Management of Hand Injuries

Hand Therapy Training Program

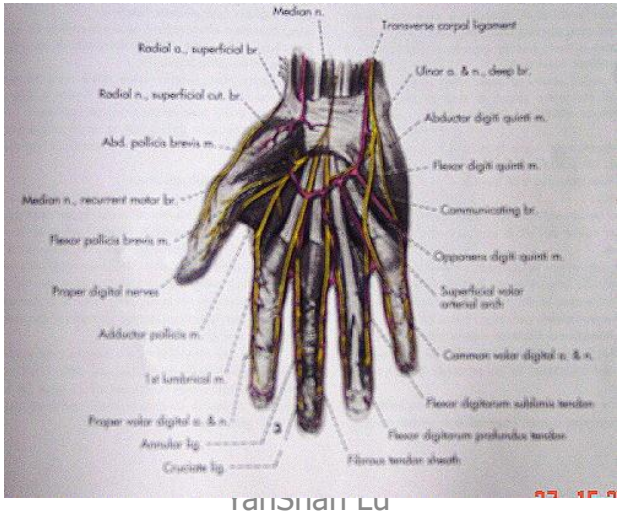
YanShan Lu 2015

The Hand

- “Next to the Brain the Hand is mans greatest asset and to it is attributed the greatest of mans handiwork” Stirling Bunnel

Introduction

- *It has been said that there is no such thing as a 'simple' hand injury although sadly they are often treated as such and with resulting morbidity and chronicity*.
  - (Merritt JHT 1998)



Complexity of the hand

"The Hand is an organ you never just injure one part without a response in the whole organ, the greatest challenge in dealing with hand injuries is to preserve function in all structures not just the injured part."

Merrit JHT 1998

The hand is an intricate organ of subtle mechanics, such that even a simple finger injury can result in significant functional impairment

Multi-tissue interface

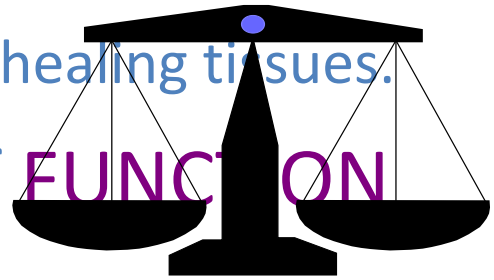
The complex biomechanics of movement in the hand are highly dependent on the ability of one tissue to GLIDE over another.

Injury or pathology involving connective tissue can result in a greater acceleration of collagen syntheses and the resultant fibrosis or scarring that can continue beyond 3 months.

This scar or adhesion binds structures together,prevents normal glide and flexibility, limits function and causes pain.

Principles of HT Treatment

- APPLIED KNOWLEDGE BASE: clinical reasoning and protocol development based on anatomy, biomechanics, pathology, healing, hand function
- EARLY intervention
- TIMING of intervention
- BALANCE between REST and MOTION.
- Restoration of GLIDE between healing tissues.
- Restoration /preservation of FUNCTION



Healing principles

- Knowledge of healing process the foundation for treatment
- an expected reparative process :(inflamation/fibrosis/remodelling)
- skill of the therapist in recognising healing phase and appropriate treatment
- “windows of opportunity” are often missed, they cannot be regained easily since the inevitable sequelae of ever increasing joint stiffness or loss of glide becomes more and more devastating with the passage of time (Fess 1998)

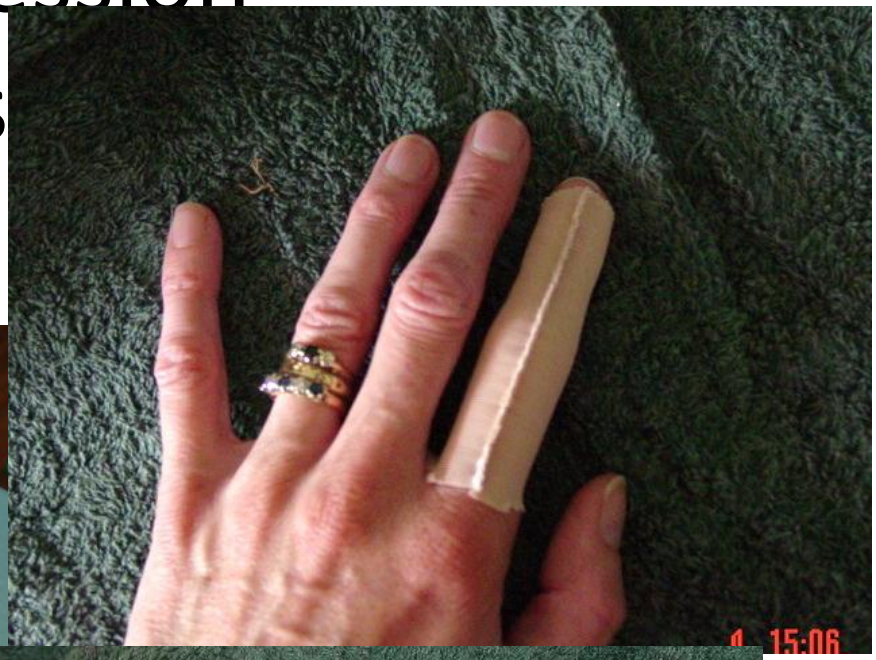
Oedema

The prevention and treatment of oedema are of paramount importance during all phases of management of the injured hand.

