# Extension Block Technique in Treatment of Bony Mallet Finger

Thesis

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# Abstract

The results of extension block Kirschner wire fixation for the treatment of mallet fractures of the distal phalanx were retrospectively assessed in 22 consecutive patients. The indications for this technique were the presence of a large bone fragment, and palmar subluxation or the loss of joint congruity of the distal interphalangeal joint. Using the Wehbé and Scheider classification there were 18 patients type I (82 %) with 8 cases (36 %) of subtype A and 10 cases (46 %) of subtype B, and there were 4 cases were type II (18 %) with 3 cases (13 %) of subtype A and 1 case (5 %) of subtype B fractures. According to the Crawford rating system there were seven cases (32 %) with excellent evaluation while 13 cases (59 %) were good and another two cases (9 %) were poor results. We believe that this technique, when properly applied, produces satisfactory results.

*Key word*

*Bony mallet_ Termina Extensor tendon_ Extension block*

# Abbreviations

- AP……. Anteroposterior
- AVN……. Avascular necrosis
- DIP·····Distal intephalangeal
- EDC……. Extensor digitorum communis
- EPL…….. Extensor pollicis longus
- FDP…….. Flexor digitorum profundus
- HD…… Hand dominance
- I……. Index finger
- IP…….. Interphalangeal
- K-wire…….. Kirschner wire
- L…… Little finger
- M……... Middle finger
- MCP ……..... Metacarpophalangeal
- ND…… Non dominant
- ORIF……. Open reduction and internal fixation
- PIP……... Proximal intephalangeal
- PTI……. Pin tract infection
- R…… Ring finger

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# Introduction

Mallet finger is a common injury involving either an extensor tendon rupture at its insertion or an avulsion fracture involving the insertion of the terminal extensor tendon. It is usually caused by a forceful blow to the tip of the finger causing sudden flexion or a hyperextension injury. Fracture at the dorsal aspect of the base of the distal phalanx is commonly associated with palmar subluxation of the distal phalanx. The most common mechanisms of injury of tendons include lacerations, avulsions and crush injuries [(1)].

Different methods have been used to treat mallet fractures. As non-surgical treatment as splinting in extension may cause secondary degenerative arthritis, loss of movement, and poor cosmetic outcomes, where accurate reduction of the articular surface and stable fixation by surgery have been recommended [(1, 2)].

Indications for surgery are a mallet fracture involving more than one-third of the articular surface or palmar subluxation of the DIP joint or loss of joint congruity of the distal interphalangeal joint or an extension lag of more than 30° [(2, 3)].

Surgical methods include DIP joint pinning, tension band wiring, extension block pinning, compression pin fixation, and screw fixation. Among these, extension block pinning, introduced by Ishiguro et al. [(4)], in 1997 is considered to be an effective and convenient technique that is commonly used [(2)].

Many surgeons who think that surgery should be considered; acknowledge that most of the open surgical techniques are somewhat

hazardous with complication that include infection, nail deformity, osteomyelitis, scar formation [5].

Extension-block K-wire fixation for acute mallet fracture is based on two sound orthopedic principles: stable arc splinting and early protected motion and though is considered a simple and useful method to obtain anatomic reduction of mallet fractures [5, 6].

# Aim of the work

The study is targeting at the evaluation of the functional outcome after extension block K-wire Fixation of bony mallet finger and determining the factors on which the results depend upon.

# Related Anatomy

## *A. Osteology:*

Each hand has 14 phalanges, which are similar. All have secondary ossification centers at their bases. Bases of the proximal phalanges are oval and concave, with the smaller heads ending in two condyles. Middle phalanges have two concave facets at their bases and pulley-shaped heads. Distal phalanges are smaller and have palmar ungual tuberosities distally [(7)].

## *B. Arthrology:*

Interphalangeal joints are hinge joints, with capsules and obliquely oriented collateral ligaments [(7)].

## *C. Anatomy*

The extensor tendons originate from the finger extensor muscle bellies which are inervated by branches from either the radial nerve or the posterior interosseous [(8)].

