COMMON HAND INJURIES, SPLINTING, AND THERAPY

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2:45-3:30pm

Objectives

- Become familiar with splint materials and education
- Overview of common sport related upper extremity injuries seen by Occupational Therapy.
- Overview of treatment for upper extremity injuries related to sport.
- Overview of splinting for upper extremity injuries related to sport.
- Understand the rules for athletics regarding the use of playing casts/splints
- Recognize splint treatment options for common athletic injuries

Splinting

Splinting

- Orthoplast Splints
  - -Questions
    - -What's the Diagnosis?
    - -What position?
    - -Are there any pins to avoid or protect?
    - -Forearm Based, Hand Based,
      Finger Based, Long Arm?

Splinting

- Splint materials are 1/16”, 3/32” or 1/8” thick.
- Minimal/mod/max resistant
- Splint materials vary in character – vary by memory, amount of drape, rigidity, perforated or solid.
- Lastly, they come with almost any color.

Splinting

Common Static Splints

- **Tip Protector Splint**
  - Used for distal finger injuries for protection and support.
- **DIP Extension Splint**
  - Used for distal finger injuries for protection and support
    - Percutaneous pinning at distal finger
- **DIP Hyperextension Splint**
  - Mallet fingers
- **Ulnar/Radial Gutter Splint**
  - Used for fractures of the hand, sprains/strains

- **Wrist Cock Up/Neutral Wrist Resting Splint**
  - Used for fractures of the hand/forearm, sprains/strains
- **Clam Shell Splint**
- Used for greater support and protection of the wrist/forearm.
- **Thumb Spica Splint**
- Used for thumb fracture, sprains/strains for protection and support

Splinting

- Wear and Care
  - Wear schedule per doctors orders and/or therapist's recommendations
    - -May depend on if static vs dynamic vs static progressive
    - -Caution to observe for skin tolerance and splint fit
  - Care
    - -Wash with warm water and antibacterial soaps
    - -Use of alcohol based products to clean splint and decrease smell works the best
    - -Education on what to avoid with the splints – hot weather - summer, in car dash, do not put in dishwasher, etc.

Splints in Athletics

SDHSAA

Volleyball:

Rule 4, Article 1: A guard, cast or brace made of hard and unyielding leather, plastic, pliable (soft) plastic, metal or any other hard substance shall **not be worn on the hand, finger, wrist or forearm, even though covered with soft padding**.

Rule 4, Artcle 2: Hard and unyielding items (guards, casts, braces) on the elbow, upper arm or shoulder must be padded with closed-cell, slow recovery foam padding no less than ½-inch thick. An elbow brace shall not extend more than halfway down the forearm.

Splints in Athletics

SDHSAA

Basketball:

Rule 3-5-2 a,b:

a. Guard, cast or brace must meet the following guidelines: A guard, cast or brace made of a hard and unyielding substance, such as, but not limited to, leather, plaster, plastic or metal shall **not be worn on the elbow, hand, finger/thumb, wrist or forearm; even though covered with soft padding.**
b. Hard and unyielding items (guards, casts, braces, etc.) on the upper arm or shoulder must be padded with a closed-cell, slow recovery foam padding no less than ½ inch thick.

Splints in Athletics

SDHSAA

Football:

Hard and unyielding items (guards, casts, braces, etc.) on the hand, wrist, forearm, elbow or upper arm are **illegal unless covered with a padded, closed-cell, slow recovery foam padding no less than ½ inch thick.**

Splints in Athletics

SDHSAA

Track: If a **guard, cast, brace, splint, etc. is worn and determined by the referee that padding is required,** such padding shall be closed-cell, slow recovery foam no less than ½ inch thick. Knee and ankle braces which are unaltered from the manufacturer's original description do not require any additional padding.

Wresting: Illegal in all cases.

Splints in Athletics

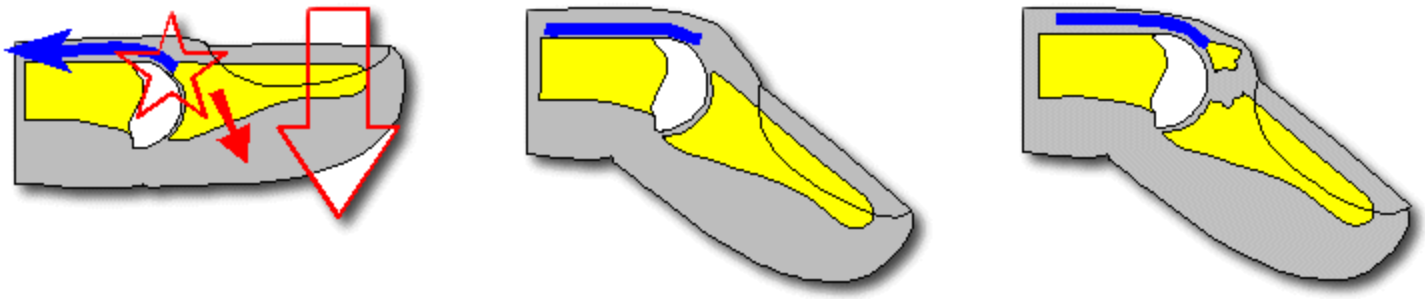
- NCAA/NAIA
  - Similar as previous rules
  - Always check with governing body
  - Communication with athletic trainers

Common Hand Injuries in Athletes

- Mallet Finger
- Tuft/Distal Phalanx Fracture
- Boutonniere Deformity
- PIP Jt Dorsal Dislocation
- Proximal Phalanx Fracture
- Metacarpal Fracture
- Thumb Fracture
- Scaphoid Fracture
- Distal Radius Fracture

Mallet Finger

Mallet Finger Injury



Mallet Finger

- Most common closed tendon injury found in athletes
- Usually the result of a jam against any surface
- Caused by disruption of terminal tendon on distal phalanx
- Present with pain, swelling and extensor lag at DIP jt.

Mallet Finger

- Management

-without pinning

-6 wks - DIP hyperextension splint

-custom orthoplast, alumifoam, Stack, serial cast

-followed by 4-6wks of night wear or weaning from splint

-AROM – PIP and MCP 1st 6wks

No DIP bending allowed – **not even one time.

-with pinning

-same as above – splint is more supportive/protective because of pin

Mallet Finger

- Management of splint
  - Remove daily to check skin
  - Clean splint and finger with alcohol
  - Dry finger prior to splint placement
  - Use of paper tape with splints

