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Hand Extensor Apparatus Injuries, a Review

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ABSTRACT

Hand tendon injuries, comprising both open and blunt traumas, particularly affecting the flexor tendons, are substantial and necessitate skilled surgical intervention. This article emphasizes the critical importance of prompt identification and appropriate treatment for both types of injuries. Diagnostic tools such as ultrasound and MRI play a pivotal role in ensuring accurate assessment. Successful outcomes rely on consistent initial therapy and meticulous aftercare, emphasizing collaborative efforts between the surgeon and the patient. The integration of physiotherapy and occupational therapy is integral to the comprehensive recovery process.

KEYWORDS: hand injuries, tendon injuries, flexor tendons, surgical intervention, diagnostic tools, ultrasound, MRI, initial therapy, aftercare, physiotherapy, occupational therapy, collaborative approach.

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INTRODUCTION

Tendon injuries represent the second most frequent type of hand injuries, holding significant importance in both trauma and orthopedic contexts. While a majority of these injuries involve open damage to either the flexor or extensor tendons, less common occurrences such as injuries to the tendon sheath and pulley or blunt avulsions should not be overlooked [1]. Clinical examination, complemented by ultrasound and magnetic resonance imaging, has emerged as crucial in the diagnostic process [2]. Surgical intervention is often required for tendon injuries, with conservative treatment being a viable option for dull avulsions affecting the extensor tendon of the distal phalanges [3]. Conservative management is typically employed for injuries to the flexor tendon sheath or isolated pulley injuries, while surgical repair is favored for cases involving multiple pulley injuries. In the postoperative phase of flexor tendon injuries, early initiation of passive movement is a fundamental principle to stimulate "intrinsic" tendon healing, ensuring favorable outcomes. Various substances have been explored for their potential to enhance tendon healing, although the evidence remains limited. Nonetheless, hyaluronic acid shows promise in promoting intrinsic tendon healing [4].The hand, serving as the primary tool for human activities in both professional and recreational settings, is constantly vulnerable to injuries and strain [5]. Despite the societal shift from an industrial to a service-oriented structure, there hasn't been a noticeable reduction in hand injuries, potentially attributed to increased engagement in personal activities like sports and DIY projects. On average, hand injuries constitute 14% to 30% of all emergency care cases, with tendon lesions ranking second (29%), fractures leading (42%), and skin lesions following as the third most common. Although only 2% of patients require hospitalization, hand injuries, particularly tendon lesions, significantly influence orthopedic and traumatic treatments. Additionally, degenerative lesions must be considered in this context [6].

Figure 1. Posterior view of extensor tendons of right hand

Extensors injuries

The elongated fingers house four common extension tendons known as extensores digitorum communes, along with the extensor indices for the 2nd finger and the extensor digiti minimi for the 5th finger [7]. The extensor digiti minimi's tendon travels through the 5th tendon compartment, while all others pass through the 4th compartment [8]. At the dorsum of the hand and the metacarpophalangeal joints, numerous cross-connections, or connexi intertendinei, are present [1, 9]. At the level of the proximal interphalangeal joint (PIP), the extensor tendon divides into two lateral reins and one central rein (tractus intermedius). Two distinct extensor tendons extend to the thumb: the extensor pollicis longus (3rd extensor compartment) and the extensor pollicis brevis (1st extensor compartment) [10]. These tendons, collectively known as the extrinsic system, belong to muscles originating proximally to the hand itself [1, 9].

The extrinsic system is complemented by the intrinsic system, consisting of muscles originating within the hand, including the lumbrical muscles, interosseous muscles, and the thenar and hypothenar muscles [11].

Blunt injuries leading to the disruption of the extensor tendons of the distal interphalangeal joint (DIP) region, commonly known as "mallet finger" (Verdan Zone 1), can be managed conservatively using a stack splint if the injury involves only a partial rupture with intact collateral fibers of the "Landsmeer ligaments" (lig. retinaculare obliquum). Surgical intervention, similar to open injuries, becomes necessary when there is an extension deficit exceeding 45°. The use of purely percutaneous wire fixation in hyperextension is no longer recommended, and instead, "mallet" fractures are addressed through osteosynthesis techniques like screws, tension band, or K-wiring [12, 13].

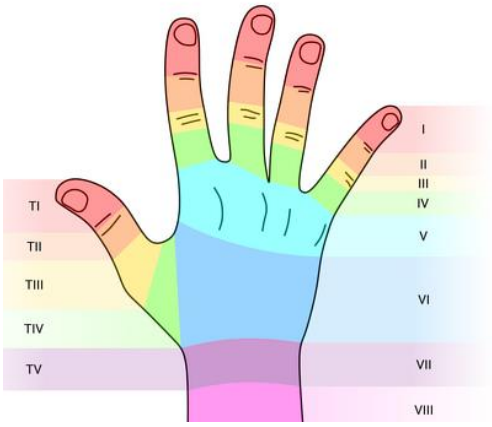

Figure 2. Verdan zones

In repairing extensor tendons, it's crucial to consider their specific anatomical characteristics [14, 15]. As the muscular part becomes more distal, the tendon diameter flattens. Consequently, traditional suturing techniques used in flexor tendon repairs, involving a central suture and circular fine adaptation of fibers, are not applicable. For open injuries, a Z-shaped incision should be extended from the wound, and due to the tendon diameter, several U-shaped sutures are employed, optionally supplemented with fine adaptation sutures using PDS (5-0, 6-0) [16].

When addressing injuries to the tractus intermedius (PIP joint) and extensor tendons at the DIP joint level, the suture should be secondarily stabilized with a temporary K-wire arthrodesis (diameter 0.8-1.0 mm) (with 6 weeks of immobilization in a neutral position). The wire is inserted diagonally to the joint space to avoid bacterial transmission, rather than longitudinally through the fingertip [1, 9].

The use of the "Lengemann wire suture" is currently not recommended. Hand extensor tendon injuries necessitate immobilization in the intrinsic plus position. Concurrent injuries to finger joints require appropriate treatment, and the articular capsule must be secured. Subluxations and dislocations of extensor tendons at the metacarpophalangeal (MCP) joint level are often identified later and may require surgical repair or, alternatively, plastic reconstruction. Osteophytic irritations of the extensor tendons, referred to as the "extensor hood syndrome," can typically be managed conservatively [16].

CONCLUSION

Injuries to the tendons of the hand, whether caused by open or blunt trauma, particularly affecting the flexor tendons, are significant and warrant the attention of a proficient surgeon. Both blunt and open injuries require prompt identification and appropriate treatment. In cases of uncertainty, the use of ultrasound and MRI can provide valuable diagnostic insights. The initiation of consistent and effective initial therapy is crucial for achieving a favorable overall outcome, and proper aftercare is equally vital. A collaborative approach between the surgeon and the patient is essential, emphasizing the importance of physiotherapy and occupational therapy in the recovery process.

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