITH THE USE OF A MINI C-ARM IMAGE INTENSIFIER IN HAND SURGERY

A. Barnard, D. Armstrong, M. Arundell, S. Evan, F.D. Burke
Pulvertaft Hand Centre, Derbyshire Royal Infirmary, UK

Our unit is an extensive user of mini C-arm fluoroscopy in both the theatre and outpatient setting. We also provide courses in radiation protection in the context of current UK Ionising Radiation Regulations (IRR 1999 and IRMER 2000). The use of the mini c-arm has allowed many more procedures to be undertaken in the outpatient setting including fracture manipulation, joint injections and dynamic screening. It also allows specific non-standard projections to be gained. However, concern is always raised when the doctor becomes imaging operator as there would seem to be no in built safety mechanism of the radiographer. There is also the potential that doctors will slip into bad practice of multiple exposures or not removing their hands from the beam, particularly when their concern is the content of the image rather than the intricacies of obtaining the image.

Our small study looked at these concerns in two ways. We firstly looked at the length of exposure versus dose received by the operator. We did this by using an anthropomorphic phantom hand with a thermoluminescent dose meter (TLD) placed on the middle finger tip (overlying the nail) and exposing the hand in the centre of the beam. We looked primarily at short exposure times, but increased this incrementally to 3 minutes of continuation radiation. We repeated this three times.

We then looked at more realistic scenarios of usage and recorded dose received by surgeons and theatre staff whilst using the mini C-arm in surgical cases. Scrubbed members of staff placed the TLD over the nail of the non dominant middle finger (as in the time/dose experiment) for up to ten serial procedures. Notes were made of exposure times and the clinical details of the case.

The results show that dose received in both experimental and clinical settings were tiny in comparison to dose limits set by the Ionising Radiations Regulations (1999) and of little significance as a dose of ionising radiation.

In conclusion, with doctors taking on the multiple roles of referrer, practitioner and operator exposure times and subsequent radiation doses remain small with the mini c-arm having many advantages in clinical practice.

10.1177/1753193409106135

A0319 THE AETIOLOGY AND PROGNOSIS OF CLAVICLE FRACTURES IN A COMBINED URBAN-RURAL PRACTICE

B.J. O'Neill, K.M. Hirpara, D. O'Briain, C.M. McGarr, T.K. Kaar
Merlin Park Hospital, Galway Regional Hospitals, Dublin Road, Galway, Ireland

Background: We reviewed all clavicle fractures presenting to our institute over a twelve month period. The aim of the study was to determine the aetiology and prognosis of clavicle fractures in a typical Irish hospital.

Methods: Over a twelve month period we reviewed all new radiographs of the shoulder region and identified 227 clavicle fractures. Each radiograph was classified using five classification systems. We reviewed all subsequent x-rays and clinical records until patient discharge. We assessed each classification system's prognostic value in predicting delayed/non-union.

Results: Our data shows that 81% of clavicle fractures occur in the middle third, 18% lateral third and 1% medial third. The overall prevalence of delayed/non-union was 7.7%, with 2.9% requiring operative management and 4.8% developing asymptomatic non-union. The prevalence of non-union in the lateral third was 12.5%, all but one were asymptomatic. Craig's classification had the greatest prognostic value for lateral third fractures, Robinson's classification had the greatest prognostic value for middle third fractures.

Conclusions: Sports injuries are the most common cause of clavicle fractures. They are common injuries but non-union is an uncommon occurrence. Non-union is more common in the lateral third but we found these to be asymptomatic. We did not assess sufficient medial third fractures for the data to be significant.

10.1177/1753193409106138

A0372 COST BENEFIT ANALYSIS FOR DAY CASE UNIT VERSUS INPATIENT TREATMENT FOR MINOR TRAUMA CASES

R. Gupta, C. Roslee, R. Khokhar, A. Tavakkolizadeh, D. Simon, J. Sinha
Kings College Hospital foundation NHS trust, London, UK

Introduction: Day surgery trauma lists are becoming an increasingly widespread approach to address the in-patient trauma demand on NHS services. Day case surgery has widely accepted economic and patient

related advantages. We have recently implemented such a list on a weekly basis at KCH DSU.

Aim: To perform an audit of the hand and wrist cases undertaken on a day surgery trauma list over a 4 month period and analyse the potential cost benefits.