Mallet Finger

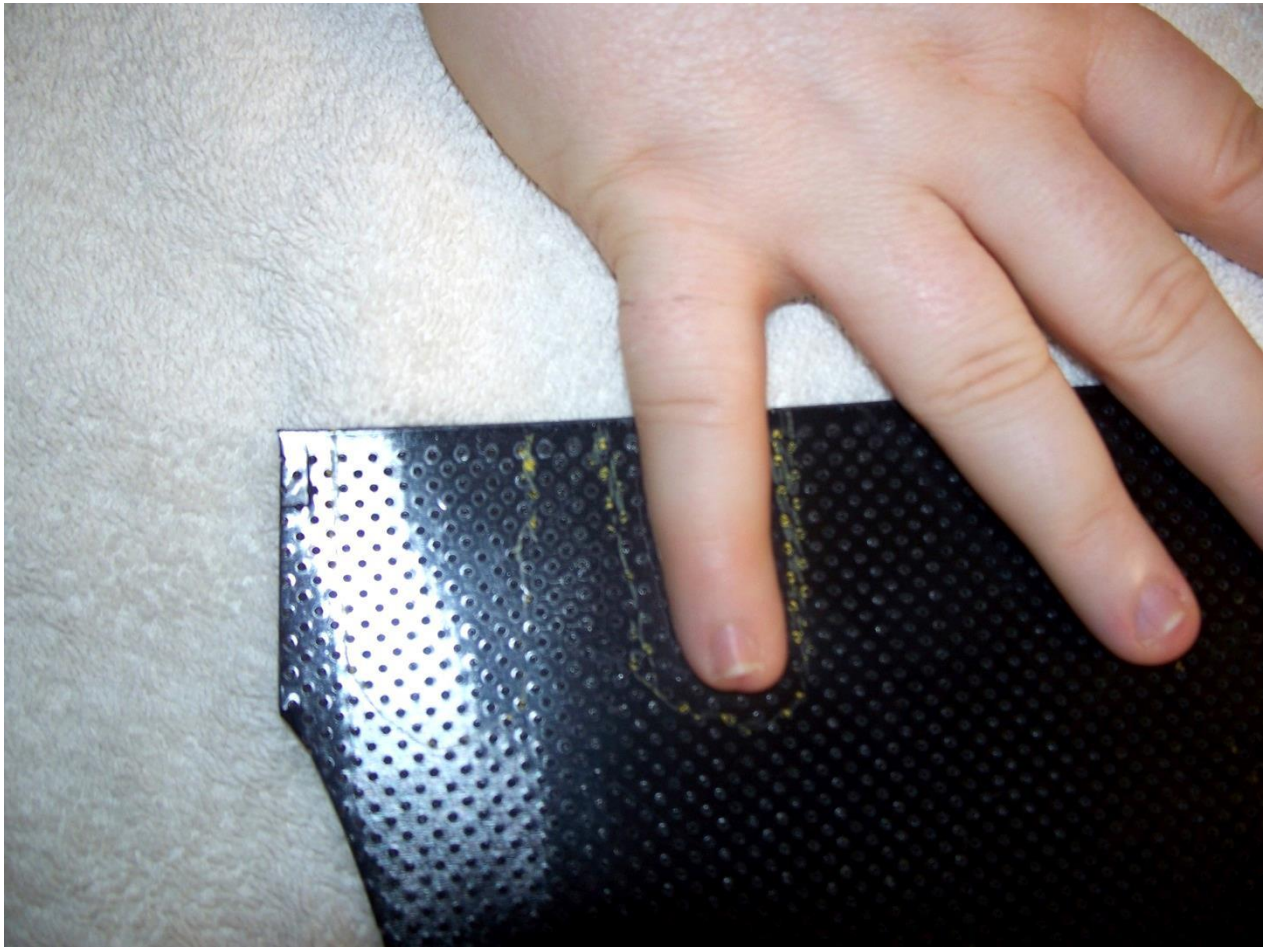
- Case Study – Football player jammed finger when trying to make a tackle – noted DIP extensor lag – assessed at after hours orthopedic clinic – sent to orthopedic hand surgeon for further evaluation.
- Evaluation of acute mallet finger
- Orders sent to hand therapy for DIP hyperextension splint x 2
- Education provided on wear/care, playing with splint during football – buddy tape, SDHSAA ruled padding – discuss with athletic trainer

Mallet Finger

Case Study

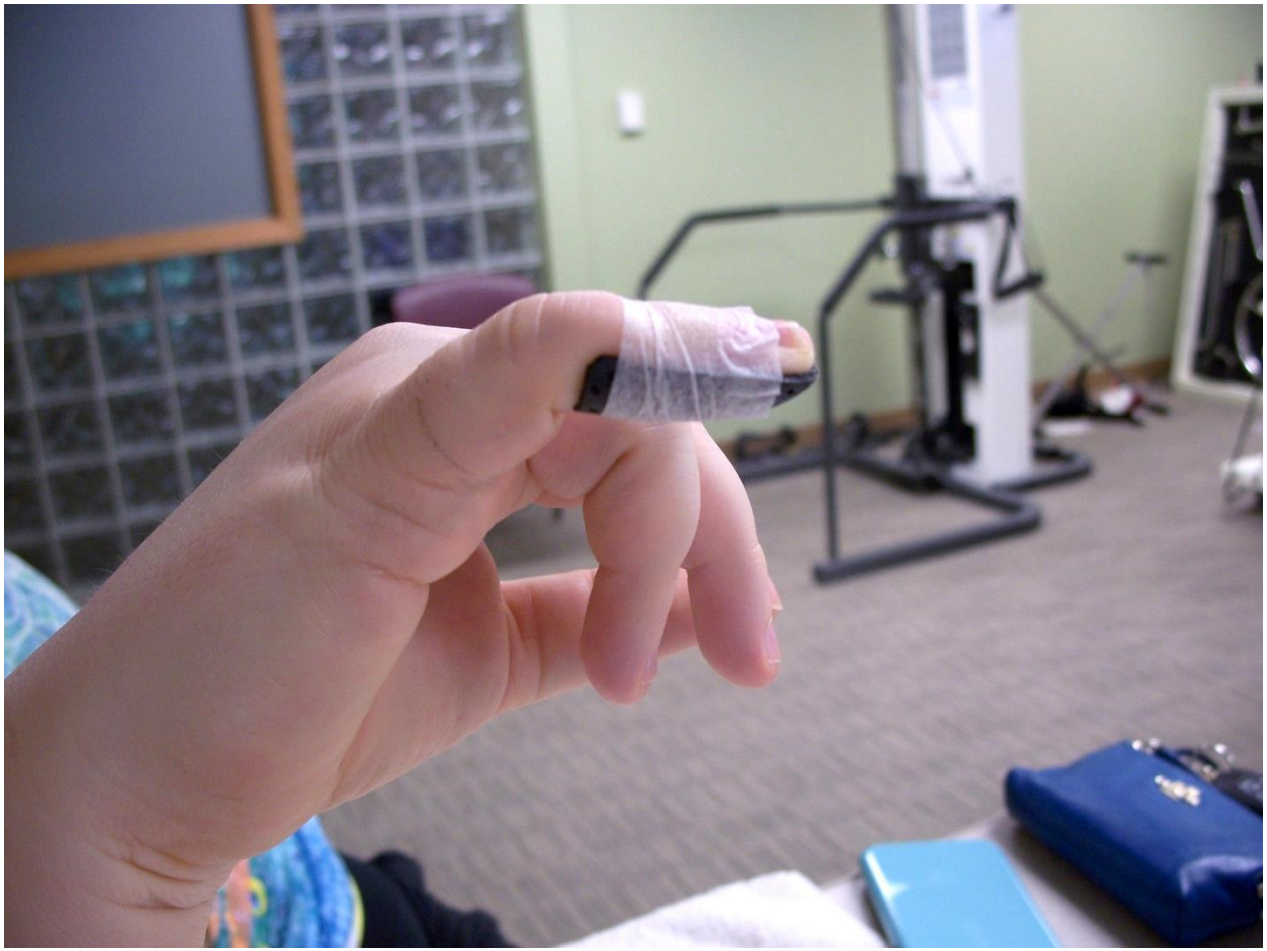
- Combo Mallet finger and tuft fracture
- Recreational play with dodgeball
- 6 weeks wear time and then return to doctor