Oedema management

- Rest.
  - Splint to prevent patterns of deformity
  - ie in swelling MCPJS extend. PIPJs flex to 30, thumb adducts
- Massage. Lymph drainage
- Elevation.
- Compression

compression glove/ s



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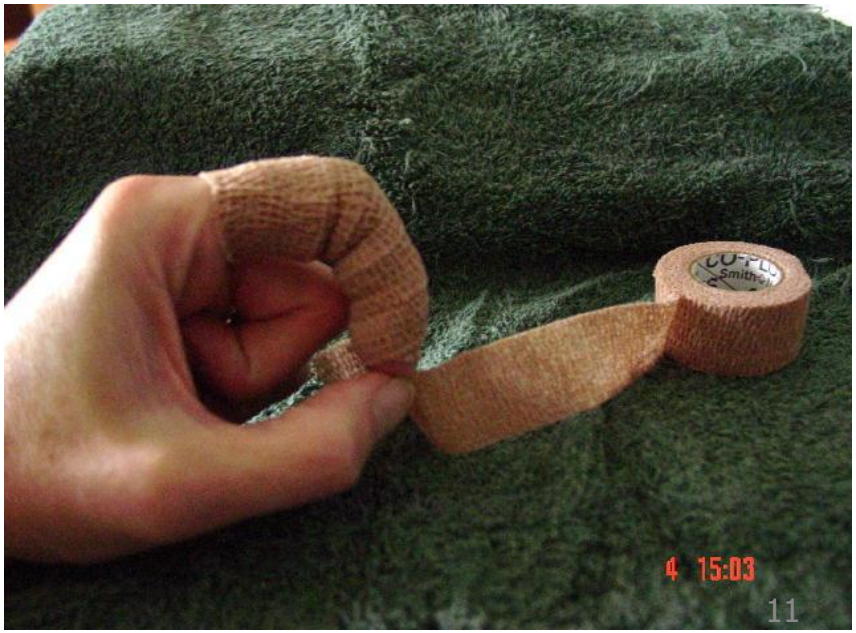

Controlled stress/ early active motion

- Literature to support application of controlled stress to healing structures.(Mason& Allen, Arem & Madden)
- Tendon protocols EPM,ECM,CAM.# bracing (Sarmiento), CPM (Salter)
- Principles can be applied to management of other tissues structures with great benefit.

Principles of Splinting

- Use of
  - LTTP ,
  - neoprene,
  - POP .
  - custom made
- Adjunct to therapy.

- Rest/ Protection /Support.
- Position to prevent deformity
- Mobilisation
- Remodelling
- Substitution
- Assistance

Types of splint: examples

- Static / static resting
- Serial Static / static mobilising
- Static progressive : principle of LLPS
- Dynamic
- semiflexible / soft support

Splints


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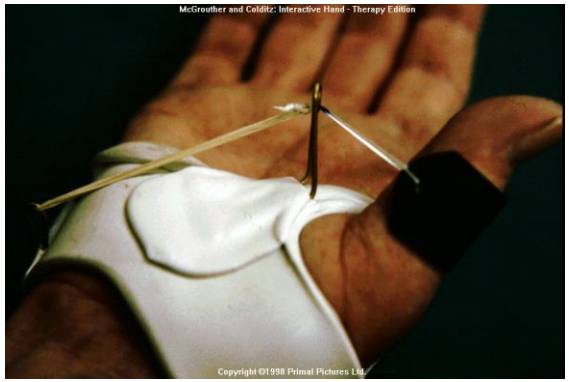
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FINGER INJURIES & HAND FRACTURES

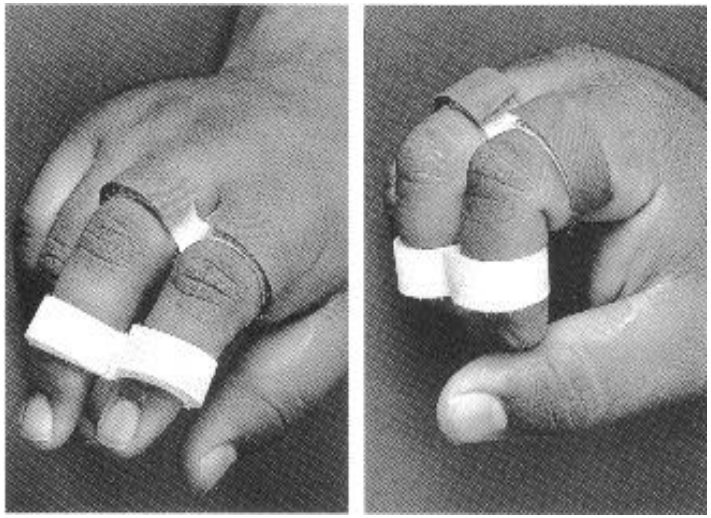
Fracture management.