Material and Methods: We performed a prospective audit of the hand and wrist trauma workload suitable for day surgery. Data was collected on patients and procedures. The tariffs charged and actual procedural costs were calculated for both day-surgery and inpatient setting for comparative analysis.

Results: 21 hand and wrist cases were performed on our once weekly day surgery trauma list during this period. 57% were male with a mean age of 37 years (range 8–95). A wide variety of fracture fixation and soft tissue procedures were performed. The average actual procedure cost in day case (£100) was significantly lower than the in-patient cost (£575).

The official tariff charged per case was comparable for day surgery and in-patient trauma however revenue was more reliable from day surgery due to a quota system imposed on in-patient trauma where on average only 75% of the tariff is gained.

Conclusion: Day surgery trauma is a safe and cost effective method of optimising the management of the minor trauma case workload. A day surgery trauma list can be set up successfully for a variety of upper limb injuries. The cost benefits include the lower average cost per procedure (£475) and a higher average tariff it generates per case (£246). The day surgery set up also improves the health care experience for the patient.

10.1177/1753193409106139

A0281 CARPAL TUNNEL RELEASE WITH SINGLE MINI-OPEN INCISION PROXIMAL TO WRIST CREASE

S.-U. Lee, S.W. Song, S.K. Rhee, S.H. Kang
Dept of Orthopedic Surgery, The Catholic University of Korea, St Mary's Hospital, 62, Yoido, Youngdeungpo, Seoul, Korea 150–713

Background: Carpal tunnel syndrome (CTS) is one of the most common diseases in orthopedic outpatient clinic, and carpal tunnel release is frequently indicated with intractable symptoms. We previously reported an effective minimal single incision technique at the midportion between thenar and hypothenar areas, however, experienced the longstanding pain and tenderness of the scar.

Aim: We report the result of the new minimal single incision proximal to the wrist crease for release of TCL.

Methods: Seventy-nine patients, operated between 2002 and 2007, were retrospectively reviewed. Indications of the surgical treatment were apparent thenar muscle atrophy and/or moderate degree injury of the median nerve at wrist without satisfactory improvement of symptoms over 3 months. Local infiltration of 1% lidocaine was done at the wrist crease area, proximal to the TCL, and around the Palmaris longus tendon (PL). Subcutaneous infiltration of lidocaine was extended to the direction of the ring finger, and finally 4ml of lidocaine was injected into the carpal tunnel. Radial based chevron skin incision, 1 to 1.5 cm in length, was made ulnar to the PL, and a blunt elevator was used to pull away the soft tissues over and under the surfaces of TCL. One blade of a small scissors was inserted under the TCL, the blade pushed against the TCL, and cut distally in line with the ring finger.

Results: Although this new incision was technically demanding to avoid complications, the general results were comparable to the previous incision technique with the significant reduction of the pain and tenderness, with the mean period of 3.7 months of tenderness of palm.

Conclusion: From the above results, we concluded that a new minimal single incision, proximal to the wrist crease, was more advisable than the previous technique to release TCL.

10.1177/1753193409105981

A0258 DYNAMIC AND QUASI-DYNAMIC ACQUIRED IN VIVO CARPAL KINEMATICS

M. Foumani, S.D. Strackee, R. Jonges, B. Carelsen, L. Blankevoort, G.J. Streekstra
Department of Plastic-and Reconstructive-and Hand Surgery, Department of Medical Physics, Orthopaedic Research Center Amsterdam, Academic Medical Center, Amsterdam, The Netherlands

Background: The wrist is the most complex joint in the human body. It is of great importance for the patient and the clinician to recognize and properly diagnose instability problems of the wrist at an early stage.

For this reason we recently introduced a new method for the acquisition of dynamic 3D images of a moving joint. In our method the forearm of the patient is placed in a device that imposes a cyclic flexion-extension or radio-ulnar deviation movement of the wrist.

With a modified mobile C-arm 3D-RX system which in its conventional application is used for imaging of static objects, a number of X-ray projection images from different angles is acquired. The C-arm is motorized to make a propeller movement over a semicircular track at

constant speed meanwhile acquiring projection images. This results in multiple sets of projection images, which are reconstructed to a series of time resolved 3D images i.e. 4D-rotational X-ray. The resulting data are processed whereby movements of the individual carpal bones can be quantified, visualized, and studied in a non-invasive way. It finally makes it possible to evaluate quantitatively the benefits of surgical wrist interventions in vivo.

This report consists of the investigation of in-vivo 3D kinematics of the carpal bones from both quasi-dynamic and dynamic acquired kinematics by the new developed 4D-RX method.