Mallet Finger



Mallet Finger

Mallet Finger



Tuft/Distal Phalanx Fracture

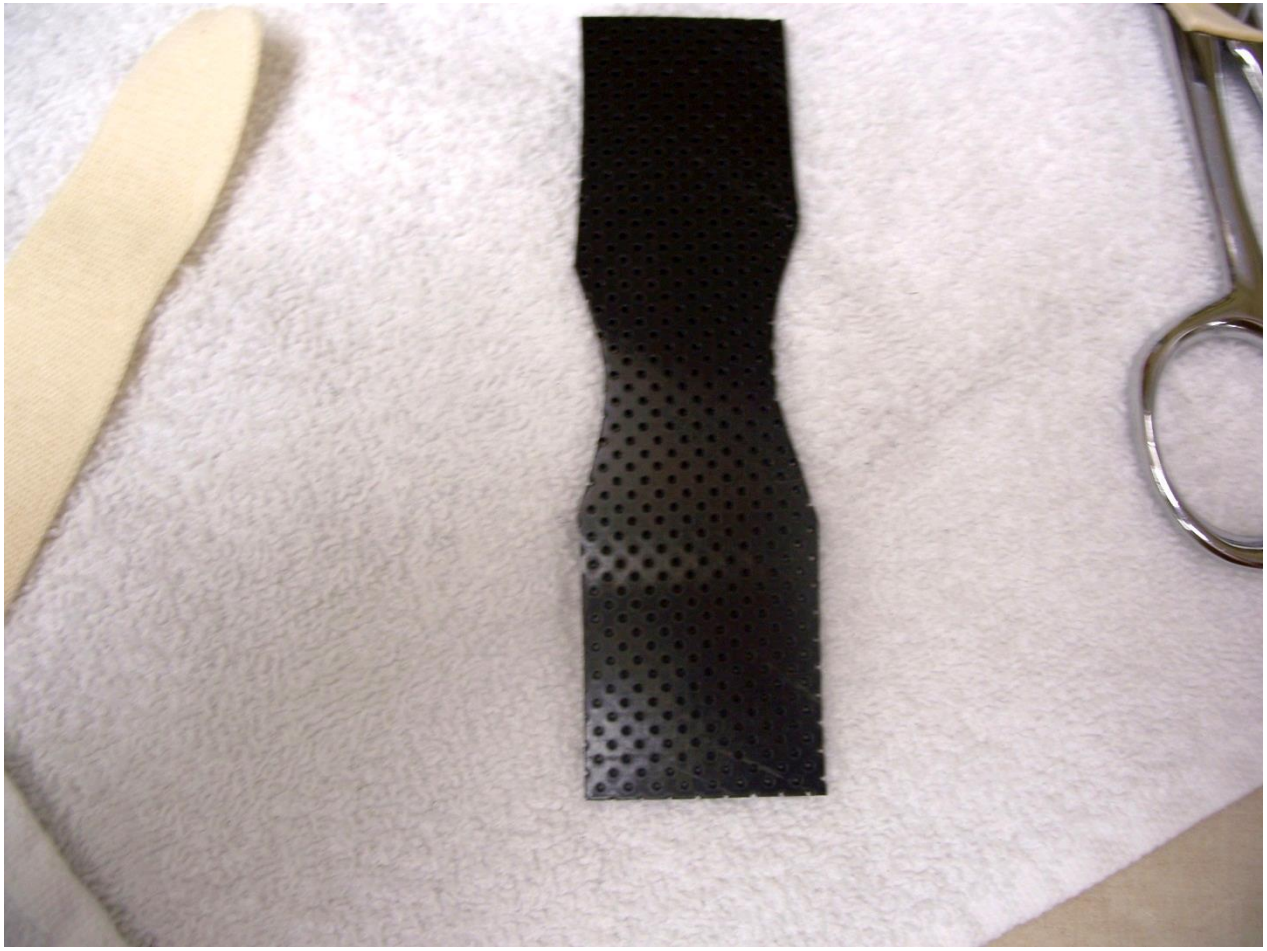
- Common fracture – smashing or crushing injury – caught in jersey, b/w helmets
- Usually treated conservatively
- If K-wire – removed approx. 3wks – AROM to DIP jt is then started
- Tip protector splint/volar DIP extension splint
- Hypersensitivity can be a problem
  - Desensitization program

Tuft Fracture/Distal Phalanx Fracture

- AROM – MCP/PIP
- Swelling Control
  - Elevation, ice, compression wrap/finger sleeve

