

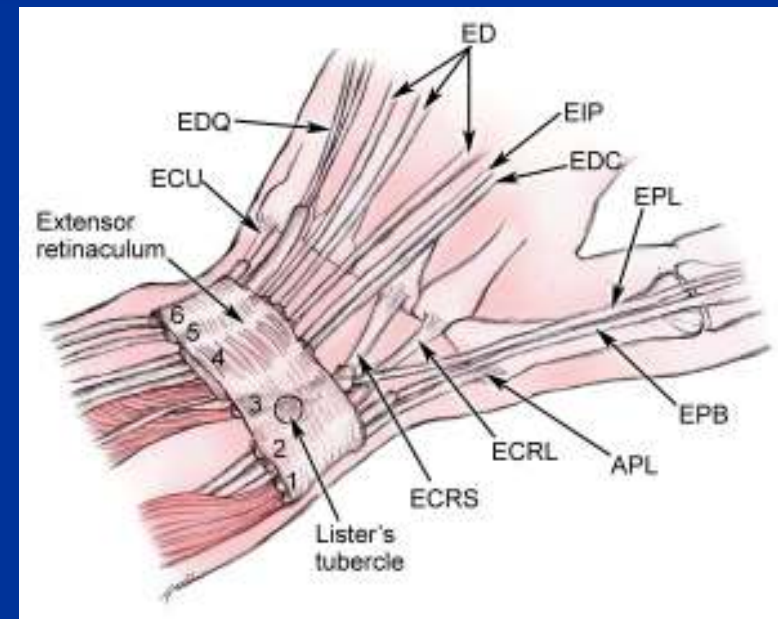


EXTENSOR TENDONS

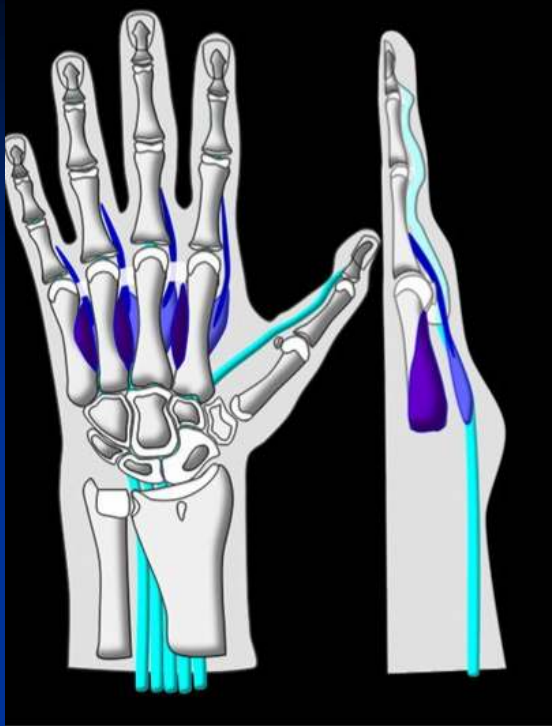
Anatomy, Mechanism and Injuries

Extensor tendons at the wrist

- As they course under the extensor retinaculum, extensor tendons of the wrist and hand are divided into 6 compartments at the dorsal wrist, each containing specific tendons.



INTRINSIC TENDONS



Function Extend IP

Lumbricals

O: FDP proximal to A1

I: Intrinsic tendon

Palmar Intrinsic (Unipennate)

Dorsal Intrinsic (Bipennate)