Method: For eight healthy subjects, a quasi-dynamic and a dynamic measurement was done for a flexion-extension and a radial-ulnar deviation movement. For dynamic scans participants were scanned during a continuous imposed motion of the wrist using the 4 Dimensional rotational x-ray imaging method. To assess quasi-dynamic images of the wrists stepwise static 3D-RX scans were obtained during flexion extension motion and radial-ulnar deviation.

Both paired student t-test and linear mixed model statistic methods were used to investigate the significance of the measured difference between the both methods.

Outcome: The root mean squared differences between the dynamic acquired scans and those acquired during a stepwise motion of the wrist were very small for both flexion-extension and radio-ulnar motion. For the radioulnar motion the mean RMS difference was 0.83 mm for translation and 3.10 degrees for rotation around the 3 axes. For flexion/extension the mean RMS difference was 0.74 mm for the translation. The differences between the dynamic acquired scans and those acquired during a stepwise motion of the wrist were not significantly different.

Conclusion: The RMS position differences are very small for both flexion and extension and radioulnar deviation. The RMS for rotations seems to be larger. Each RMS value is larger than the precision of the 4D-RX system; 0.02 ± 0.005 mm for translation and 0.12 ± 0.07 degrees for rotation. No significant difference was seen between the two methods for acquiring of carpal kinematics in healthy individuals.

10.1177/1753193409106401

A0044 ULNAR NERVE COMPRESSION NEUROPATHY IN GUYON'S CANAL

E. Gudemez, A. Gulgonen
VKF American Hospital, Department of Hand and Microsurgery, Turkey

Introduction: We evaluated our patients who had ulnar nerve compression neuropathy in Guyon's canal considering with causes, levels of compression, operative treatments, and long-term follow-ups.

Materials and methods: Twelve patients (Seven females, five males) are included in this study. The average age of patients was 36.3 years (19 to 70). Complaints of patients varied from the level of compression of the ulnar nerve, zone I, II, or III. Eight patients presented with pain and/or swelling on the area of hypothenar eminence; intrinsic motor weakness and sensory disturbances of the ulnar nerve (Zone I). Three patients showed only motor weaknesses in the intrinsic muscles innervated with ulnar nerve (Zone II). One patient had only sensory deficit (Zone III). The most common cause found was a ganglion (5 patients), followed by aneurysmatic dilatation of the ulnar artery (2 patients), arteriovenous malformation (2 patients), giant cell arteritis of the ulnar artery, pisiform dislocation, and synovitis caused by rheumatoid arthritis. Nerve conduction studies were consistent with compression of the ulnar nerve. In all cases, Guyon's canal was decompressed. Space-occupying lesions were removed. In the case of ulnar artery involvement, this was either reanastomosed or reconstructed using vein graft.

Results: The average follow-up period was 3.4 years (1 to 7). All patients were pain free. Sensory evaluations and strength measurements showed comparable results with contralateral hand. In cases of ulnar artery surgery, Doppler examinations showed normal patency of the artery.

Conclusion: Swelling and pain in Guyon's canal, and ulnar nerve symptoms may represent some variety of clinical reasons. Careful execution will help facilitate proper diagnosis and institution of appropriate treatment plan.

10.1177/1753193409105979

A0336 AESTHETIC AMPUTATION OF THE MIDDLE FINGER USING A CAPITO-HAMATE OSTEOTOMY

J. Szalewicz-Szpunar, M. Beustes-Stefanelli, D.L. Viet
Institut de la Main, Clinique Jouvenet, Paris, France

Introduction: Isolated amputation of the middle finger is rarely performed but is particularly troublesome functionally and aesthetically displeasing. To fill the space of the third ray, with the objective of obtaining a more aesthetically pleasing four digit hand, without any convergence of fingers, we suggest performing a capito-hamate osteotomy.

Material and method: We report 15 cases of capito-hamate osteotomy after isolated amputation of the third ray.

There were 9 men and 6 women with an average age of 47 years. The indication had been trauma in 10 cases and malignancy in 5 cases. Average follow-up was 29 months (12 to 266 months). The first stage of the procedure is the amputation of the third ray. The Y-shaped skin incision is placed over the dorsal aspect of the fourth metacarpal. The amputation is performed by disarticulation of the third carpo-metacarpal joint. The second stage is the capito-hamate osteotomy. This consists of excising a quarter of the capitate on its ulnar aspect and the cartilage of the radial edge of the hamate. The third stage is the capito-hamate arthrodesis which is performed by means of dorsal staples. The last stage is the closure of the 3rd space, suturing the dorsal capsula of the carpometacarpal joint, the juncta tendinosum and the intermetacarpal ligaments. The wrist is immobilized for 2 weeks.

