Hand tendon injury

Introduction

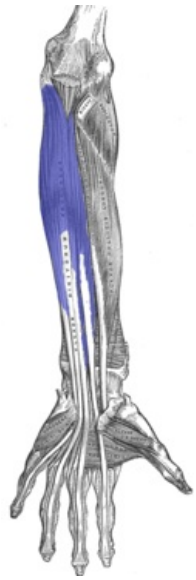
Hand tendon injuries are divided into blunt and sharp (sharp are more common). A healthy tendon rarely ruptures (it can tear from its attachment or tear off a bone fragment with attachment). Only a degeneratively changed tendon is subject to blunt trauma. Sharp injuries are usually injuries with a knife, saw, ax, etc. In accidents with a drill, complicated injuries occur, when the tendon can twist on the drill and tear it out.

Injuries to the tendons of the hand are classified as injuries to the **extensor** and **flexor** parts of the hand.

Principles of treatment of flexor tendons

Surgical anatomy of the flexor system

Three-jointed fingers have two flexor tendons. **The surface flexor** attaches to the middle part of the middle link. **Deep flexor** on the distal link. Both flexors run on the fingers in an osteofibrous canal, which consists of a tendon sheath and a system of loops (five are annular and three are oblique). Only three loops fix the thumb. The area between the proximal interphalangeal joint (PIP) and the distal palmar groove is called the "nobody's zone" (healing in this area is complicated by poor nutrition of the tendon and more frequent adhesions with surrounding tissues).



Deep flexor with attachment to the distal joints of the 2nd to 5th finger

Classification of flexor tendon injuries according to location (according to Kleinert, who defined five zones for the fingers and five zones for the thumb in 1980)[1]:

Three-jointed fingers:

- Zone 1 – distal to the PIP joint
- Zone 2 – from the PIP joint to the distal palmar groove (“nobody’s zone”)
- Zone 3 – from the distal palmar groove to the distal edge of the carpal tunnel
- Zone 4 – carpal tunnel (contains m. flexor carpi radialis, m.flexor pollicis longus, superficial and deep finger flexors)
- Zone 5 – proximal to the carpal tunnel. It has three layers: **superficial** (m. pronator teres, m. flexor carpi radialis, m. palmaris longus a m. flexor carpi ulnaris); **medium** (m. flexor digitorum superficialis) and **deep** (mm. flex. digitorum prof., m. pollicis longus, m. pronator quadratus).

Inch:

- Zone T1 – distal to the IP joint
- Zone T2 – IP joint – thenar groove
- Zone T3 – thenar groove – distal edge of the carpal tunnel
- Zone T4 and T5 (same as zones of three-jointed fingers)

Diagnostics

Clinical differentiation of a deep or superficial flexor injury (or a combination thereof) is important. When **the deep flexor** is injured, the ability to flex the distal joint during fixed extension of the middle joint of the finger is impaired. In the **case of a violation of the superficial flexor** failure of the flexion of the injured finger in extension is confirmed (= elimination of the deep flexor). When **both flexors are injured** the ability of active flexion in the distal and proximal interphalangeal joints (DIP and PIP) is lost, while flexion is preserved in the base joint (due to the influence of the lumbrical and interosseous muscles).

Therapy

The therapy of the injured tendon is surgical. The suture is performed with atraumatic suture material with a long absorption time (Prolen, Promilen 3-0, 4-0, for suturing 5-0, 6-0). The suture technique according to Kessler, Tsuge, Kleineter is used. The most widespread technique is Bunell's, but it limits the nutrition of the tendon. In the case of a tendon injury, when it is not possible to bring the injured ends together, a Z plastic can be performed - lengthening the tendon at the cost of narrowing it in half, or by bridging the damage by free transfer of the tendon (removal from the palmaris longus and plantaris muscles). Timely suturing of the tendon is important. Delaying the suture leads to shortening of the tendon stumps and fibrous changes in its sheath. Equally important is rehabilitation and follow-up treatment. It is a passive movement of the tendon in the fibrous canal (using, for example, a dynamic splint according to Kleinetra), to prevent fusion of the tendon with the surrounding area. Tendon remodeling lasts until *8th to 9th week* . .[2]

Principles of treatment of extensor tendons

There are statistically fewer sharp injuries of extensors than flexors.

Surgical anatomy of the extensor system

The important function of the extensors is mainly performed by the **interosseous** and **lumbrical** muscles.

Interosseous muscles are formed by several muscle bundles of different lengths. They start on the sides of the metacarpals on the palmar and dorsal sides. They are innervated through n. ulnaris. Dorsal interosseous muscles act as finger abductors and palmar as adductors. According to attachment, we divide them into deep and superficial.

Lumbrical muscles depart from m. flexor digitorum profundus. They are located under the aponeurosis palmaris and radiate to the aponeurosis dorsalis of the three-jointed fingers. They function as stabilizers of the metacarpophalangeal joint (MP joint) and also as extensors of the distal joint. They form an active diagonal system between flexors and extensors in the proximal part of the finger.

Classification of injuries:

- hammertoe – tearing of the distal attachment of the extensor manifested by persistent flexion in the DIP joint when attempting to extend the finger (a common sports injury)
- the so-called **buttonholes** (buttonholes) – interruption of the middle extensor band and there is hyperextension of the DIP joint and paradoxical flexion in the PIP joint
- injury of m. extensor pollicis longus
- injury in the area of the MP joint

Therapy

Sharp injuries are treated surgically with the same technique as flexors. After suturing, the wrist is fixed in dorsiflexion and semiflexion in the finger joints. *Hammer toe* can be treated conservatively on a splint in hyperextension of the DIP joint and in semiflexion of the PIP joint. After three weeks, the PIP joint is released and the fixation of the DIP joint is left for another 3 weeks.[2] A *buttonhole* type injury can be treated conservatively with finger splint immobilization in extension of both IP joints for six weeks.

Links

Resources

- POKORNÝ, Vladimír. *Traumatologie.* 1. edition. Triton, 2002. 307 pp. ISBN 80-7254-277-X.
- VIŠŇA, Petr – HOCH, Jiří. *Traumatologie dospělých.* 1. edition. Maxdorf, 2004. 157 pp. ISBN 80-7345-034-8.

References

1. POKORNÝ, Vladimír. *Traumatologie.* 1. edition. Triton, 2002. 307 pp. ISBN 80-7254-277-X.
2. VIŠŇA, Petr – HOCH, Jiří. *Traumatologie dospělých.* 1. edition. Maxdorf, 2004. 157 pp. ISBN 80-7345-034-8.