

## Reconstruction of Hand Extensor Tendon Injuries

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### ABSTRACT

Surgical intervention is required for the treatment of hand tendon injuries, which include both open and blunt traumas, and mainly impact the flexor tendons. These injuries are significant and require skillful surgical intervention. Both sorts of injuries are discussed in this article, with a particular emphasis placed on the crucial need of timely detection and adequate treatment. In order to guarantee a correct evaluation, diagnostic technologies such as ultrasonography and magnetic resonance imaging (MRI) play a crucial role. Consistent initial therapy and attentive followup, with an emphasis on collaborative efforts between the surgeon and the patient, are essential to achieving successful outcomes. The comprehensive rehabilitation process is not complete without the incorporation of occupational therapy and physiotherapy into the treatment schedule.

**KEYWORDS:** Hand injuries, tendon injuries, flexor tendons, surgical intervention

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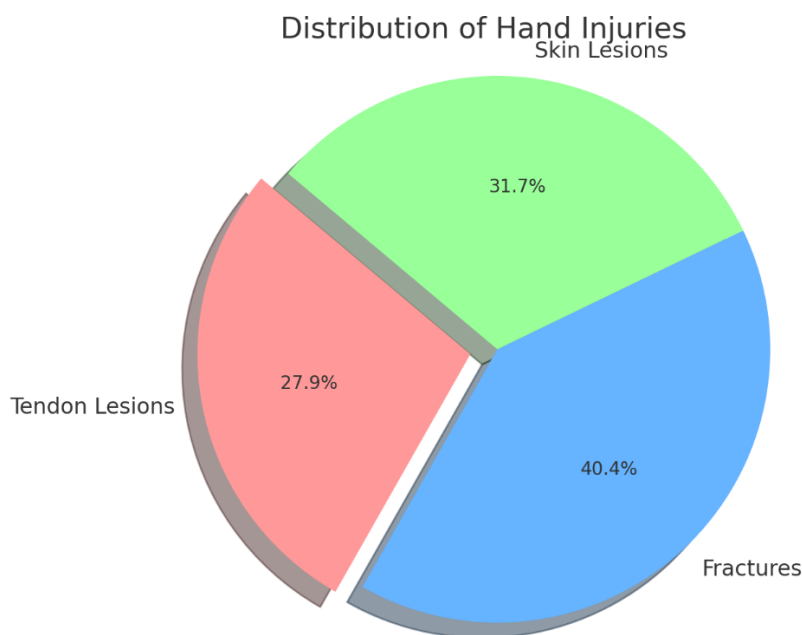
### INTRODUCTION

Injury to the tendon is the second most common form of hand injury, and it is of great relevance in both the context of trauma and the context of orthopedics. Despite the fact that the majority of these injuries involve open damage to either the flexor or extensor tendons, it is important to not neglect less common occurrences such as injuries to the tendon sheath and pulley or blunt avulsions. In recent years, the clinical examination, in conjunction with the use of ultrasonography and magnetic resonance imaging, has become an essential component of the diagnostic process. When it comes to tendon injuries, surgical intervention is frequently necessary; however, conservative therapy is a possible alternative for dull avulsions that involve the extensor tendon of the distal phalanges. In the event of injuries to the flexor tendon sheath or isolated pulley injuries, conservative therapy is often utilized, however surgical repair is strongly recommended for instances that involve numerous pulley injuries. The early commencement of passive movement is a crucial concept that should be followed throughout the postoperative period of flexor tendon injuries.

This approach is intended to encourage "intrinsic" tendon repair, which will ensure good results. There are a number of drugs that have been investigated for their ability to improve tendon healing; however, the proof of their effectiveness is still limited. Hyaluronic acid, on the other hand, has demonstrated some potential in facilitating the repair of intrinsic tendon. The hand, which is the principal instrument for human activity in both professional and recreational contexts, is always susceptible to accidents and strain because of its primary function. Despite the fact that society has shifted from an industrial to a service-oriented structure, there has not been a discernible decrease in the number of hand injuries. This might be ascribed to an increase in the number of people participating in personal activities such as sports and do-it-yourself projects. For the most part, hand injuries account for between 14 and 30 percent of all cases that require emergency medical treatment. Tendon lesions come in second place with 29 percent, followed by fractures with 42 percent, and skin lesions come in third place with 33 percent. Hand injuries, particularly tendon lesions, have a considerable impact on orthopedic and traumatic therapies, despite the fact

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that only 2% of patients require hospitalization for their injuries. Moreover, degenerative lesions are something that should be taken into consideration in this context.