Results: No immediate postoperative complications were noted. Residual pain was considered acceptable for up to 3 months, and was noted in 3 patients. No pseudoarthrosis or stiffness had occurred. Grip strength was equivalent to the contra-lateral hand in three cases, decreased by between 10 and 20% in 10 cases and decreased by 30% in 2 cases. The patients themselves considered their aesthetic result to be highly satisfactory in 12 cases and satisfactory in the remaining 3.

Discussion: Excision of the third metacarpal with a simple repair between the adjacent remaining metacarpals leads an unaesthetic convergence of the second and fourth rays. Osteotomy and translocation of the adjacent metacarpals (i.e. the second, or the fourth-fifth composite) risks particular complications (pseudarthrosis, mal-rotation, metacarpophalangeal joint stiffness). A capitate osteotomy alone, as proposed by Pezé, changes the midcarpal joint and we consider it difficult technically and unreliable, compared to our capito-hamate osteotomy.

Conclusion: After amputation of the middle finger, we consider a capito-hamate osteotomy to be the most reliable and the most effective technique to allow an aesthetically pleasing four digit hand, especially by avoiding any convergence of fingers, classic in the ray amputation by isolated metacarpal resection.

Keywords: amputation, middle finger, capito-hamate osteotomy

10.1177/1753193409106027

A0131 MEASUREMENT OF PALMAR ANGLULATION IN METACARPAL NECK FRACTURES USING ULTRASOUND

B. Hennecke, S. Kluge, B. Juon, A. Jenzer, M. Traub, E. Vögelin

Department of Plastic and Hand Surgery, University of Berne, Switzerland

Background: Therapy of metacarpal neck fractures is discussed controversially in the literature. Some authors describe normal hand function of malunited metacarpal neck fractures with a palmar angulation up to 70°; others define 30° as the uppermost limit to maintain normal hand function. However, the methods of measuring palmar angulation are often not clearly defined. The optimal method of radiographic measurement would be on an exactly lateral projection of the fractured bone. The superposition of the metacarpal bones in the exactly lateral projection makes it difficult to recognize the anatomical landmarks for a correct measurement of the degree of palmar angulation. Here, we present a new method to measure palmar angulation in metacarpal neck fractures using ultrasound.

Aim: The aim of this prospective study is to compare the radiographic methods of measuring palmar angulation in metacarpal IV und V neck fractures with a new method using ultrasound.

Methods: 17 patients with a neck fracture of the metacarpals IV or V were treated either conservatively or operatively by closed reduction and endomedullary Kirschner wire osteosynthesis. Two weeks after trauma or operation, respectively, a x-ray (pa, oblique, lateral) was performed. Two examiners measured the palmar angulation on the oblique and lateral projections using two different methods (medullary canal- and dorsal cortex-method). The same examiners performed measurements of palmar angulation using ultrasound. The measurements obtained with the different methods as well as by the two examiners were compared.

Results: Depending on the method of radiographic measurement and different x-ray projections, an average of up to 21° higher angles were determined as compared with the ultrasound-method. The medullary canal-method on average produced 11° higher readings as compared with the dorsal cortex-method. The average deviation in angles measured between the two examiners was higher for the radiographic methods than for the ultrasound-method.

Discussion/Conclusion: The ultrasound-method for measuring palmar angulation in metacarpal neck fractures is simple, standardized, cheap, rapidly available, and does not involve radiation. An exactly lateral projection of the fractured metacarpal bone can be imaged without superposition, and the measured angles appear to be more precise in comparison to radiographic methods. The question arises as to whether previous studies that suggested normal hand function

with palmar angulation up to 70° might have been based on false higher angle-readings due to the use of radiographic methods.

10.1177/1753193409106025

A0324 THE DAD (DYNAMIC JOINT DISTRACTOR) IN THE MANAGEMENT OF COMPLEX DIGITAL FRACTURES

G. Delia, F. Catalano, G. Risitano, M. Colonna, F.S. d'Alcontres
Department of Plastic and Reconstructive Surgery, University of Messina, Italy

The right function of proximal (PIP) and distal (DIP) interphalangeal joints allows rapid and elegant movements of the fingers. Complex digital fractures represent a real challenge for hand surgeon who should find inexpensive and easy to perform treatment, focusing on stable reduction and early motion.