Deep Intrinsic Tendon

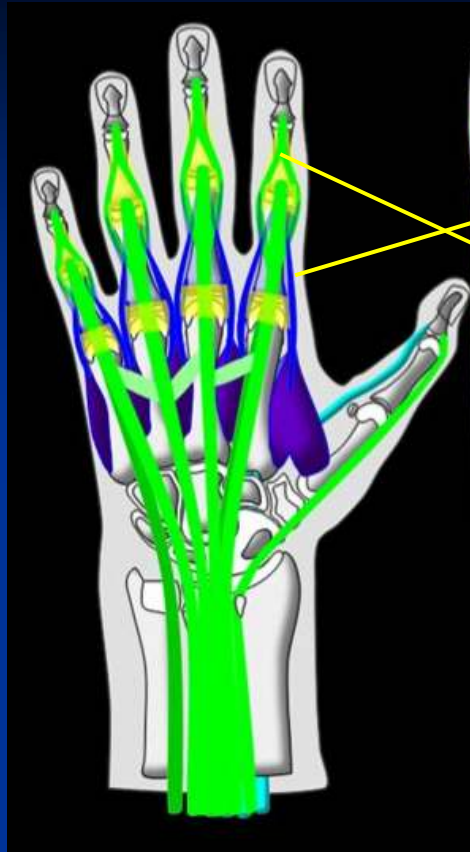
I: Lateral MC base

Superficial tendon

- Medial merge to Central band
- Lateral merge to Collateral band

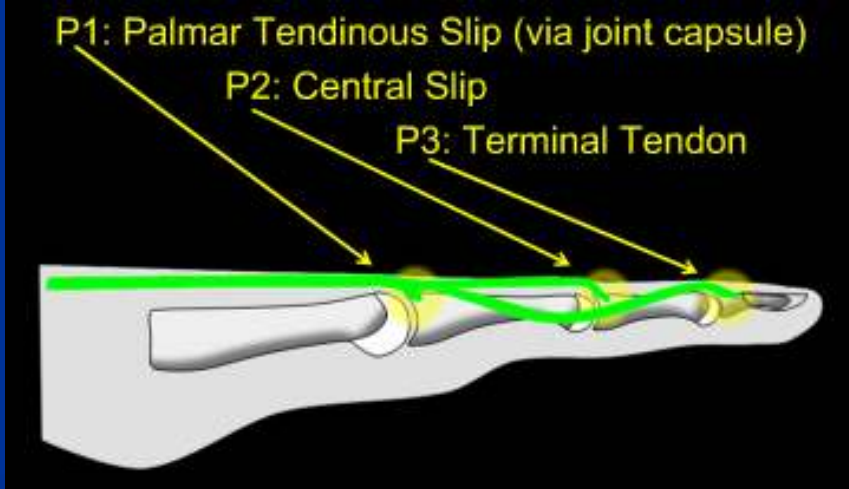


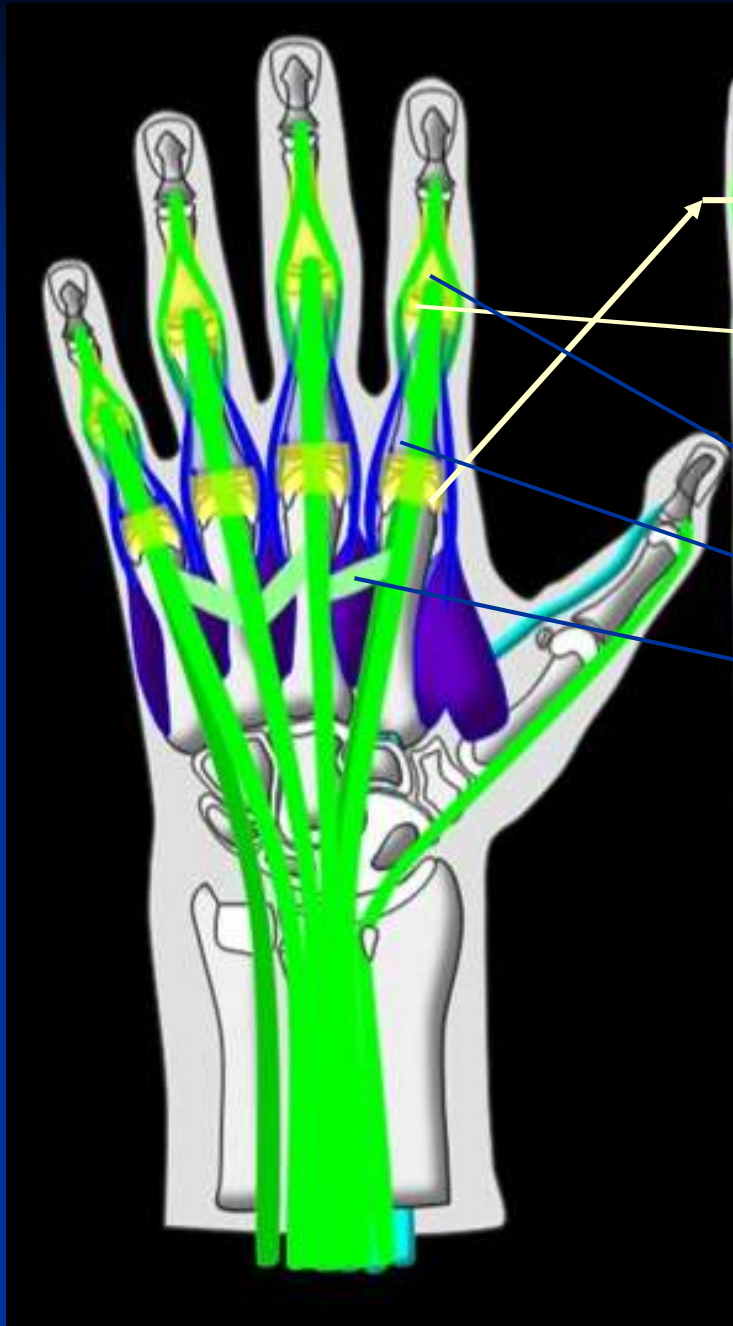
EXTRINSIC TENDONS



Central Band
O: EDC
I: Middle phalanx base

Collateral band
O: Central band
Joined by lateral band
I: Distal phalanx (terminal tendon)





- Sagittal band