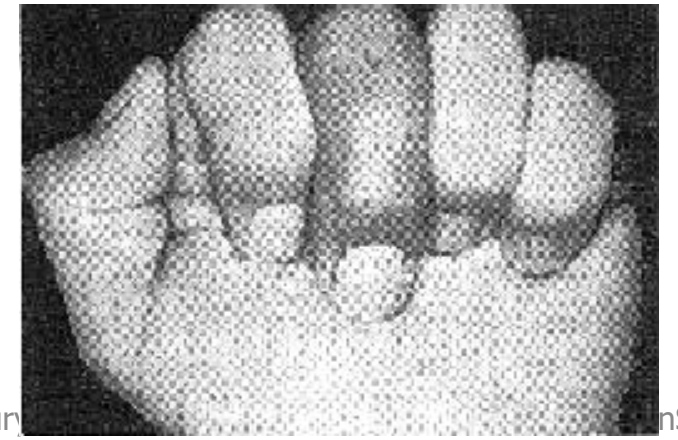
- Initial: Assessment of stability. Correlation of anatomy.
- Importance of management of soft tissue envelope. Associated injury and risk of adherence/contracture. Refer early.
- Where possible:
  - Free/move other joints.
  - position imobilised joints safely
  - Early motion : TGE, NGE
  - Oedema and pain managemnet.
  - Graduated loading post 6/52. graduated function

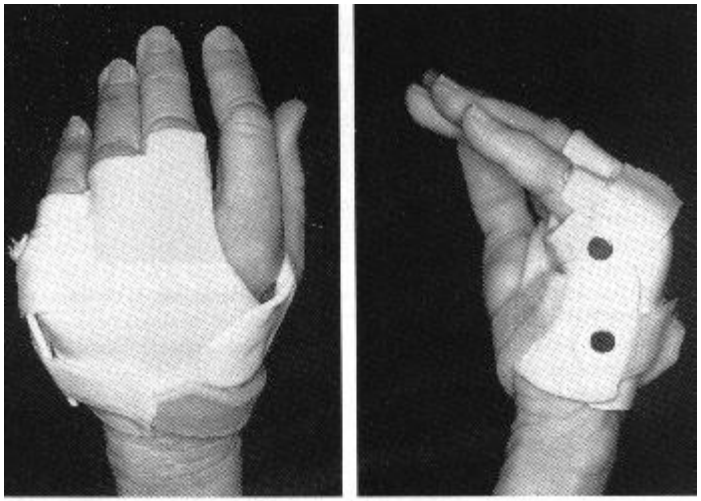
Distal radius

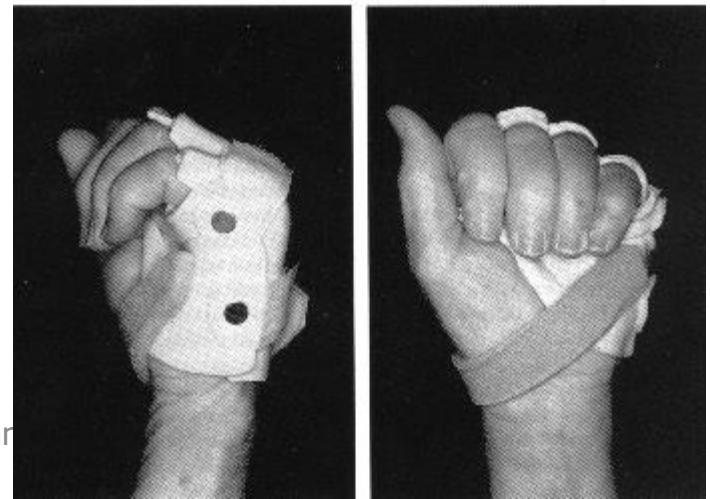
- Initial # management :Restoration of normal anatomy important especially inclination of joint surfaces and DRUJ congruity.
- In POP:
  - should be pain free: risk CTS, CRPS,
  - check FULL finger ROM: risk MCPJ contracture
- Consider referral immediate post POP:
  - very weak wrist extensors, poor grip/function, educate, support etc
  - Early motion.
  - Splints for stiffness
- Likely concurrent ligament injuries.

