

Hand surgery in Austria

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In the European history of hand surgery, Austria has an outstanding position. This has been earned by internationally well-known Austrians, who were dedicated to this specialty. Early of the twentieth century Austrian surgeons recognized that a specialized hand surgery education was essential to provide optimal care for hand injuries. The professional spirit and efforts have been continued by Austrian surgeons up to today.

Early contributors to hand surgery

Over centuries, some notable Austrian surgeons have contributed to hand surgery: Johannes Hartlieb (1400–1468) published the earliest German-written book of hand surgery '*Buch von der Hand*'. Simon Zeller (1746–1816) used a triangular dorsal flap to repair the interdigital space after syndactyly correction. Karl Langer von Edenberg (Ritter von Edenberg) (1819–1887) described *Spaltlinien der Haut (skin ridges)*. Wenzel Leopold Gruber (1814–1890), an anatomist, published numerous works on anatomical variations of the hand, including the *Martin-Gruber connection* (connection of the ulnar and median nerve at the forearm). Carl Nicoladoni (1847–1902) reconstructed the thumb with pollicization of toes and developed tendon transpositions. Robert Kienböck (1871–1953), a radiologist, described aseptic bone necrosis of the lunate. Ludwig Kirchmayr (1873–1928) developed a tendon suture technique in the hand, later known as *Kichmayr repair*. Arthur Steindler (1878–1959) performed biceps tendon plasty and tendon transposition in the hand. Lorenz Böhler (1885–1973) gained worldwide fame with his work on fracture treatment and emphasized the focused care for hand injuries. He was one of the most distinguished personalities in Austrian trauma surgery. Josef Ender (1915–1980) published on a plate of his design as well as on scaphoid plating. Otto Russe (1913–1983) performed scaphoid pseudarthrosis bone grafting.

In more recent decades, Jörg Böhler (1917–2005) completed a German translation of *Surgery of the Hand*, written by Bunnell and founded the *Wiener Handkurse* course series, that is still being held today. He was recognized as a Pioneer of Hand

Surgery by the International Federation for Societies for Surgery of the Hand in 2001. Ernst Scharizer (1922–2009) was an editor of the *Handchirurgie* (changed in 1983 into *Handchirurgie, Mikrochirurgie, Plastische Chirurgie*). Emil Beck (1931–2001) published on surgical treatment of Kienböck's disease, including transposition of a vascularized pisiform bone into the lunate bone. Hanno Millesi (1927–2017) played a key role in peripheral nerve surgery, and was a co-editor of the *Handchirurgie* and was recognized as a Pioneer of Hand Surgery in 1998. He was also a founding member of the Austrian Society of Hand Surgery (ÖGH). Hildegunde Piza-Katzer (1999–2008) focused on treatment of congenital hand deformities, and was recognized as a Pioneer of Hand Surgery in 2013. Sigurd Pechlaner, another founding member of the ÖGH, has had a main interest in wrist trauma and edited *Atlas of Hand Surgery*. He was recognized as a Pioneer of Hand Surgery in 2017.

Hand surgeons in the Medical University Innsbruck performed bilateral hand transplantations in 2000 for a patient injured by a bomb. The procedure was conducted by the Plastic and Reconstructive Surgery team led by Professor Piza-Katzer and the Trauma Surgery team led by Doz Pechlaner, together with the Department of Visceral, Transplant and Thoracic Surgery team led by Professor Margreiter. In Austria, four bilateral hand or forearm transplantations have been performed.

Austrian Society of Hand Surgery

In 1959, scientific meetings were established in Germany, mainly by Dieter Buck-Gramcko. The meetings led to the foundation of the German-speaking Society of Hand Surgery (DAH: Deutschsprachige Arbeitsgemeinschaft für Handchirurgie) in 1965. Founding members were from Germany, Austria and Switzerland and were Jörg Böhler, Dieter Buck-Gramcko, Walter Christ, Jürgen Geldmacher, Heinz Georg, Klaus Hellmann, Heinz Hoffmann, Hanno Millesi, Henry Nigst, Wolfgang Pieper, Wilhelm Schink, Claude Verdan, Albrecht Wilhelm and Gottlieb Zrubecki.

Evolving from the DAH, the Austrian Society for Hand Surgery (ÖGH: Österreichische Gesellschaft für Handchirurgie) was founded in 1990. Founding

members were the Austrian members of the DAH and included Hanno Millesi, Jörg Böhler, Heinz Kuderna, Sigurd Pechlaner, Andreas Pachucki and Emil Beck. The society started with 40 members and had grown to 283 members in 2017. The ÖGH is a member of the Federation of the European Societies for Surgery of the Hand (FESSH). Four Austrian hand surgeons have gained the FESSH Diploma.

Each ÖGH presidency lasts 3 years. A single re-election for another 3 years is possible. The society hosts a national annual scientific congress 'ÖGH Frühjahrsklausurtagung' in different locations. Since 2009, this annual meeting includes hand therapists, who organize their own society meeting (Österreichische Gesellschaft für Handtherapie, ÖGHT) (www.oeght.at). The combined congress represents close cooperation between hand surgeons and hand therapists in Austria.