Extensor digitorum communis arises from the lateral epicondyle of the humerus, by the common tendon; from the intermuscular septa between it and the adjacent muscles, and from the antebrachial fascia. It divides below into four tendons, which pass together with that of the extensor indices proprius, through a separate compartment of the dorsal carpal ligament, within a mucous sheath. The tendons then diverge on the back of

the hand, and are inserted into the middle and distal phalanges of the fingers (figure 1) [(9)].

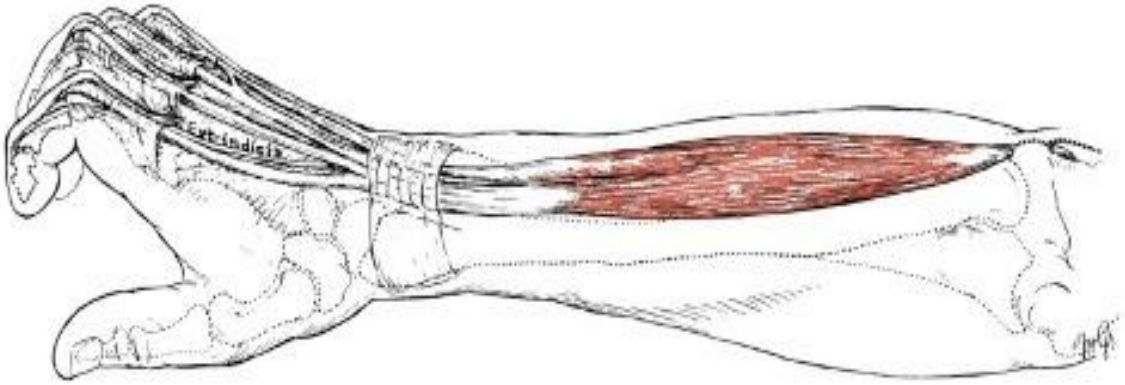
Opposite the metacarpophalangeal articulation each tendon is bounded by fascicule to the collateral ligaments and serves as the dorsal ligament of this joint; after having crossed the joint, it spreads out into a broad aponeurosis, which covers the dorsal surface of the first phalanx and is reinforced, in this situation, by the tendons of the interossei and lumbricalis (figure 1) [(9)].

Opposite the first interphalangeal joint this aponeurosis divides into three slips; an intermediate and two collateral ones: the former is inserted into the base of the second phalanx; and the two collateral ones, which are continued onward along the sides of the second phalanx, unite by their contiguous margins, and are inserted into the dorsal surface of the last phalanx. As the tendons cross the interphalangeal joints, they furnish them with dorsal ligaments [(9)].

The tendon to the index finger is accompanied by the extensor indices proprius, which lies on its ulnar side. On the back of the hand, the tendons to the middle, ring, and little fingers are connected by two obliquely placed bands, one from the third tendon passing inferior and laterally to the second tendon, and the other passing from the same tendon inferior and medially to the fourth (figure 1)[(10)].

The extensor digitorum communis extends the phalanges, then the wrist, and finally the elbow. It acts principally on the proximal phalanges, the middle and terminal phalanges being extended mainly by the interossei and lumbricales.

It takes its arterial supply from the posterior interosseous artery and nerve supply from radial nerve (posterior interosseous) [9].




***Figur1*** *extensor digitorum muscle* [12]

## ***Anatomy of Extensor Mechanism Over Proximal Phalanx***

The intrinsic tendons from the lumbricals and interossei form the lateral bands and the EDC trifurcates proximal to the proximal interphalangeal (PIP) joint, with the central component becoming the central slip, and the lateral components joining up with the lateral bands [8].

## ***Anatomy Of Extensor Mechanism Over Middle Phalanx***

The lateral bands are maintained in position by the triangular ligament, which unites them dorsal and distal to the PIP joint, and the transverse retinacular ligaments, which stabilize them to the flexor tendon sheath. There is a normal dorsal-palmar translation of the lateral bands with respect to the PIP joint axis of rotation during flexion and extension, which must be preserved to retain normal extensor function. Distal to the triangular ligament, the radial and ulnar lateral bands merge to form the