MP & PP Fractures

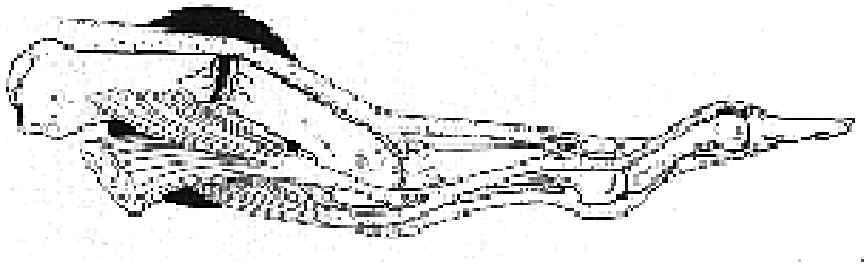








Metacarpal splints



Mallet injuries

- Injury to terminal extensor tendon.
- Splint in 0 - hyperextension 6-8/52
- Skin care
- weaning protocol splint v activity.

Mallet Injuries

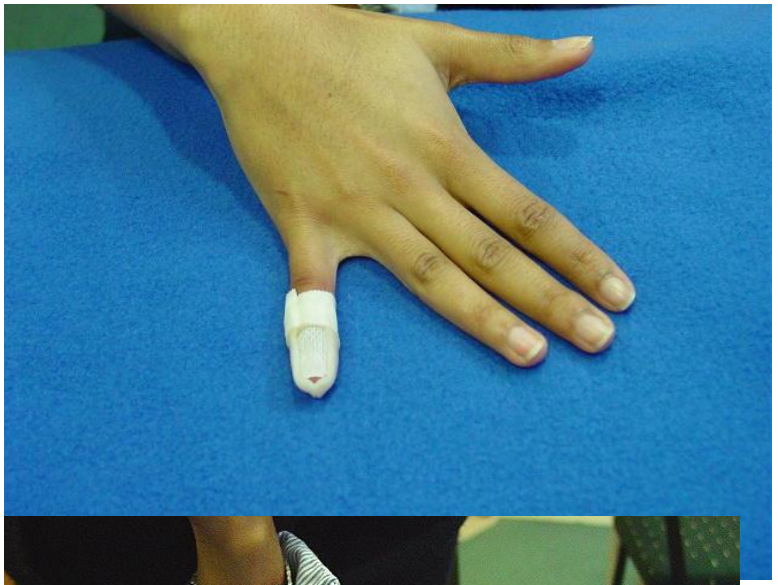
PROBLEMS

- Stax splints
- skin care
- poor follow up
- no weaning

SUGGESTIONS

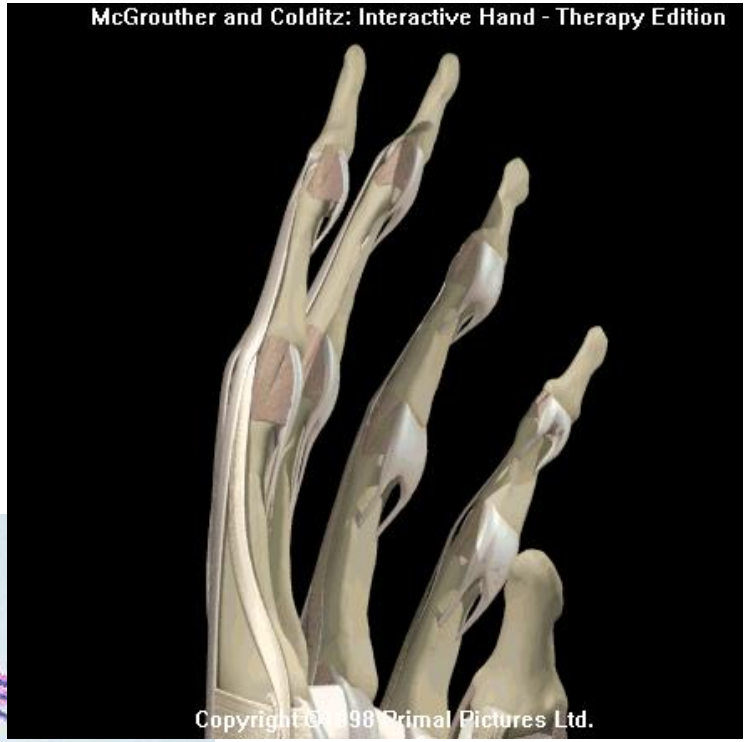
- Early ref. to HT
- customised splint
- extension taping
- supervision
- weaning protocol at 6-8/52

