

Recent advance

# Treatment of chronic extensor tendons lesions of the fingers

## *Prise en charge secondaire des lésions de l'appareil extenseur des doigts*

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### Abstract

Chronic finger extensor apparatus injuries are the result of the initial acute treatment having failed or being flawed. Because of their chronic nature, these injuries present various amounts of tendon retraction, tendon callus lengthening, peritendinous scar adhesions, static and dynamic imbalances with the flexor apparatus and intrinsic muscles, and joint contractures. This article will review the anatomy of the extensor mechanism and then will outline by location, the various clinical pictures that are secondary to chronic tendon injury. The clinical presentation of these injuries can be highly variable but their symptomatology and treatment are very specific. Of the possible therapeutic strategies for chronic mallet finger with or without associated swan-neck deformity, chronic boutonniere deformity, chronic sagittal band injuries, old ruptures on the dorsum of the wrist and traumatic defects in multiple tissues, conservative treatment is often the main element. Secondary surgical repair is not free of complications, and the results are often lacking. Rehabilitation and orthotic bracing are an integral part of the management of these injuries, no matter which treatment method is being considered.

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*Keywords:* Finger extensor tendon; Secondary repair; Mallet finger; Swan-neck deformity; Boutonniere deformity; Traumatic injury; Tendon laceration

### Résumé

Les lésions anciennes de l'appareil extenseur des doigts résultent du défaut ou de la faillite de leur traitement initial au stade aigu. Les conséquences de la chronicité des lésions entraînent à des degrés divers des rétractions tendineuses, des allongements de cals tendineux, des adhérences cicatricielles péri-tendineuses, des déséquilibres statiques et dynamiques avec l'appareil fléchisseur et les muscles intrinsèques, ainsi que des raideurs articulaires. Cet article fait un rappel de l'anatomie de l'appareil extenseur et des différents tableaux cliniques consécutifs à une lésion tendineuse ancienne selon le siège de la lésion. Les présentations cliniques peuvent être très variées et leur sémiologie ainsi que leur traitement sont spécifiques : doigt en maillet chronique avec ou sans déformation associée en col de cygne, déformation en boutonnière chronique, lésion chronique des bandelettes sagittales, ruptures anciennes au dos du poignet ainsi que les lésions avec perte de substance pluritissulaire répondent à des stratégies thérapeutiques dans lesquelles le traitement orthopédique trouve souvent une large part. Les réparations chirurgicales secondaires ne sont pas dénuées de complications et leurs résultats sont le plus souvent incomplets. La rééducation et l'appareillage sont indissociables de la prise en charge de ces lésions, quelle que soit la méthode thérapeutique envisagée.

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*Mots clés :* Tendon extenseur des doigts ; Réparation secondaire ; Doigt en maillet ; Déformation en col de cygne ; Déformation en boutonnière ; Lésion traumatique ; Rupture tendineuse

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## 1. Introduction

Chronic injuries of the finger extensor apparatus are the result of an open (laceration, defect) or closed (rupture, instability) initial injury that was either not treated or not treated properly. This may have happened because the injury was missed, the initial treatment was inappropriate, the treatment duration was too short or too long, or because the initial treatment failed, despite being well-conducted. Once chronic, the tendon injury is associated with varying amounts of tendon retraction, tendon callus lengthening, peritendinous scar adhesions, static and dynamic imbalances with the flexor apparatus and intrinsic muscles, and joint contractures. Manifestation of these injuries, which is closely related to their location and therefore the anatomy and physiology of the extensor mechanism, leads to highly varied clinical pictures that have equally varied functional consequences. Based on the significance of the latter, each clinical picture will have specific symptomatology and respond to specific treatment.