- Transverse volar plate attachments
- Retinacular ligament
 - Transverse to Central tendon
 - Oblique to Terminal tendon
- Intertendinous expansions
 - -Triangular ligament
 - -Arciform fibres
 - -Tendinous junctions

Extensor Mechanism (Apparatus)

Extrinsic actions

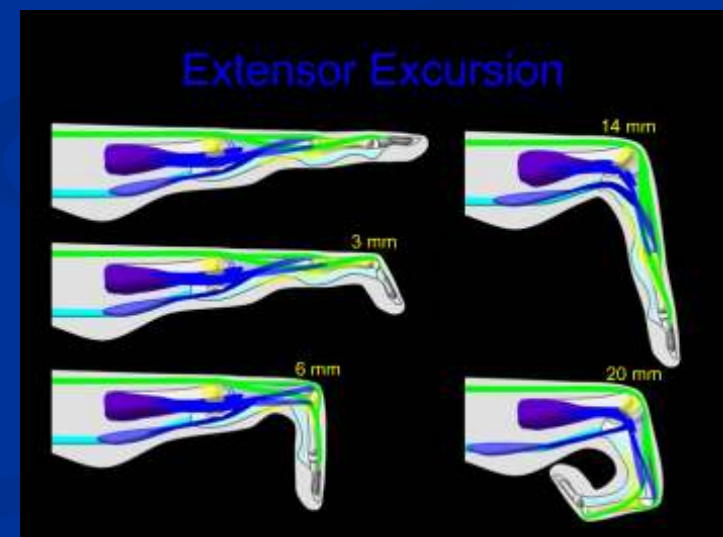
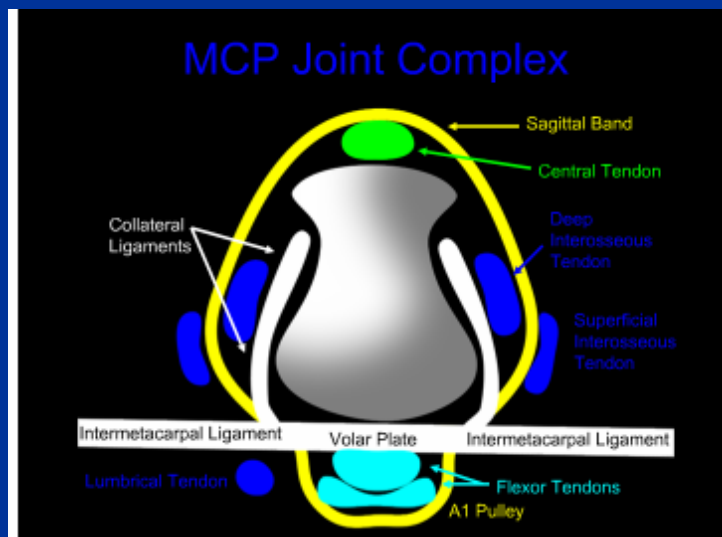
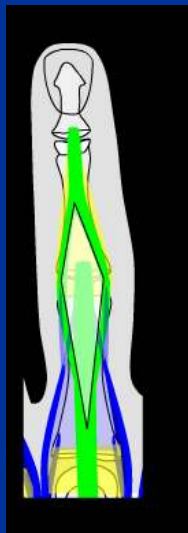
Extension across MCP and PIP by Central band