Tuft Fracture/Distal Phalanx Fracture

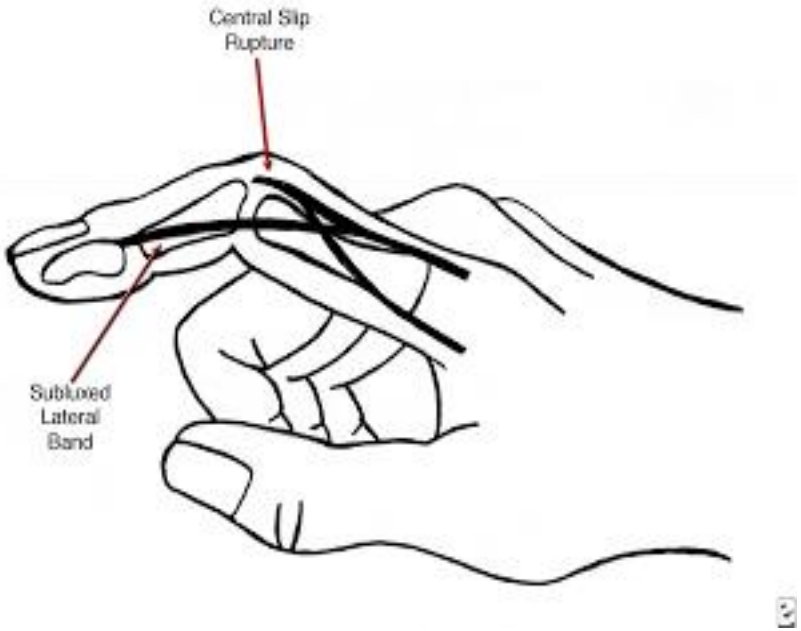
Tuft Fracture/Distal Phalanx Fracture



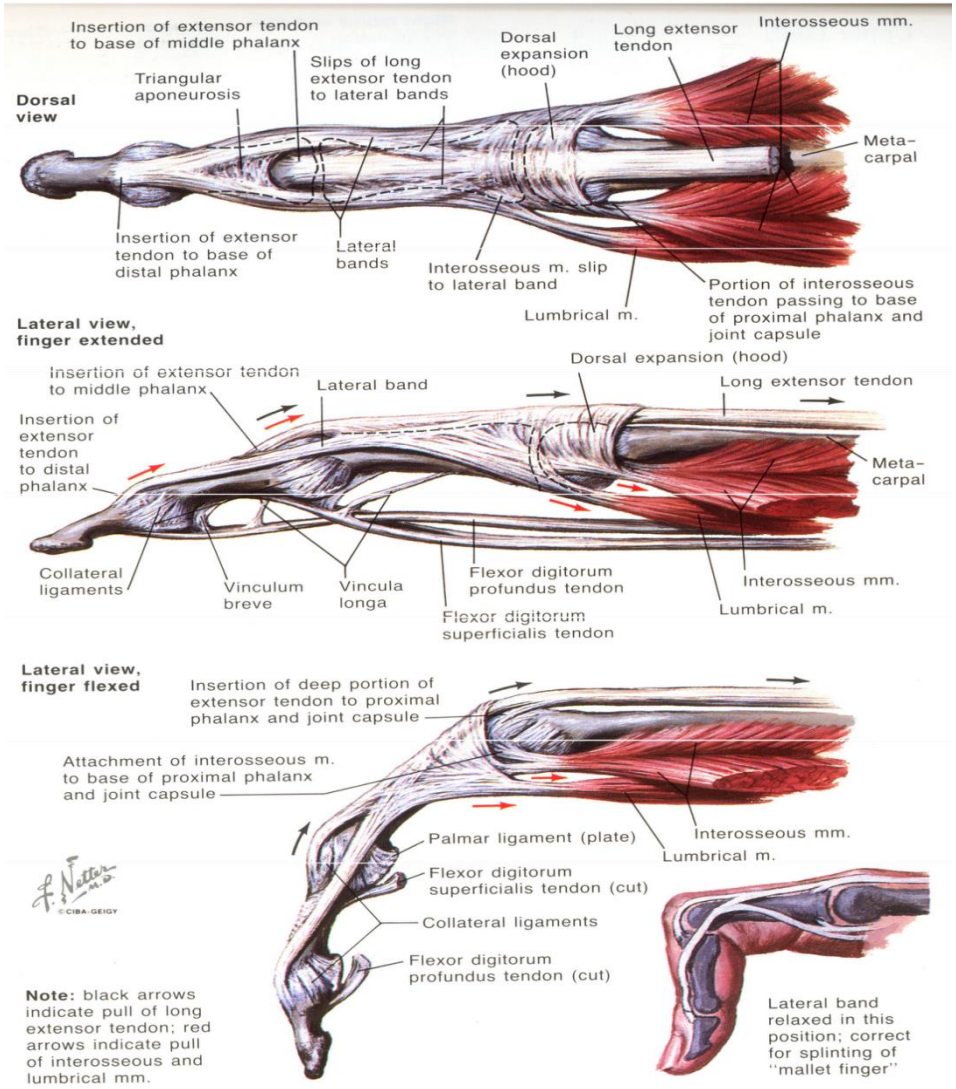
Tuft Fracture/Distal Phalanx Fracture

Tuft Fracture/Distal Phalanx Fracture

Boutonniere Deformity



Boutonniere Deformity



Boutonniere Deformity

- Athletes usually injured by forced hyperflexion at the PIP jt. - "jammed" finger
- Central slip is disrupted at dorsal insertion at middle phalanx and lateral band migrates anteriorly

Boutonniere Deformity

- Management - Acute
- Full time volar based PIP extension splint with DIP free for 6 weeks and then night time wear for 4 weeks
- DIP free to allow dorsal movement of lateral bands and ensure oblique retinacular ligament does not get tight

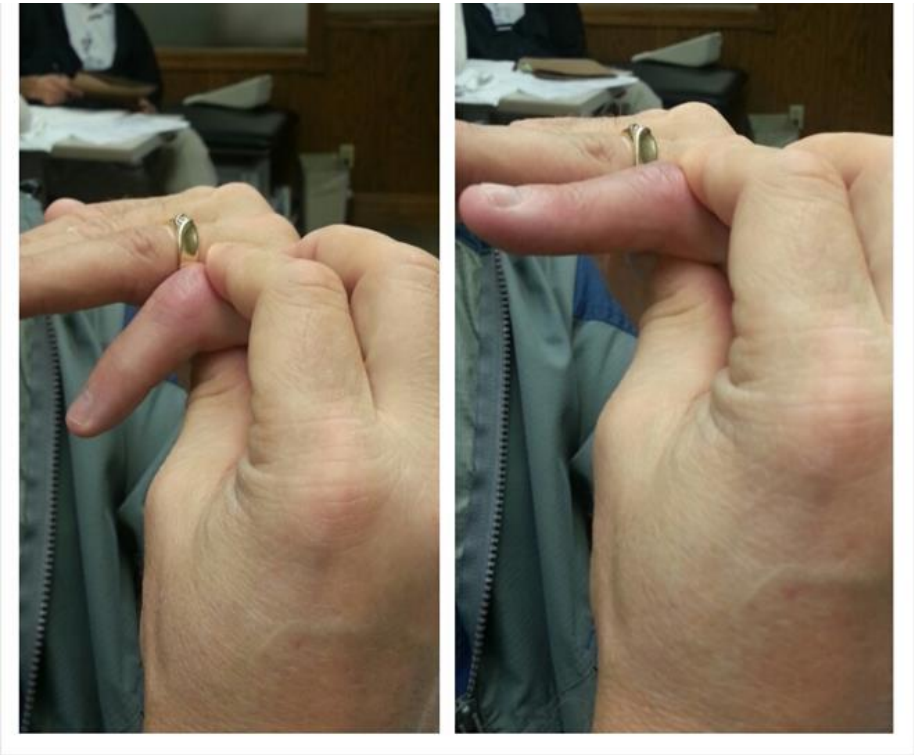
Blocking Exercises

Focus on DIP blocking and reverse blocking exercises

- DIP BLOCKING

Boutonniere Deformity

- REVERSE BLOCKING
  - MCP's flexed with active extension of IP's,



Boutonniere Deformity

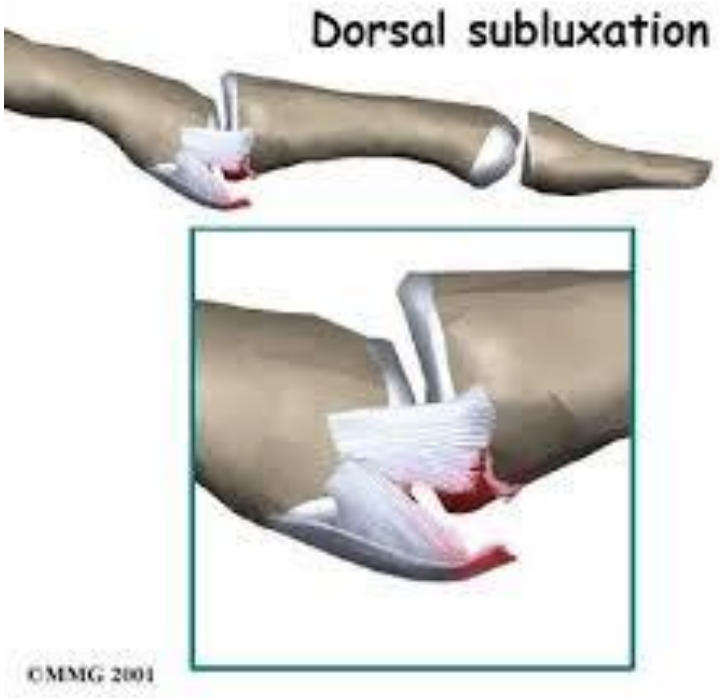
- Management - Chronic
  - Chronic or PIP flexion contracture
  - Focus is on regaining passive PIP extension through dynamic, static progressive splint or serial casting
  - Once PIP joint passive extension established – initiate or continue with emphasis on reverse blocking and active DIP blocking motion
  - Continued focus on swelling reduction