Mallet taping and splintage



PIPJ presentation

PIPJ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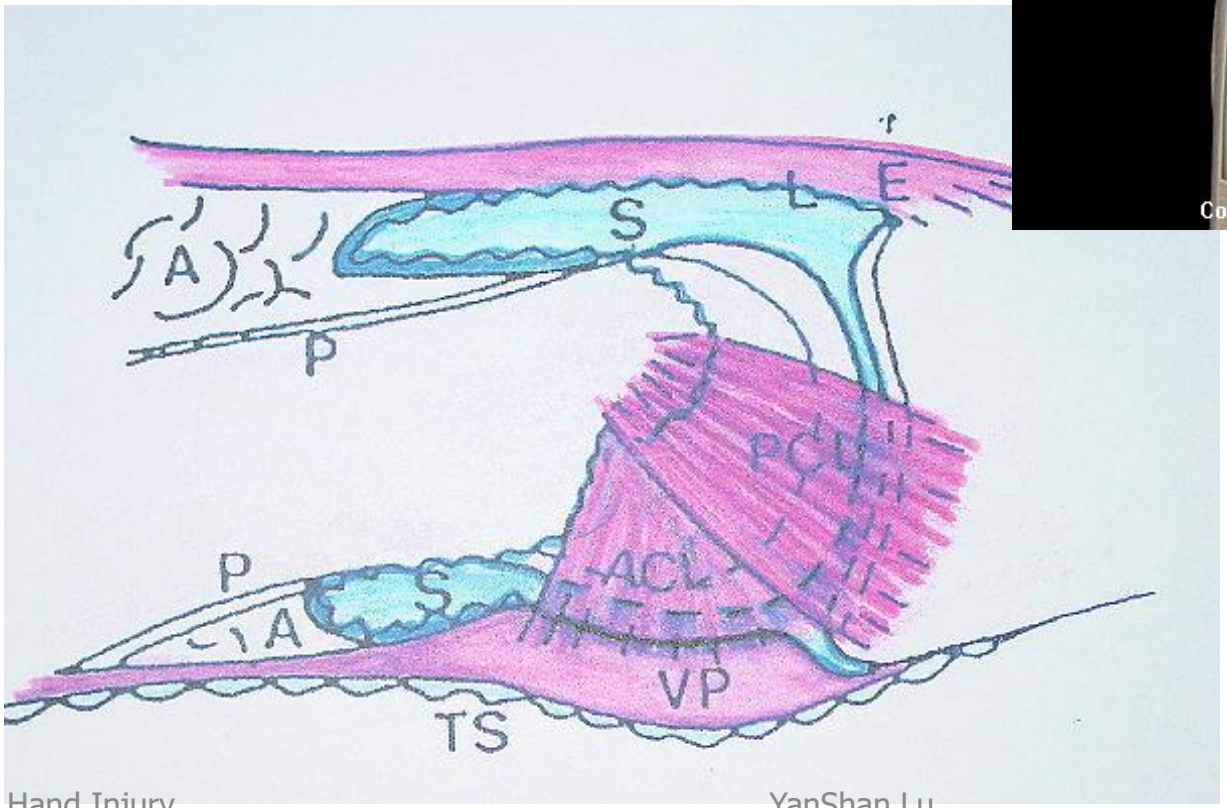
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PCL
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VP
TS

PIPJ Injuries

- Hyperextension injuries
  - Type 1 Hyperextension. VP avulsed and incomplete CL tear.
  - Type 2 Dorsal dislocation VP avulsed. Complete CL tear. No articular contact
  - Type 3 # dislocation. Stable if # < 40% a/s
- Hyperflexion injuries
  - the Boutonniere deformity

PIPJ Injuries.

PROBLEMS

- small joint = small problem.
- Extent of injury not obvious
- inappropriate splintage
- poor follow up