Extension across PIP and DIP by Collateral band

Intrinsic actions

Interossei Flex IP with Flexed MP, Extend IP with Extended MP

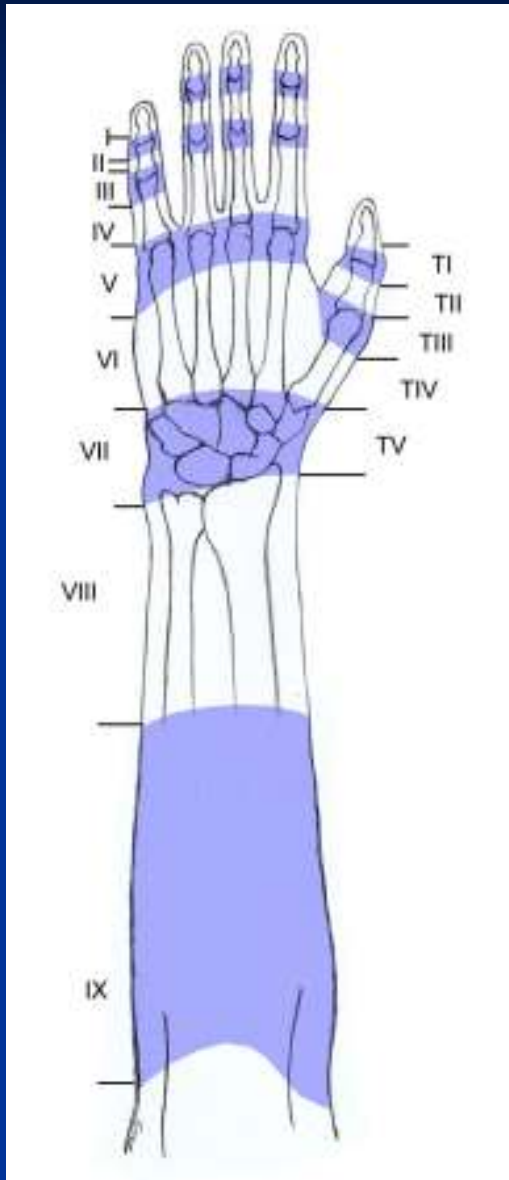
Lumbricals Extend IP with Flexed MP, Flex IP with Extended MP



EXAMINATION

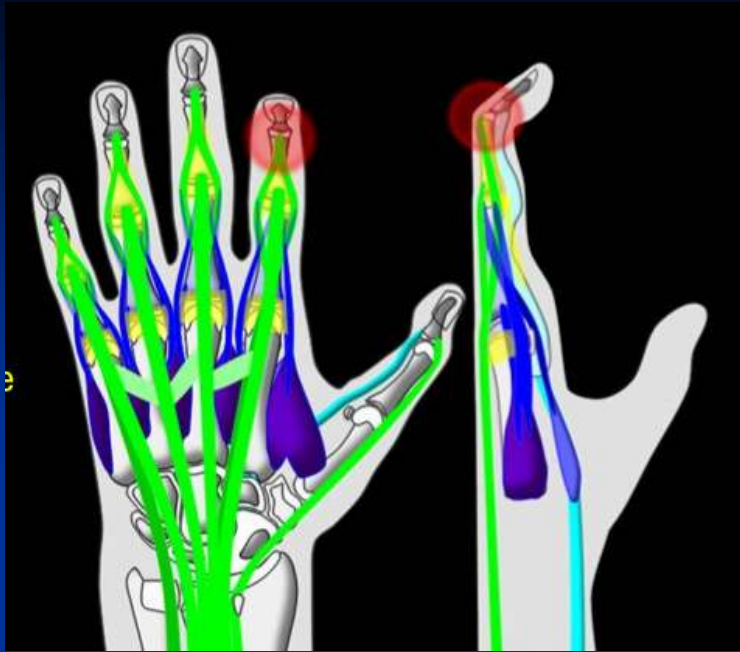
- Neurovascular status
- Flexor tendon function
- Radiographs if indicated
- Wound inspection (with or without LA)
 - Joint inspection
- Zone V- VII Carefully test MCP extension with wrist in Neutral and IP joints extended

