Open Extensor Tendon Injuries

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Learning Objectives

- Summarize the anatomy of the extensor mechanism.
- Discuss the various zones and epidemiology of extensor tendon injuries.
- Assess the clinical presentation and evaluation of extensor tendon injuries.
- Detail the treatment for each extensor tendon injury by zones.
- Define the complications and rehabilitation following surgical treatment of extensor tendon injuries.

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The extensor tendons in the dorsum of the hand lie relatively superficially, making open injuries to the extensor mechanism a common source of morbidity. These injuries can range from simple clean lacerations to complex open injuries associated with severe skin and soft tissue loss. Although many advances in the treatment of tendon injuries focused on the flexor tendon, the extensor tendon has begun to receive more attention in recent literature. Knowledge of modern repair techniques and rehabilitation protocols may improve patient outcomes. This Current Concepts article summarizes the treatment of open extensor tendon injuries with a focus on the recent literature. *(J Hand Surg Am. 2015;40(2):391–397. Copyright © 2015 by the American Society for Surgery of the Hand. All rights reserved.)*

Key words Extensor tendon, tendon repair, tendon reconstruction.

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ANATOMY AND CLASSIFICATION

At the level of the forearm, the extrinsic extensor tendons can be divided into deep and superficial groups based on the relative position of their muscles bellies. The superficial group includes the extensor carpi radialis longus and brevis (ECRL and ECRB), the extensor digitorum communis (EDC), the extensor digiti minimi (EDM), and the extensor carpi ulnaris (ECU) muscles. The deep group includes the abductor pollicis longus (APL), the extensor pollicis brevis (EPB), the extensor pollicis longus (EPL), and the extensor indicis proprius (EIP) muscles.[1]

The extensor tendons enter 6 separate fibro-osseous compartments at the level of the wrist formed by the distal radius and extensor retinaculum and are numbered from radial to ulnar. The first dorsal compartment contains the APL and EPB tendons. The second includes the ECRL and the ECRB tendons, with the latter lying more ulnar. The third compartment, located just ulnar to Lister tubercle, includes the EPL tendon. The fourth contains the EDC and EIP tendons. Distally, the EIP tendon is ulnar to the EDC of the index finger at the level of the index metacarpophalangeal (MCP) joint.[1] The fifth compartment holds the EDM tendon whereas the sixth contains the ECU tendon. An absent EDC tendon to the little finger is common, and the EDM tendon is often doubled.[1]

At the base of the finger, the extrinsic tendon passes over the MCP joint and trifurcates over the proximal phalanx. The central portion continues on as the central slip and inserts at the base of the middle phalanx. The lateral slips of the extrinsic extensor tendon merge with contributions from the interosseous on both sides and lumbrical muscles on the radial side to form the lateral bands. The conjoined lateral bands then join dorsally and insert at the base of the distal phalanx to form the terminal portion of the extensor tendon (Fig. 1).[2]

Several important retinacular ligaments stabilize the distal portion of the extensor mechanism. At the middle phalanx lies the triangular ligament that stabilizes the 2 lateral bands dorsally and prevents their volar subluxation when the proximal interphalangeal (PIP) joint is flexed. The oblique retinacular ligaments originate from the volar portion of the proximal phalanx and the flexor tendon sheath to insert into the terminal tendon and help to link PIP and distal interphalangeal (DIP) joint motion. Finally, the transverse retinacular ligaments originate from the volar plate on each side of the PIP joint and insert into the lateral bands, preventing their dorsal migration during finger extension (Fig. 1).

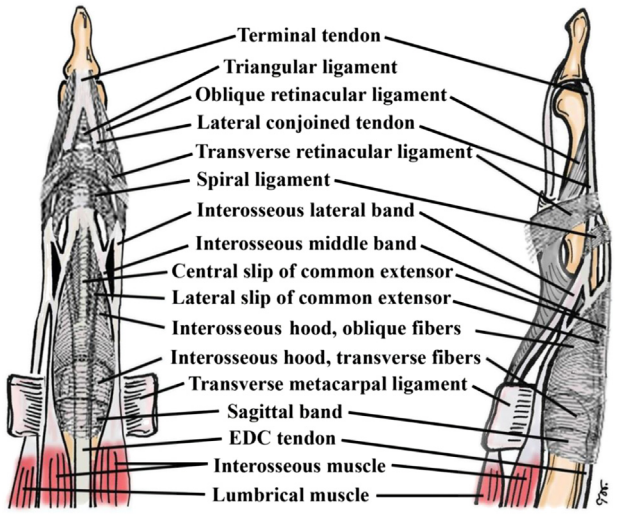

FIGURE 1: Dorsal and lateral views of the extensor apparatus. (Reprinted with permission from Lattanza L, Lam J. Extensor tendon injuries. In: Trumble T, Budoff J, eds. *Hand Surgery Update IV*. Rosemont, IL: American Society for Surgery of the Hand; 2007:360. Copyright © 2007 American Society for Surgery of the Hand.[15])

Kleinert and Verdan[3] divided the extensor mechanism of the hand, wrist, and forearm into 8 zones (Fig. 2). Zone I extends from the base of the nail to middle portion of the middle phalanx and includes primarily the DIP and the terminal tendon. Zone II is over the middle phalanx. Zone III involves the PIP joint, and zone IV the proximal phalanx. Zone V contains the MCP joint, and zone VI the metacarpals. Zone VII covers the carpus and extensor retinaculum whereas zone VIII includes the distal one third of the forearm to the musculotendinous junction. Zone IX refers to the remaining muscles. The thumb is classified differently, with TI involving the interphalangeal joint, TII the proximal phalanx, TIII the MCP joint, TIV the metacarpal, and TV the carpus.[1]

Epidemiology

Patillo and Rayan[4] published an epidemiologic study of 86 patients with 125 open extensor tendon injuries. The patients were predominantly men (83%) with a mean age of 34.2 years, and the dominant hand was injured more commonly (60%). Injuries to the thumb were most frequent, followed by those to the index finger. Laceration with a sharp object was the most common mechanism of injury; saw injuries were second. Sharp tendon injuries tended to occur proximal to the MCP joint whereas saw injuries were typically distal to this joint. As expected, saw injuries as well as crush/avulsion injuries had concomitant