Training of hand surgeons and educational activities

Becoming a hand surgeon in Austria requires a consultancy in orthopaedics and traumatology, plastic or general surgery. Since 2009, hand surgery is a recognized sub-specialty in Austria. Towards specialization, one needs a 3-year education in a certificated hand surgery centre and also a mentorship during this period by a registered hand surgeon. In addition, 150 credits have to be achieved through taking part in ÖGH meetings, or/and advanced training and graduation of hand and microsurgical courses. Three hundred surgical procedures in different disease categories have to be completed according to the FESSH Diploma guidelines. As of November 2017, 96 specialized hand surgeons are working in Austria.

In 1958, Jörg Böhler founded the *Wiener Handkurse*, where residents or consultants in different stages of their education could gain special knowledge of treatment of the hand during lectures and practice on cadavers. These courses are currently hosted by Wolfgang Hintringer and Martin Leixnering and are known far beyond Austrian borders. The courses now take place twice a year, including basic and advanced courses, a wrist course and a course designed for rheumatic conditions of the hand.

Every year a training course with international speakers is organized in Innsbruck by Markus Gabl and Rohit Arora. In addition, *The International Wrist Symposium* (www.unfallchirurgie-innsbruck.at) is held in Innsbruck, which is mainly directed at specialists. These events offer a theoretical but also a practical platform where the presented methods can be practised on cadaver specimens.

Microsurgical training courses are held each year in Vienna organized by Johannes Rois, Alexander Meznik and Friedrich Russe at the Hospital Allgemeine Unfallversicherungsanstalt – AUVA 'Unfallkrankenhaus Meidling'. Another institution for microsurgical training has been run in Linz by Oskar Kwasny, Heinz Brock and Georg Huemer, called *Mikrochirurgisches Ausbildungszentrum Linz – MAZ*. Many other specialized hand courses are offered throughout the year and are listed on the society website.

Major clinical practice

In 2017, among 272 medical units, four FESSH certified hand trauma centres took care of 8.8 million inhabitants of the country. In these centres, all hand trauma, including replantation, is treated by teams of qualified hand surgeons. These centres are Department of Trauma Surgery, Medical University Innsbruck, UKH Salzburg, Lorenz Böhler Trauma Center AUVA Vienna and Unfallkrankenhaus Wien-Meidling der AUVA. The four centres are evenly distributed geographically, with two in the eastern, one in the middle and one in the western part of the country.

Ordinary acute hand trauma is treated in every hospital by trauma surgeons. Specifically trained hand surgeons (with orthopaedic, plastic or trauma background) take care of more complex hand conditions, such as carpometacarpal arthritis, finger and wrist joint replacements, rheumatoid arthritis, carpal and wrist arthrodesis, fractures of the wrist and forearm, Dupuytren's contracture, secondary reconstruction of flexor and extensor tendons, hand and wrist tumours, nerve compression syndromes, microvascular surgery, Kienböck's disease, congenital hand problems, hand infections, wrist and forearm instability, ulna impaction syndrome and carpal and distal radioulnar joint instabilities.

Around 200,000 Austrians are affected by Dupuytren's contracture. The principal treatment is partial fasciectomy. Since 2011, treatment with collagenase is offered all over the country. To control the possible complications of the non-surgical treatment, the Austrian Society of Hand Surgery decided that only surgeons should use the collagenase because they have experience with surgery of the Dupuytren's disease and are capable of handling complications. A nationwide registry for application of collagenase and its outcomes was established by the Medical University Innsbruck and the Austrian Society of Hand Surgery in 2011. Up to now, more than 800 patients are registered in this system. The long-term results, the complications and the recurrence rate will be published soon.

Around 1% of Austria's population has rheumatoid arthritis. Hand surgeons with an orthopaedic background treat most of the cases. Generally, since the introduction of biologic agents, the incidence of surgical treatment is decreasing.

National statistics of hand trauma, insurance and prevention

The government insurances are mainly from four companies: general trauma insurance company; insurance for Austrian federal railway and coal organization; insurance for government employees; and insurance for farmers. Besides them, there are a few private insurance companies. In 2011, 6.1 million people had a public accident insurance (population in Austria at that time was 8.4 million).

In 2011, 109,408 industrial accidents occurred, 39% of which affected the hand. In total, 42,281 hand injuries occurred in Austria at work in 1 year.

The main injuries were wounds and superficial lesions followed by fractures, dislocations, spraining and distortions. Prevalent locations were the index finger, the thumb, the metacarpal region and the wrist. The main injury mechanism was contact with sharp or pointed objects like knives, cutters, syringes, needles, glass and steel sheets. The overall costs spent for hand injuries treatment were 285 million Euro. The average costs per injury were 6.670 Euro. These facts and costs led to the foundation of a committee for hand injury prevention, with representation from insurance companies, the medical community, government and industry. The Third European Hand Injury Prevention Congress took place in 2014 in Vienna.

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