INJURIES



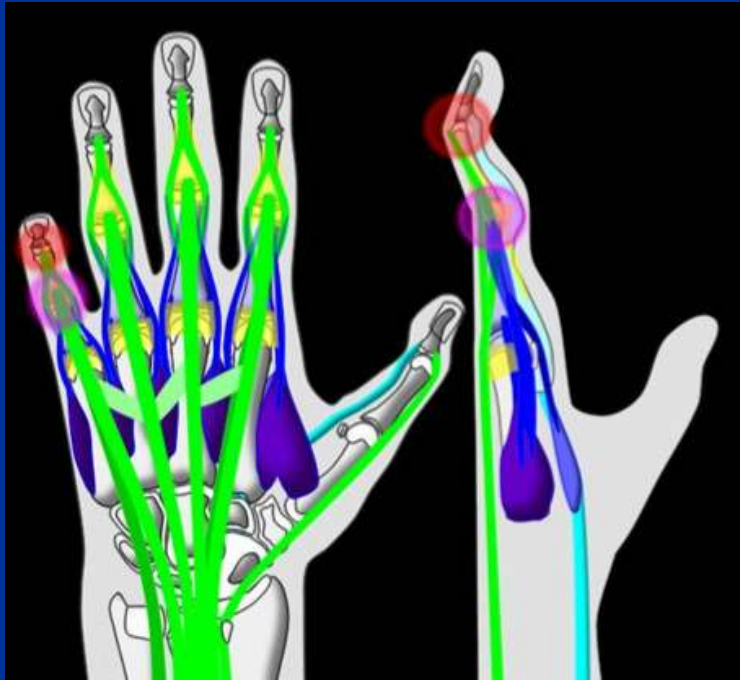
- Zone I –DIP Joint
- Zone II - middle phalanx
- Zone III – PIP Joint
- Zone IV – proximal phalanx
- Zone V – MCP Joint
- Zone VI - metacarpal
- Zone VII Wrist joint





MALLET

- Terminal Tendon rupture
- Deformity may be delayed
- Type I extensor tendon avulsion from distal phalanx.
- Type II laceration
- Type III deep avulsion that injures tendon and skin.
- Type IV fracture of distal phalanx



SUPER MALLET

- Swan-neck deformity due to Mallet
- Failed closed Rx for Mallet
- Pre-existing hyper extensible PIP

TREATMENT

ZONE I – DIP joint

Open injury

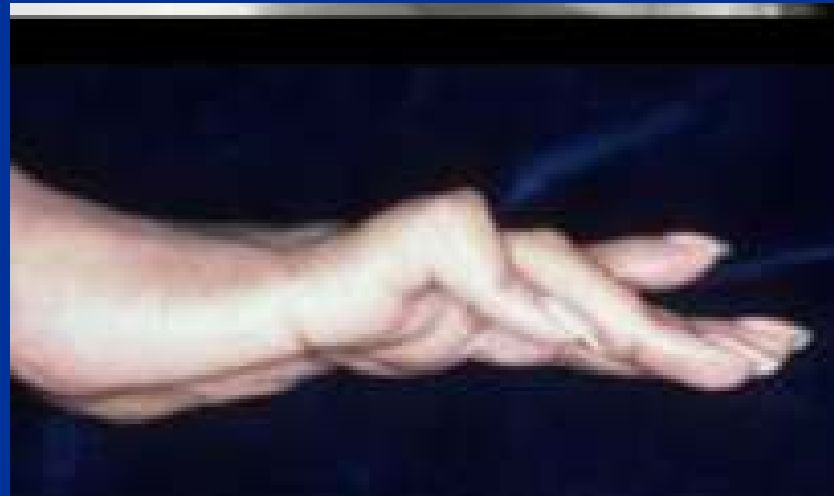
- Lavage and debridement of the joint, tendon repair, skin closure, and K-wire fixation.