The literature describes many therapeutic strategies as extensive block splinting, open reduction, internal fixation and dynamic traction external fixation mechanism, but long term problems, such as pain and articular stiffness, are common.

Dynamic traction external fixation mechanism could represent a suitable option to treat complex digital fractures. The aim is to assess the clinical outcomes in patients sustaining complex digital fractures using a new home-made system, the "dynamic joint distractor" (DAD).

Nineteen patients (16 men and 3 women), average age 37 years (range 16 to 55), were treated from January 2007 to May 2008. All fractures involved long fingers. In 13 cases, DAD was used to repair articular fractures, 9 of the PIP and 4 of the DIP, in 3 cases it was used to correct a post-traumatic clinodactily and in 3 cases to treat a pluri-fragmental fracture. Nine patients had acute injuries, ten reported a chronic lesion, which was treated with DAD after an average delay of 33 days. In our experience, dynamic joint distractor (DAD) represents a good choice to treat complex articular fractures or dislocations. Our results show a good functional recovery of the injured finger, a fine compliance of the patient, without important complications. Low profile design and cheap cost make it different from other traction devices described in the literature.

10.1177/1753193409106026

A0208 EXPERIMENTAL HISTOLOGICAL VIEW OF PERFORATORS

I. Matei¹, S. Geuna², A. Georgescu¹, P. Tos³, B. Battiston³, G. Ronchi², F.D. Scipio², I. Capota¹, F. Ardelean⁴

¹*UMF Iuliu Hatieganu Cluj Napoca, Rehabilitation Hospital Cluj Napoca, Romania*

²*Department of Clinical and Biological Sciences, University of Turin, San Luigi Hospital, Orbassano, Italy*

³*Gruppo Interdivisionale di Microchirurgia, Turin, Italy*

⁴*Rehabilitation Hospital Cluj Napoca, Romania*

Introduction: This abstract presents a new approach to perforators, from microscopic histological and ultra-structural point of view. In order to explain why some flaps based on very good perforator vessels suffer, while other based on reduced caliber perforators thrive, we performed a comparative experimental study on rat and pig perforators.

Method: The study was performed in Cluj Napoca, Romania and Torino, Italy, and is based on the comparative examination by light and electron microscopy of the perforators harvested from rats and pigs. The perforators harvested from rat were emerging from the superior and/or inferior epigastric artery and the pig perforators were emerging from the thoraco-dorsal artery, the intercostal arteries and the gluteal artery. In Cluj Napoca, the perforators were harvested and introduced in Glutaraldehyde 2.5% (for the electron microscopy study) or paraformaldehyde 4% (for light microscopy) and passed in their respective buffers after 12–18 hours. In Torino the samples were dehydrated, embedded in paraffin, cut and stained by Haematoxylin and Eosin and Masson's trichrome techniques (for the light microscopy) or postfixated in 1.5% osmium tetroxide, dehydrated, embedded in Glauert's resin mixture and cut using an ultramicrotome (for electron microscopy).

Results and conclusions: We consider that this type of study is ground-breaking for the future of microsurgery and our next step will be the analysis of perforators harvested from human cadavers and a comparative study regarding these types of perforators.

10.1177/1753193409106137

A0347 IS CARPAL TUNNEL DECOMPRESSION AN OFFICE PROCEDURE?

S. Beeharry
Hand Unit Hospital, Schweitzer Colmar 68000, France

Background: Carpal tunnel decompression is a very common procedure mostly accomplished under local anesthesia. Nevertheless most operations are carried out in hospitals in ambulatory units.

Aim: We set out to compare cases done in an office setting with a series done in a day surgery center. The office-based surgery practice met the necessary requirements.

Methods: In the year 2002 two hundred cases were performed in an office setting and compared with a series done in a hospital day unit. The same method of treatment was applied (one portal endoscopic release) in

both series. Patients, nurses and surgeon were questioned. Procedural cost was analysed with the method recommended by the federation of Ambulatory Surgical Centers.

Results: Patient and nurse's satisfaction were high. Cost was lower in the office facility. This is due to indirect and non productive labor cost. Surprisingly supplies and instruments were also cheaper. General expenses and payroll were equivalent.

10.1177/1753193409105983