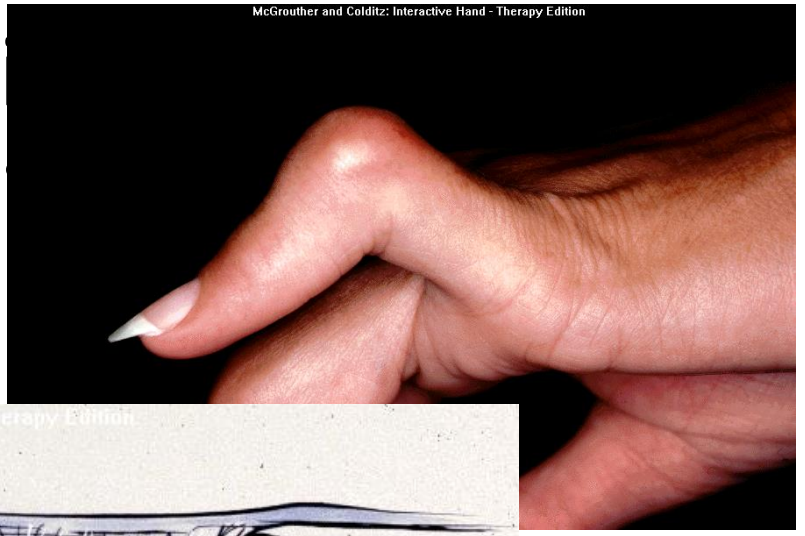
SUGGESTIONS

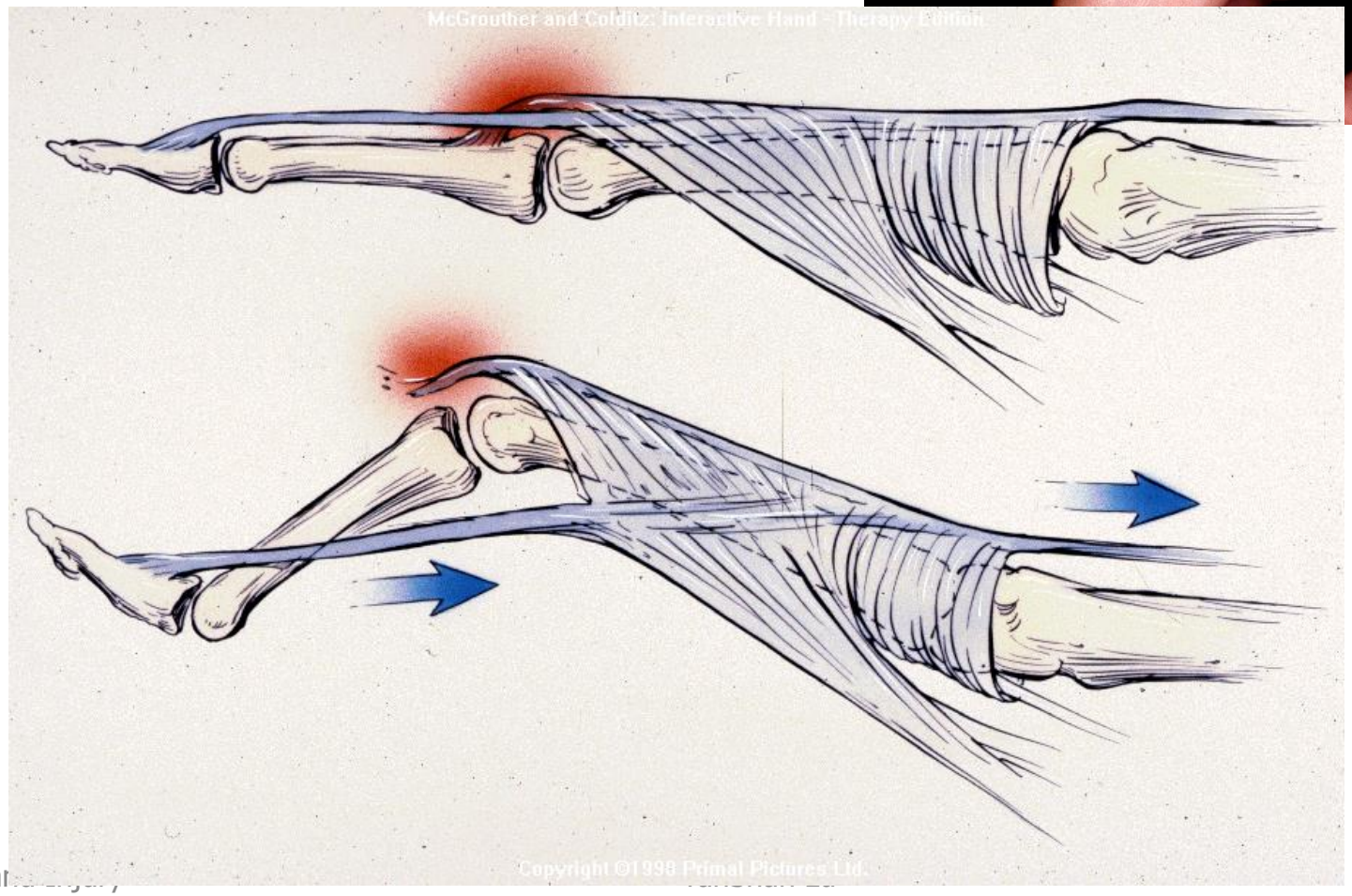
- small joint = complex problem
- listen to history
- early intervention
- appropriate splintage
- adequate follow up, ECM, oedema control