PIP joint dorsal dislocation

- Volar Plate Disruption

- Hyperextension injury

- Jammed Finger injury



PIP joint dorsal dislocation

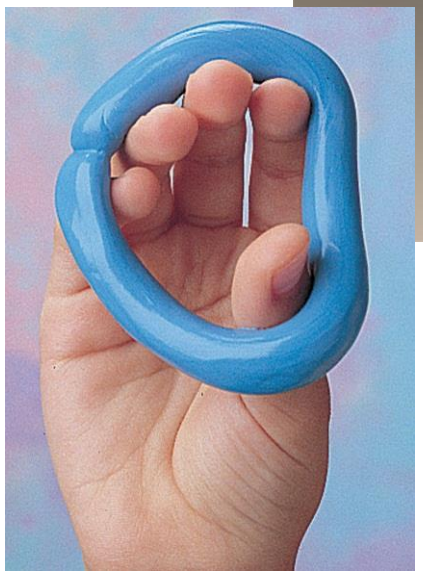
- Orthoplast dorsal blocking splint at 20-30 degrees
- Decrease restriction of splint by 10 degrees each week starting at 2 to 3 weeks per orders; splint x 6wks
- Splint fabricated out of 1/16" material
- Distal strap removed to allow patient to perform AROM of IP's within splint frequently during the day.

PIP joint dorsal dislocation

- Edema control techniques
- Edema wrap, compression wrap/finger sleeves

PIP joint dorsal dislocation

- Strengthening – 4 to 6 wks or when ordered by doctor
- Isometrics, therapy putty/ball



Proximal Phalanx Fracture

- Volar angulation, limited rotation usually occurs with proximal phalanx
- Need to have a balance between treating fracture and limiting adhesions/promoting gliding of the tendons

Proximal Phalanx Fracture

- Management
  - Splinting
    - MCP's in flexion and IP's extended "intrinsic plus" positioning – safe position
    - Forearm based or hand based gutter splint
  - Position of MCP joints
    - collateral ligament
    - stablility

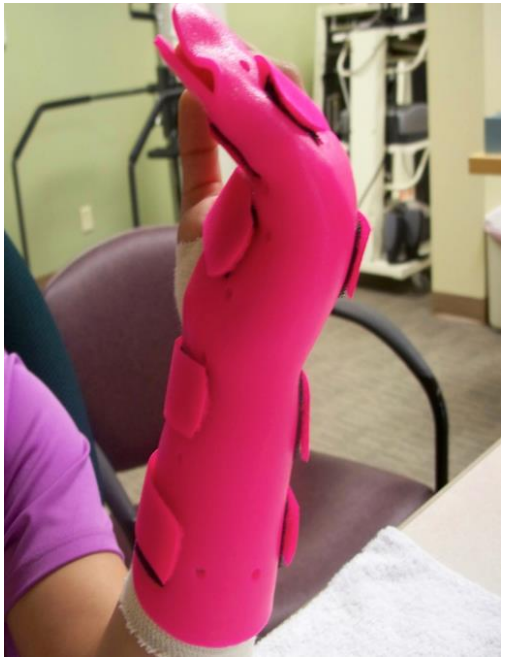
Proximal Phalanx Fracture

Proximal Phalanx Fracture

- Management
  - ROM initiated per doctors orders and/or at 2-4 weeks with splint utilized up to 6 weeks.
  - Athlete to wear splint that is least confining for protection per doctor and wrapped with approved ½" closed cell foam
  - If reduction not maintained then closed reduction with pinning followed by open reduction and fixation – followed with AROM per doctor orders, edema and incision/dressing management

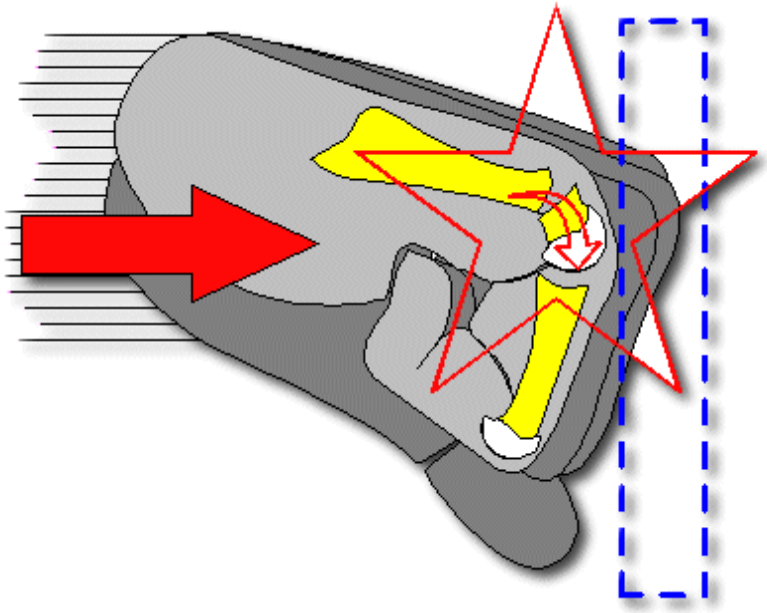
Proximal Phalanx Fracture

- Case Study
  - 10 y.o. playing football. Caught the ball and overextended small finger
  - Seen by orthopedics with closed reduction
  - Order for custom FA based intrinsic plus positioned splint
  - RICE principles
  - Return to doctor in 1 week for recheck
  - Initiate arom of hand as ordered



Metacarpal Fracture

- Metacarpal neck Fracture
  -Boxer's Fracture
  -Common metacarpal Fx
  -Allows for angulation not rotation