## 2. Anatomy of extensor mechanism

### 2.1. Anatomy at the forearm and hand

#### 2.1.1. Standard configuration

The standard configuration of the finger extensor apparatus (not including the thumb) consists of a common extensor tendon for each finger and individual extensor muscles for the second and fifth finger (Fig. 1). In the forearm, about 4 cm from the wrist joint, the individual extensor tendons for each finger split from the common extensor digitorum (ED) muscle body (also known as the extensor digitorum communis). For the fifth finger, a single tendon arises from the muscle body of the extensor digiti minimi (EDM), which is also known as the extensor digiti quinti. For the second finger, the deep extensor indicis proprius (EIP) has muscle fibers that reach the wrist joint in 70% of cases [1].

On the dorsum of the distal radius and the radiocarpal joint, the extensor tendons – surrounded by a synovial sheath – enter into a narrow osteofibrous canal that is compartmentalized by septums and has a roof formed by the extensor retinaculum. The tendon's excursion is the greatest at this point (up to 41 mm). The 25-mm long fourth extensor compartment contains the ED and EIP. The slightly longer fifth compartment is a fibrous canal that runs over the top of the distal radioulnar joint. It only holds the EDM. The synovial sheath has a single proximal recess, 5 mm proximal to the proximal edge of the retinaculum. It terminates beyond the distal edge of the retinaculum by a recess around each tendon, with the longest one being on the ulnar side. The extensor retinaculum holds the extensor tendons against the skeleton during wrist extensor, preventing tendon bow stringing.

On the dorsum of the hand, the tendons diverge and are no longer cylindrical; they become flatter as they get closer to the metacarpophalangeal (MCP) joints. The extensors for the middle and ring fingers run over the third and fourth metacarpals. Those of the index and little fingers run over

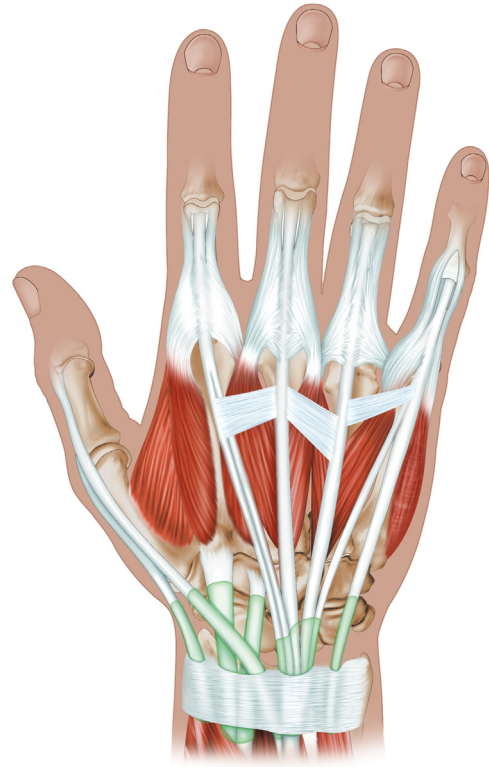


Fig. 1. Diagram of the finger extensor apparatus on the dorsum of the wrist and hand.

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the second and fourth intermetacarpal spaces. The common extensor tendons are held together by fascia, which can be reinforced in the distal metacarpal region by oblique or transverse links called intertendinous connections. The distribution of these intertendinous connections varies as does their constitution (tendon, ligament, fascia). The most common, most defined and thickest join the extensor of the middle finger to that of the fourth finger in 73% to 80% of cases [2,3]. Conversely, the one joining the common extensor of the index to that of the middle finger is rarer and thinner. The intertendinous connection joining the fourth finger's extensor to that of the fifth finger is often formed by a division of the latter's common extensor tendon. The EIP and EDM, which are located on the ulnar side of the common extensor of the respective finger, generally do not have any intertendinous connections. Intertendinous connections help to stabilize the extensor tendons on the back of the metacarpal heads when the MCP joints are flexed or laterally deviated. They can participate in finger extension in certain types of anatomical variations.

#### 2.1.2. Anatomical variations

The greatest anatomical variations in the finger extensor apparatus are in the area between the forearm and dorsum of the hand. These consist of varied intertendinous connections, absence of the fifth finger's common extensor tendon, tendon splitting, or presence of extra muscles or tendons such as the extensor medii proprius, extensor indicis and medii, extensor

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