Closed injury

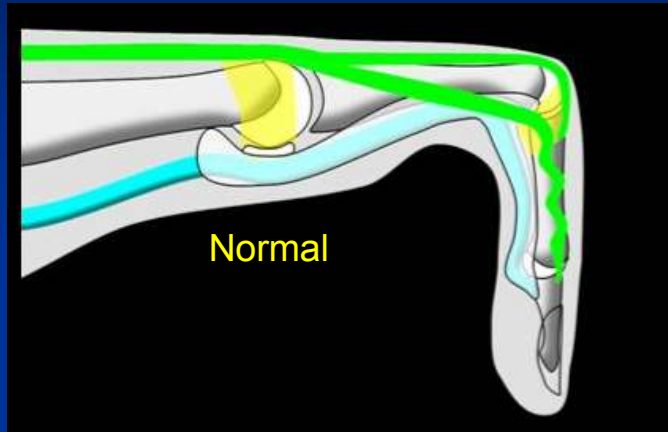
- Accurate reduction of fracture involving a large intra-articular fragment (>30% of the articular surface).
- Mallet finger splint, aiming for slight hyperextension. 6 weeks.

Established mallet finger deformity:

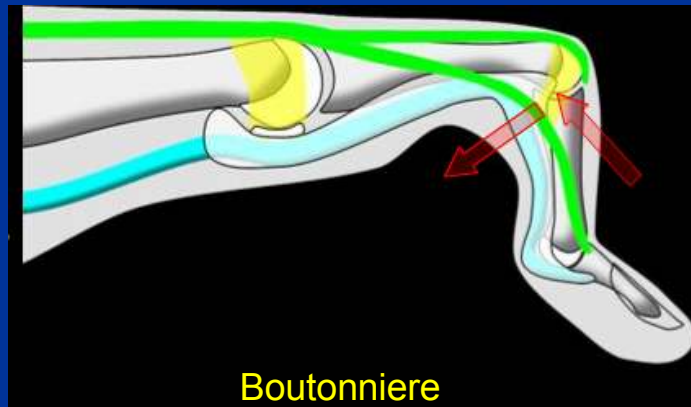
- excision of the redundant scar and prolonged splintage
- DIP arthrodesis in 100° of flexion.



BOUTONNIERE DEFORMITY



Transverse Retinacular ligament tethers collateral band
Prevent active DIP extension when PIP is fixed in flexion



Incompetent Transverse retinacular ligament

TREATMENT

ZONE III – PIP joint

Open injury

- Repair with PIP joint fixed in full extension.
- In contaminated wounds, repair is best delayed.

Closed injury

- Spilintage
- Large bony fragment – K-wire fixation

Dislocation

- usually associated with disruption of central slip.

Established boutonnière deformity (Mobile or Static)

Techniques described which include repair of triangular ligament, transection of lateral bands, transfer of lateral bands to base of MP







■ Zone V – MP Joint

- Extensor Lag
- Sagittal band injury – cannot Initiate but can Maintain extension
- Remember hand intrinsic action – examine with wrist in neutral and IP extended

TREATMENT

- Fight bite due to human tooth injury -primary repair is contraindicated.
- Splint the MP joints in a full extension splint for 3 weeks. PIP and DIP joints should remain free
- Dynamic extension splint following removal of the full extension splint until no extensor lag remains.