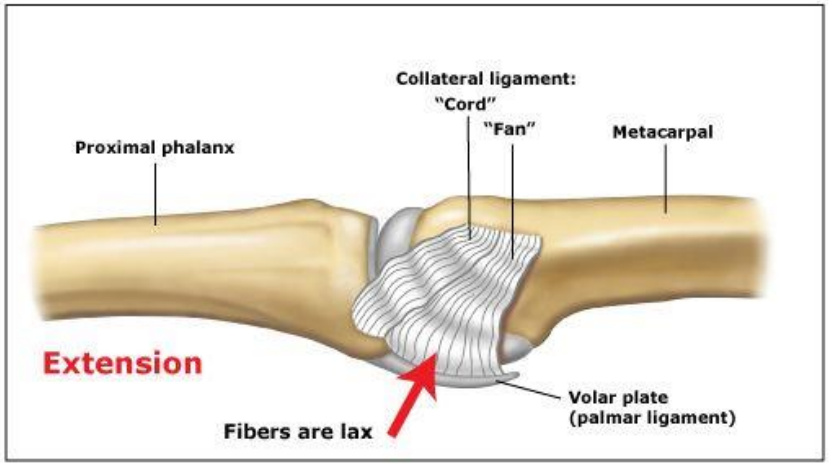


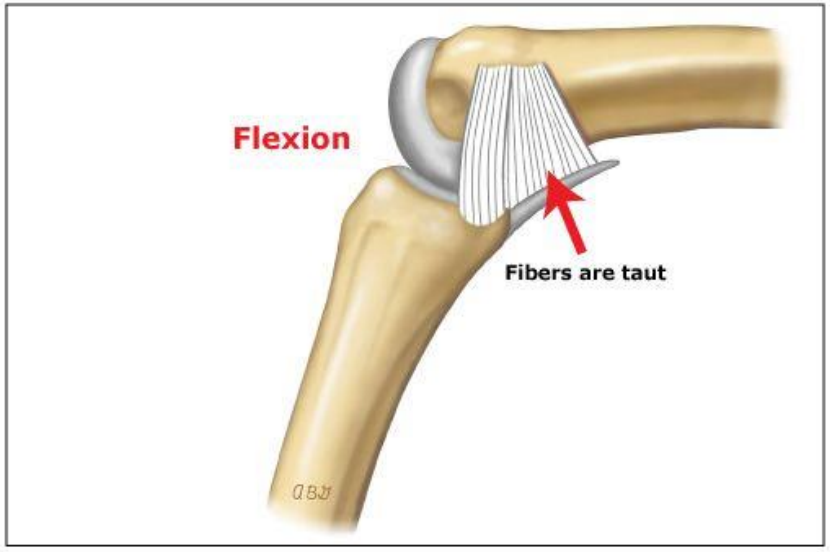
Metacarpal Fracture

Management

- Splint - hand or forearm based splints – 4-6 wks
- Edema control
- ROM started at 2-4 wks
- Strengthening 4-6 wks or as ordered
- Return to play upon doctors orders or when evidence of healing is shown

Metacarpal Fracture



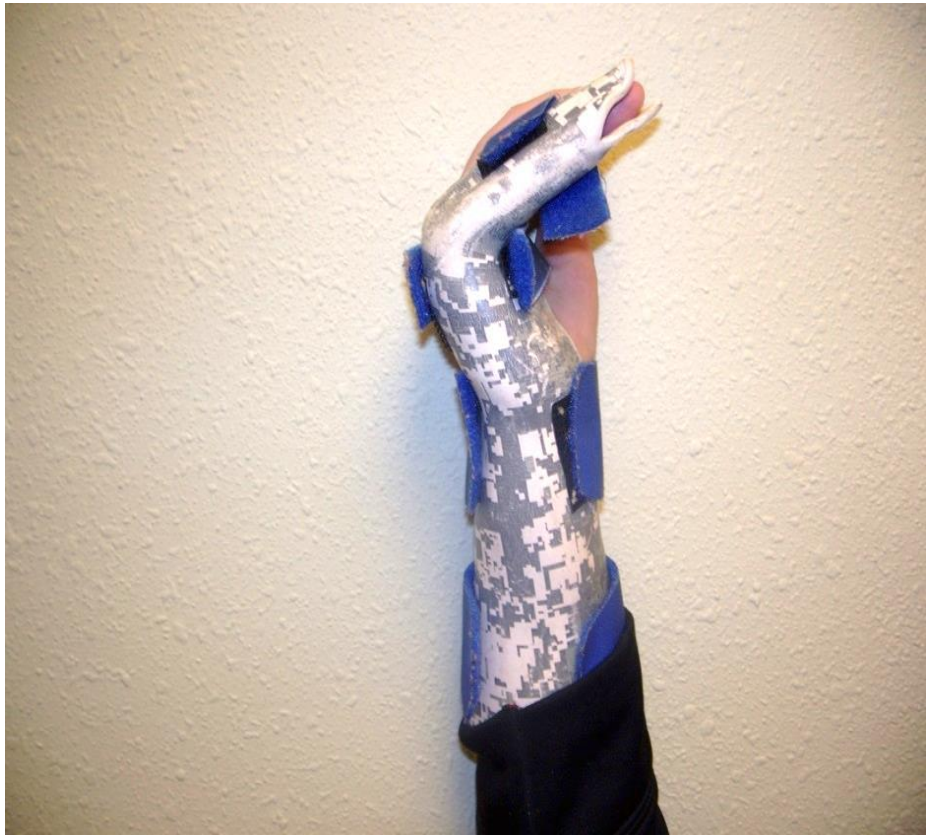


- MCP's placed in flexed position in splints
  - Maintain length of MCP collateral ligaments
  - Provide stability

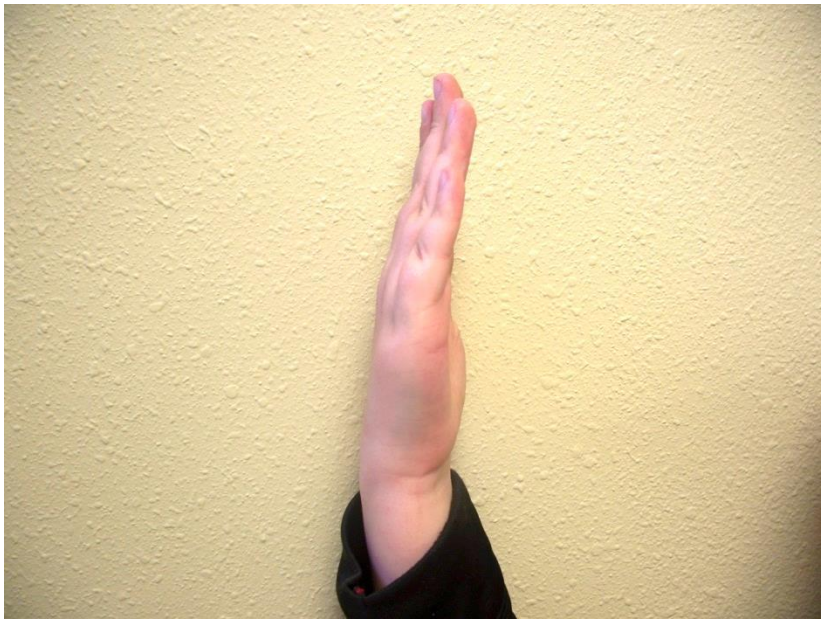
Metacarpal Fracture

Metacarpal Fracture

- Young male with Salter Harris II fracture – neck fracture
- Injured playing football
- Initiated with ulnar gutter splint and arom
- Splinted x 4wks and then as needed



Metacarpal Fracture



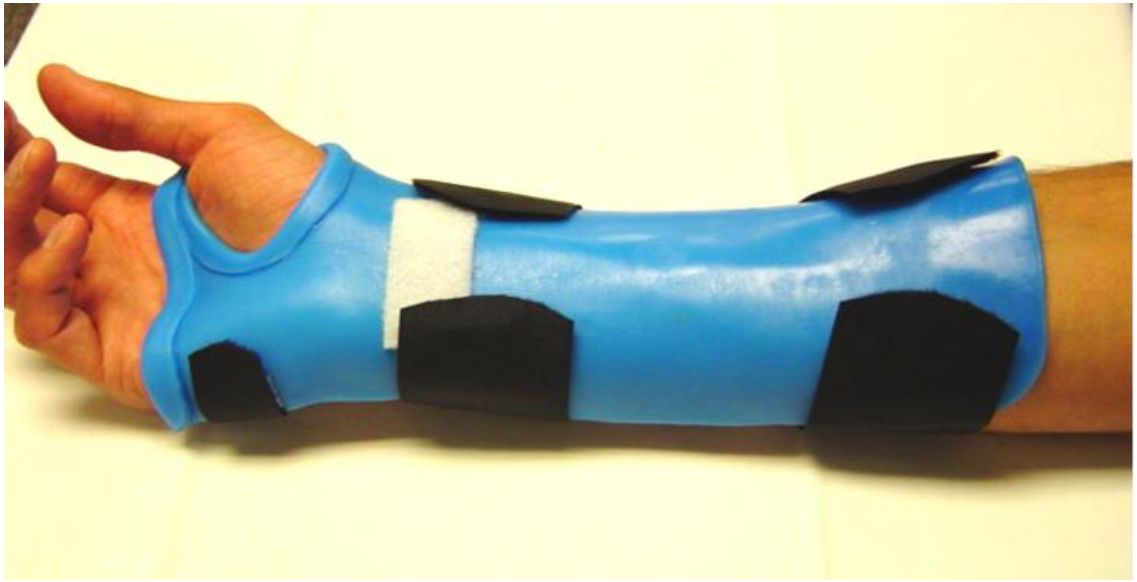
3 weeks post injury

Distal Radius Fracture

Accelerated Protocol

- Days 3-5 Post-Op

  Orthoplast Splint – Patient may remove splint for Light ADL activities - hygiene, dressing, eating, computer work