**Figure 1. Distribution of Hand Injuries**

### Hand extensors

Four common extension tendons, also known as extensores digitorum communes, are located within the elongated fingers. Additionally, the extensor indices for the second finger and the extensor digiti minimi for the fifth finger are also located within the fingers. While the tendon of the extensor digiti minimi travels via the fifth tendon compartment, the tendon of all other tendon compartments goes through the fourth compartment. Numerous cross-connections, also known as connexi intertendinei, may be seen at the dorsum of the hand as well as at the

metacarpophalangeal joints. At the level of the proximal interphalangeal joint (PIP), the extensor tendon splits into three parts: two lateral reins, one central rein, and the tractus intermedius. The thumb is equipped with two unique extensor tendons: the extensor pollicis longus, which is located in the third extensor compartment, and the extensor pollicis brevis, which is located in the first extensor compartment. The muscles that originate proximally to the hand itself are the ones that are responsible for these tendons, which are collectively referred to as the extrinsic system.



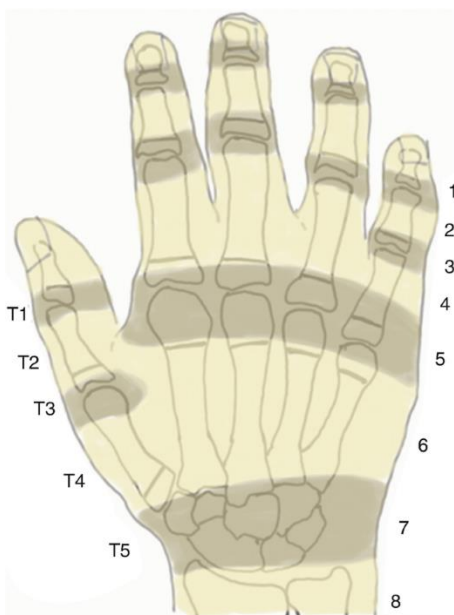
**Figure 2. Extensor digitorum communis**

In addition to the extrinsic system, there is also the intrinsic system, which is comprised of muscles that originate from within the hand. These muscles include the lumbrical muscles, the interosseous muscles, as well as the thenar and hypothenar muscles.

A stack splint can be used to manage blunt injuries that result in the disruption of the extensor tendons of the distal interphalangeal joint (DIP) region, also known as "mallet finger" (Verdan Zone 1), in a conservative manner. This is the

case if the injury involves only a partial rupture and the collateral fibers of the "Landsmeer ligaments" (lig. retinaculare obliquum) are intact. When there is an extension deficit that is greater than 45 degrees, surgical intervention, which is comparable to when open injuries occur, becomes essential. When hyperextension is present, the use of wire fixation that is entirely percutaneous is no longer suggested. Instead, osteosynthesis procedures such as screws, tension bands, or K-wiring are utilized to treat "mallet" fractures.

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**Figure 3. Verdan zones of the hand**

**To properly repair extensor tendons, it is essential** to take into account the special anatomical properties of these tendons. As the muscular component moves further away from the tendon, the diameter of the tendon grows flatter. As a consequence of this, the conventional suturing methods that are utilized in the repair of flexor tendon, which include a central suture and the circular fine adaptation of fibers, are not appropriate. It is recommended that a Z-shaped incision be extended from the wound in order to treat open injuries. Because of the tendon's width, it is necessary to use many U-

shaped sutures, which may be reinforced with fine adaption sutures using PDS (5-0, 6-0).

It is recommended that the suture be secondary stabilized with a temporary K-wire arthrodesis (diameter 0.8-1.0 mm) for treating injuries to the tractus intermedius (PIP joint) and extensor tendons at the DIP joint level. This should be done after six weeks of immobilization in a neutral posture. Instead of inserting the wire longitudinally through the fingertip, the wire is first entered diagonally to the joint region in order to prevent the spread of germs



**Figure 4. Extensor repair in zone IV**

In the present moment, the utilization of the "Lengemann wire suture" is not suggested. Isolation in the intrinsic plus position is required for patients who have sustained damage to their hand extensor tendons. It is necessary to stabilize the articular capsule and administer the proper therapy for injuries that occur simultaneously to the finger joints. Subluxations and dislocations of extensor tendons at the metacarpophalangeal (MCP) joint level are frequently discovered at a later stage. These conditions may necessitate surgical correction or,

alternatively, plastic restoration. Osteophytic irritations of the extensor tendons, often known as the "extensor hood syndrome," are normally something that can be addressed in a conservative manner.

### Final Thoughts

When it comes to injuries to the tendons of the hand, whether they are caused by open or blunt trauma, injuries that specifically affect the flexor tendons are important and require the care of a skilled surgeon. When it comes to

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injuries, both blunt and open wounds require rapid detection and treatment that is suitable. Use of ultrasound and magnetic resonance imaging (MRI) can give useful diagnostic insights in situations when there is doubt. The beginning of initial therapy that is both consistent and successful is essential to the achievement of a good overall outcome, and the provision of appropriate aftercare is also of utmost importance. It is necessary for the surgeon and the patient to work together in order to get the best possible outcome, with a particular emphasis on the significance of physiotherapy and occupational therapy in the healing process.

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