SPECIAL TESTS

Mallet Finger Test

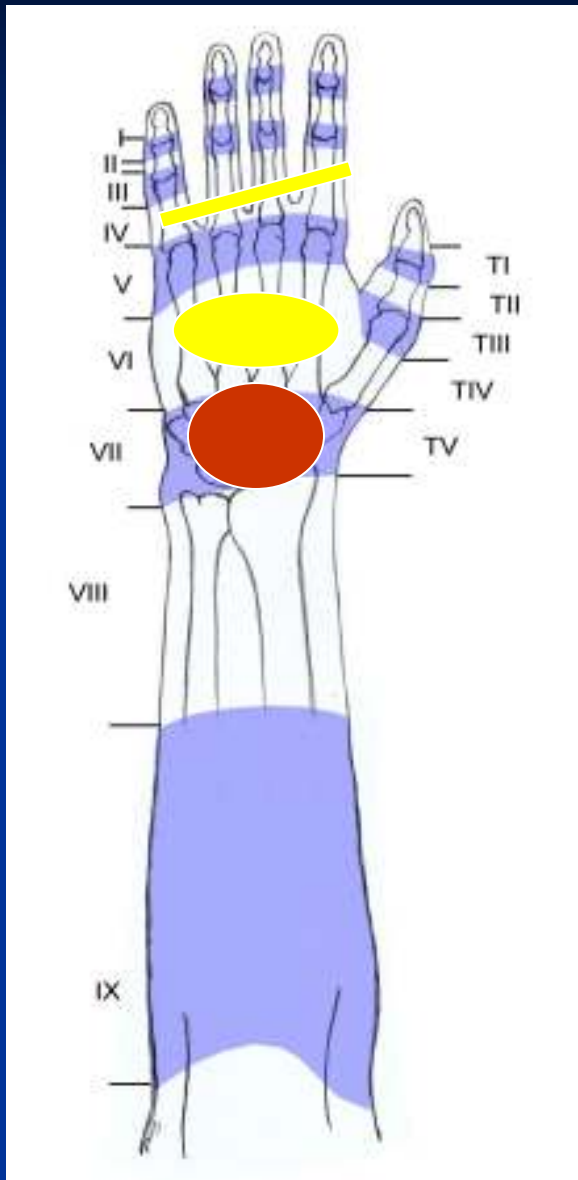
- extensor tendon integrity at the DIP joint.
 - Isolate the tendon by holding the involved finger at the middle phalanx.
 - Begin with the D.I.P. joint relaxed in flexion.
 - Instruct the patient to extend the D.I.P. joint.

Boutonniere Deformity Test (Elson's Test)

- central slip integrity of the extensor tendon at the PIP joint.
 - Put finger over edge of table, with PIPJ flexed to 90deg and MP in extension
 - Instruct patient to extend P.I.P. joint against resistance
 - Normal –DIP floppy; Abnormal – DIP stiff