Volar plate management

Boutonniere

Boutonni
deform

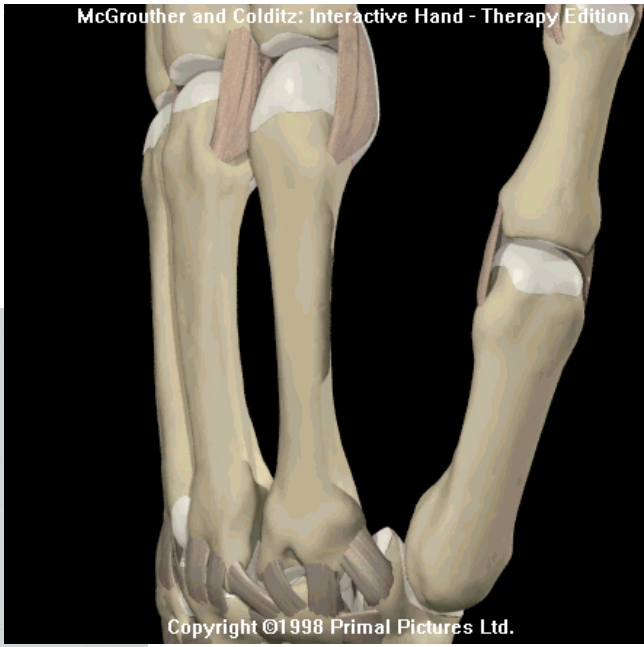




PIP splint option

PIPJ dynamic splints

MPJ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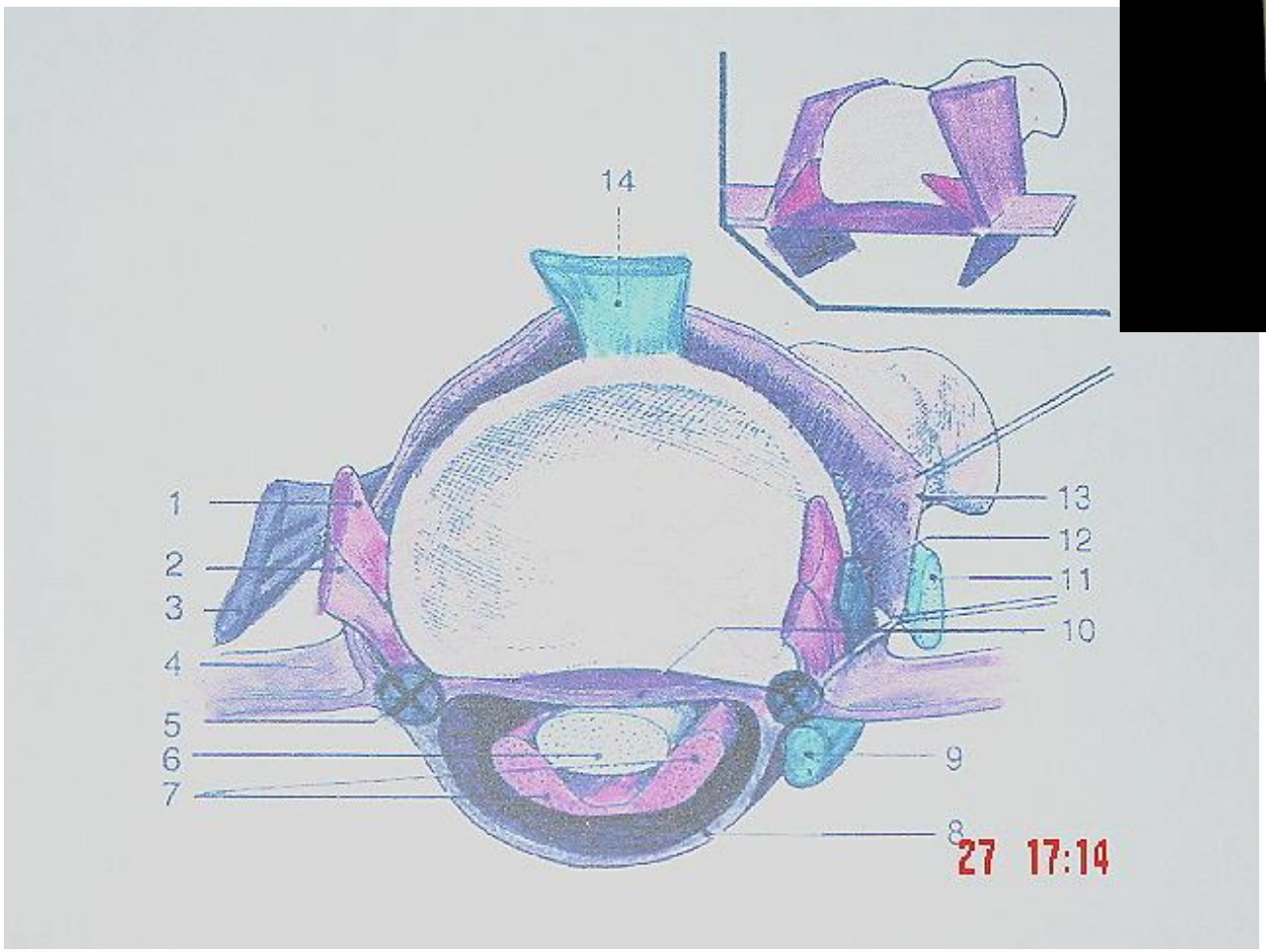
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MPJ strains

- Trauma and repetitive use injuries
- Trauma: joints easily stiffen and fibrose into extension with loss of functional flexion and grip.
- Intrinsic muscles often injured or strained.
- PC and mouse ,intrinsic overload.