Accelerated Protocol

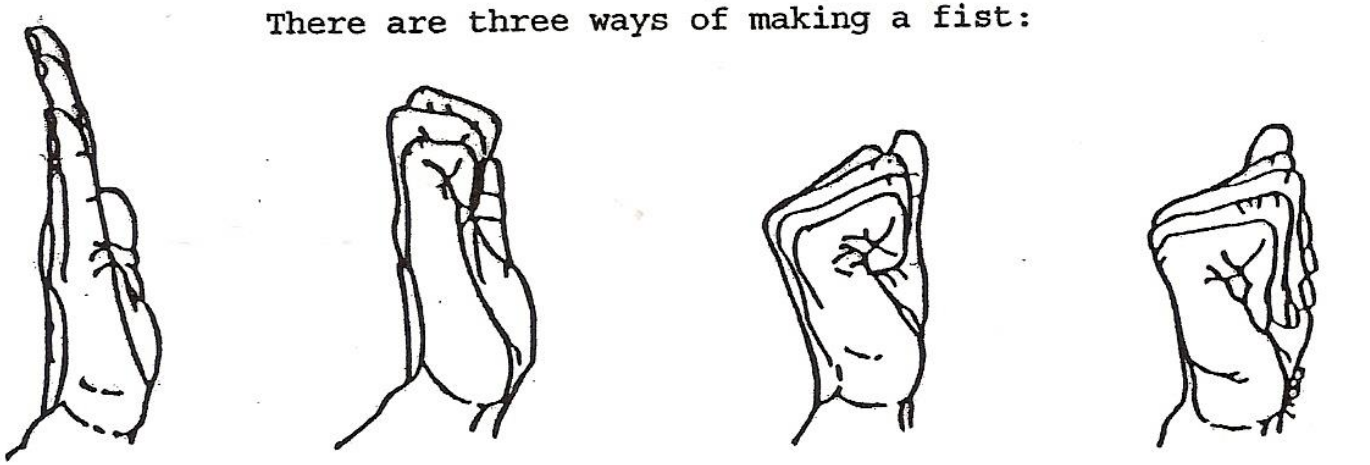
- Case Study:
- 3-5 Days Post-Op
  - AROM for wrist and forearm
    - Ensure patients are flexing/extending wrist with correct muscles by keeping MP joints bent with motion
  - AROM/PROM fingers
  - Edema Control
  - Lifting Restriction – 5 lbs.

Active Range of Motion

TENDON GLIDING EXERCISES

Tendon gliding is a **very important** part of your exercise program.

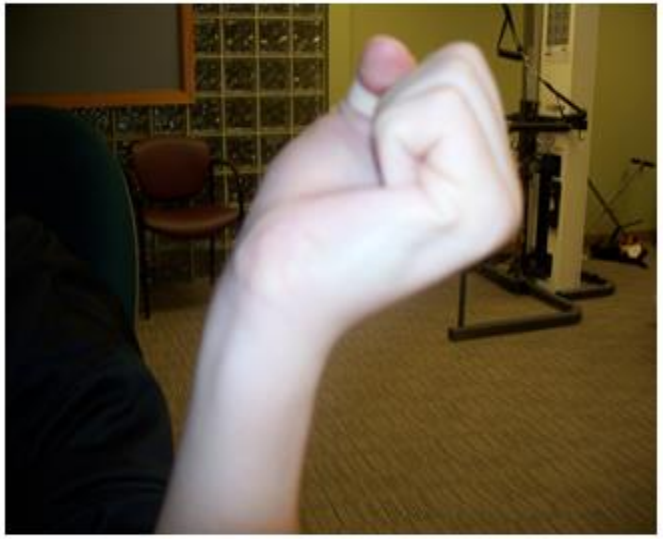
There are three ways of making a fist:



Straight Hook Fist Straight Fist

Accelerated
Distal Radius Fracture Protocol

- Reinforce that wrist extensors – not – finger extensors are used for motion



Accelerated Protocol

- 2 Weeks Post-Op
  - PROM Wrist and Forearm
  - Isometric Exercises
  - Light Putty Exercises
  - Lifting restriction – 10 lbs.

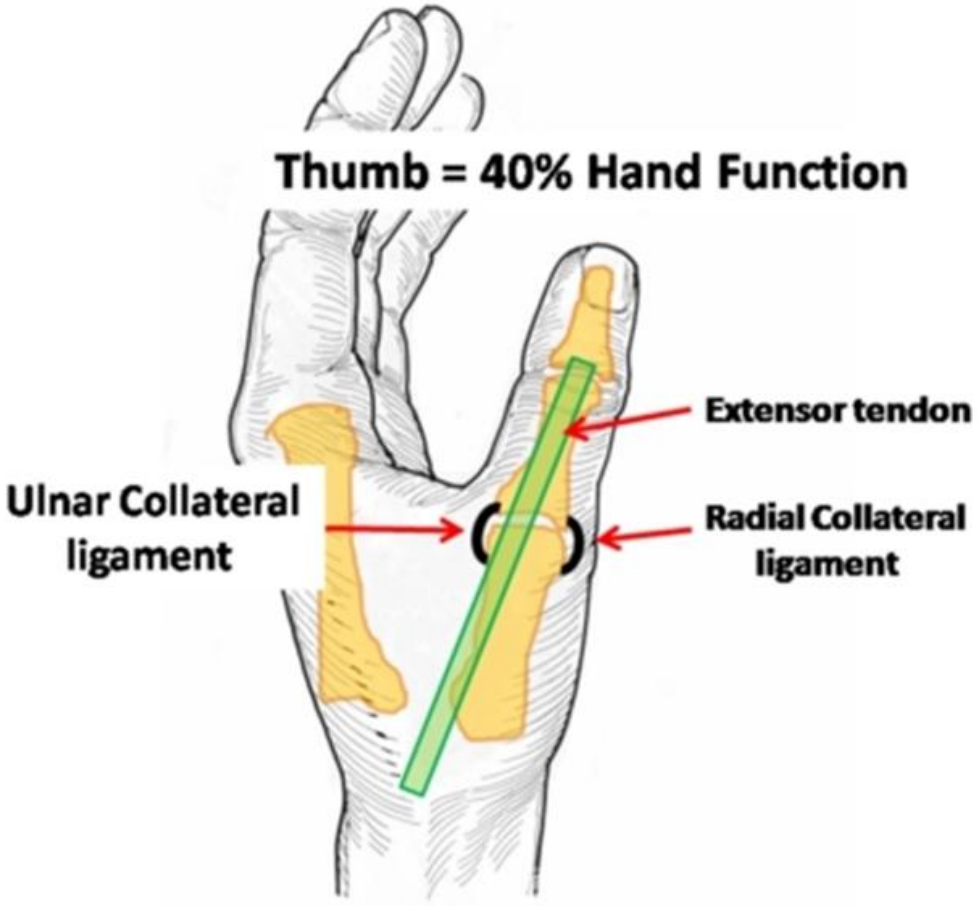
Accelerated Protocol

- 3 Weeks Post-Op
  - Wean from Splint
  - Return to sport – varies by Physician
- 4 Weeks Post-Op
  - Concentric Wrist Strengthening
  - Medium Putty Strengthening
  - Splint Discontinued **
  - Lifting Restriction – 40 lbs.