Sagittal Band rupture Test

- cannot Initiate but can Maintain extension

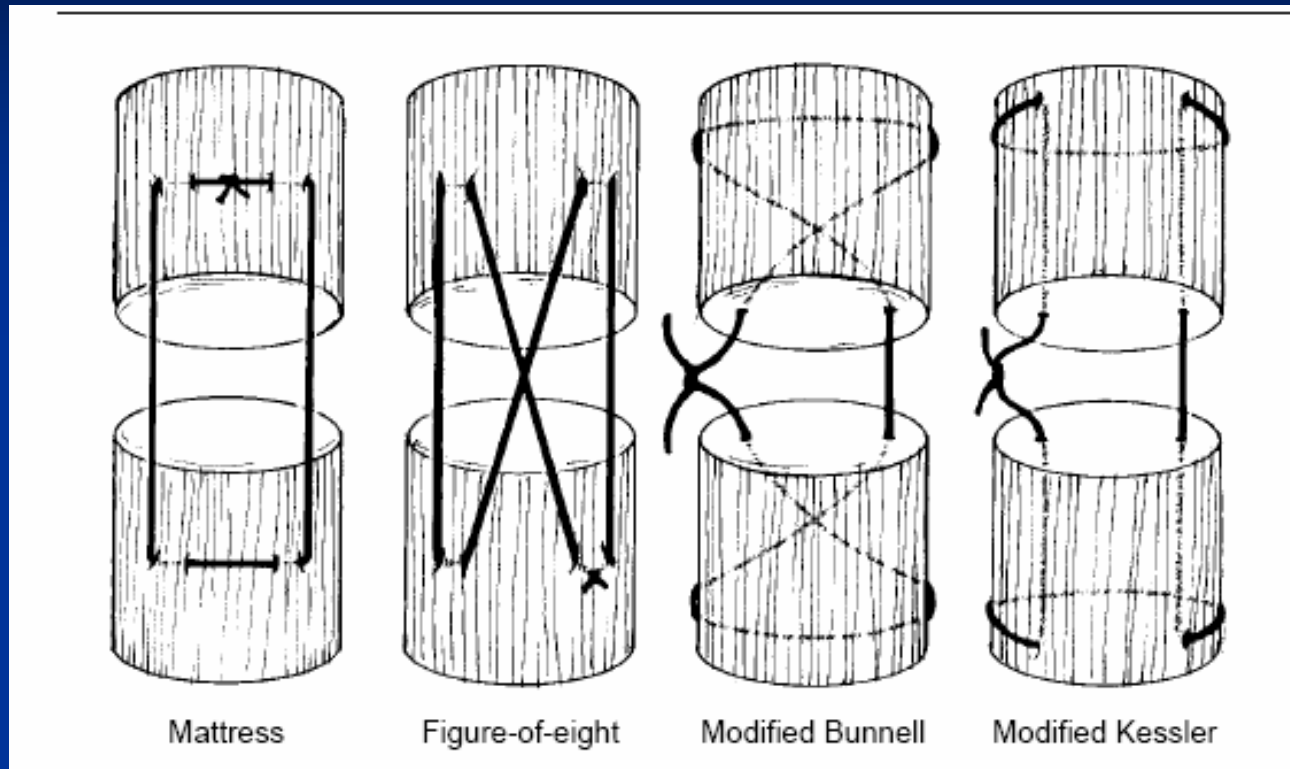


- ZONE II – Middle phalanx
 - No clinical deformity is present usually.
- Zone IV – Proximal phalanx
 - Treatment is by direct repair and K-wire immobilization.
- Zone VI Metacarpal
 - Tendinous juncture may mask injury
 - Horizontal mattress suture
 - Splintage
- Zone VII Wrist joint
 - Core suturing technique repair of tendons
 - extensor retinaculum is divided and repaired by Z lengthening

TENDON REPAIR

- Ultimate strength of a tendon repair depends on number & size of sutures crossing the laceration site
- Resistance to gap formation depends on suture purchase
- **Partial lacerations**
 - > 50% need repair
 - proximal to the MP joint may not require repair
 - At or Distal to MP must be repaired

TECHNIQUES

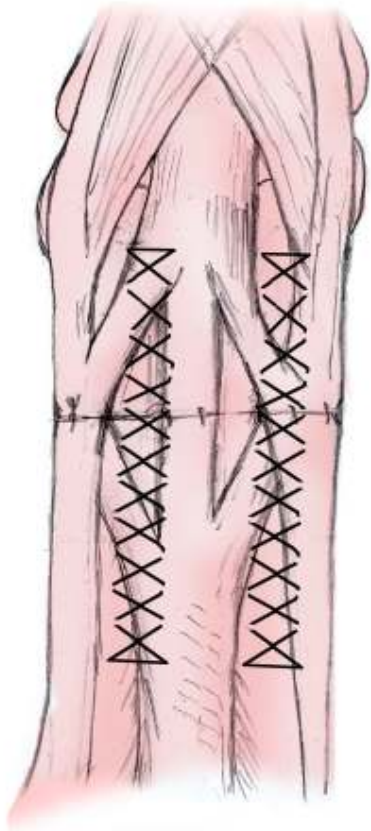


Strength

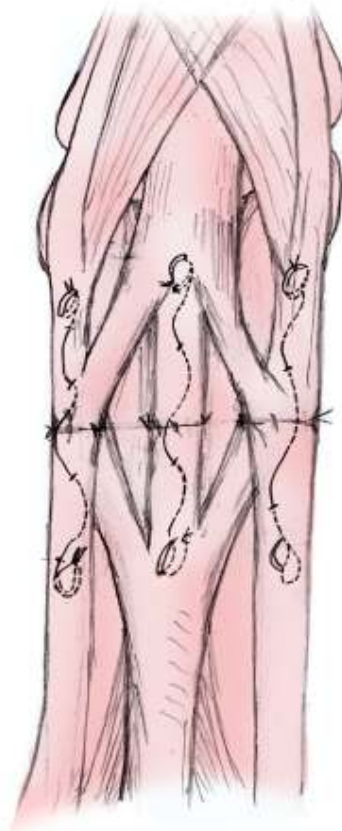
Modified Bunnell > Modified Kessler > horizontal mattress and figure of 8

Newport and Williams (JHS 1992 Nov.)

Modified Becker



6-Stranded double-loop



MGH tendon repair technique (crossing running suture repair/Becker)

- superior suture purchase (superior resistance to gap formation)
- more resistant to gap formation than Bunnell

Howard and Greenwald (JHS Sep 1997)

POST OPERATIVE CARE

Dependant on the level of extensor tendon injury

- distal to MP joint
 - PIP and DIP joints are held immobilized in extension for 4-6 weeks

- proximal to the MP joints
 - MCP joint in extension for 1-2 weeks
 - followed by a passive extension/active flexion splint