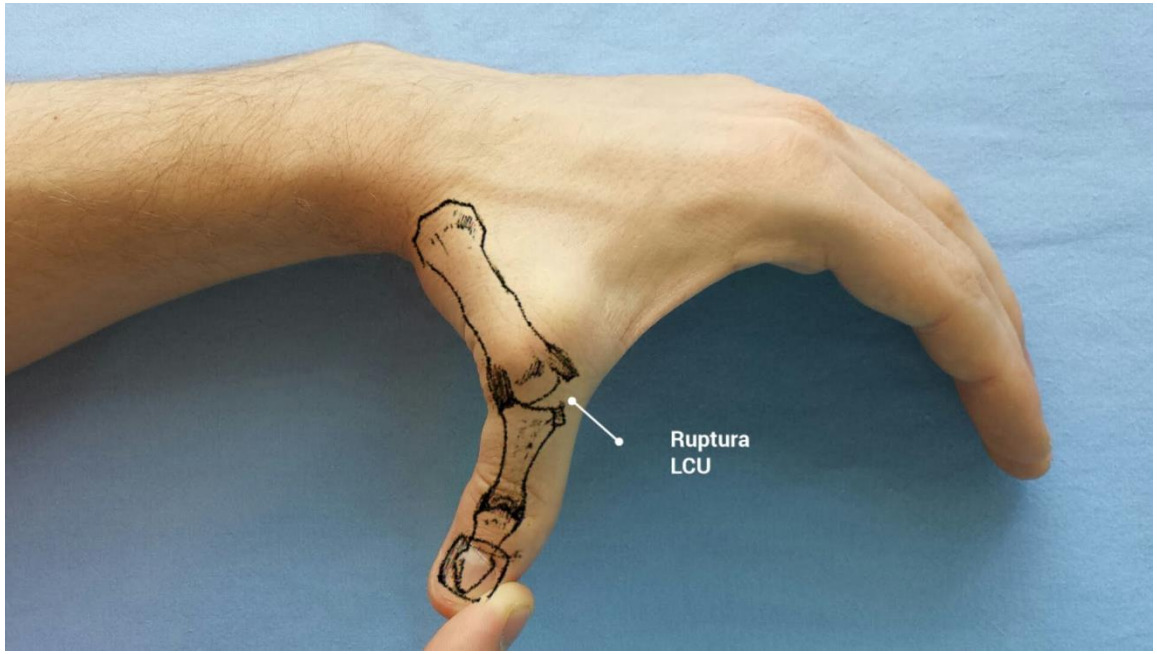
Orthoplast Wrist Splint

Radial or Ulna Shaft Fracture

Ulnar or Radial Collateral Ligament Thumb Injury



Ulnar Collateral Ligament Thumb Injury



Ulnar Collateral Ligament Injury – force applied to digit in radial direction

Thumb Collateral Ligament Sprain Conservative Management

- 0-4 Weeks – Hand based thumb spica splint
- 4-6 Weeks – AROM of thumb – painfree range
- 6-8 Weeks – Unrestricted range of motion
  - Splint for sport activity and protection
  - Gentle Strengthening.Weeks
- 8 Weeks – Splint discontinued for light ADL activities, continued for Sport activities
- ****dependent on joint tenderness.**

Thumb Collateral Ligament Injury Surgical Management

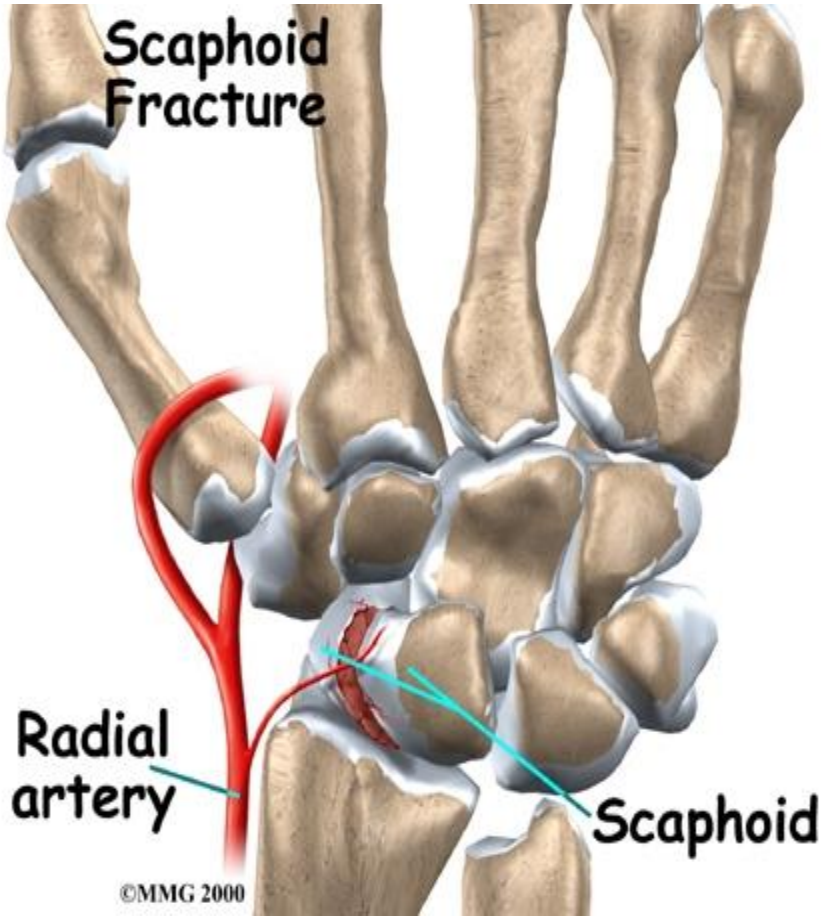
- Initial Treatment – Wrist thumb Orthoplast Splint
- 4 Weeks – Pin Removal and AROM/AAROM to thumb and wrist.
- 6-7 Weeks – PROM to thumb,
- * Avoid lateral strain to thumb
- 8 weeks – Splint discontinued for light ADL Use.
- Possibly continued splint use for heavy hand use and sport


a-Band
EXBAR

Splinting Options

Scaphoid Fracture

- Can be missed on initial X-ray secondary to edema
- Noted by tenderness with palpation at Anatomical snuff box
- Previously typically with surgical intervention and extended period of immobilization – leading to decreased range of motion and loss of ADL function of the hand



Scaphoid Fracture

Scaphoid Fracture

Internal fixation increases position of healing and decreases immobilization time

Reference List

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