Thumb UCL injuries

- Skiers or game keepers thumb
  - Abduction strain.UCL ligament
  - Can include # avulsion.
  - Stener lesion
- Splint 4-6/52 then graduated mobilisation.

UCL thumb splint

Wrist pain

"Beware the sprained wrist"

Dorsal Extrinsic ligaments

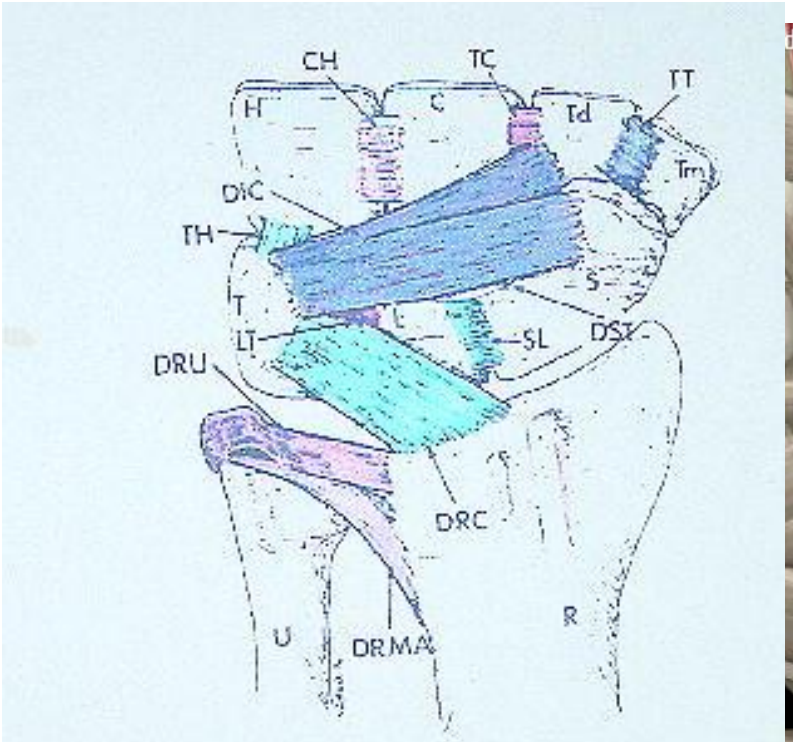
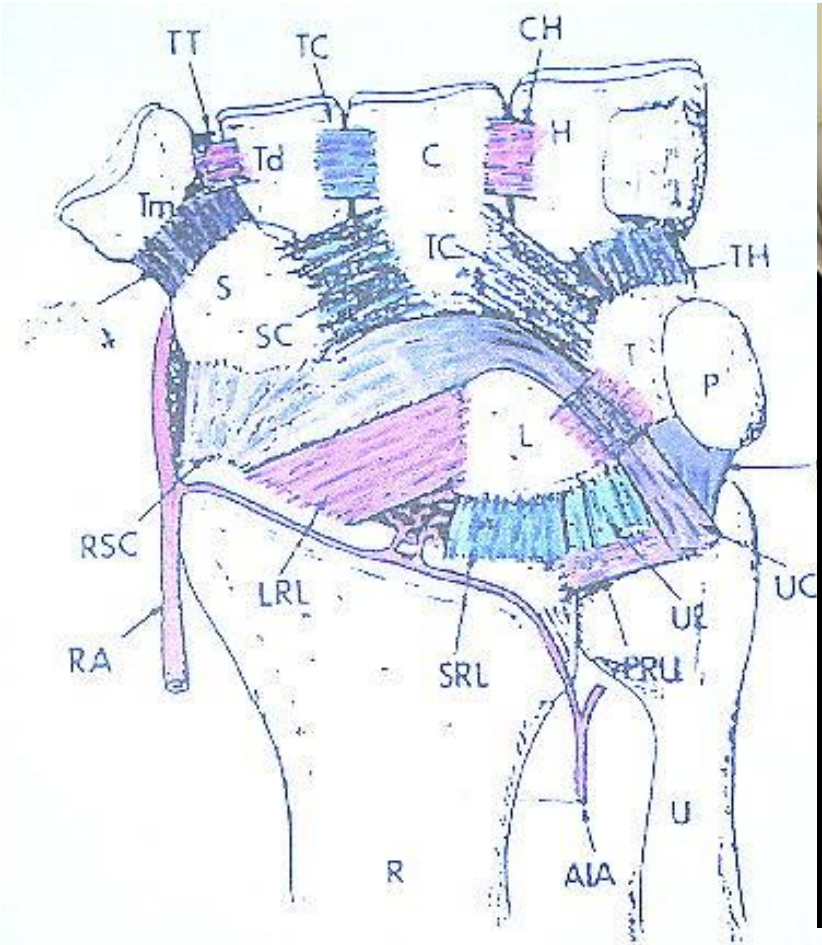
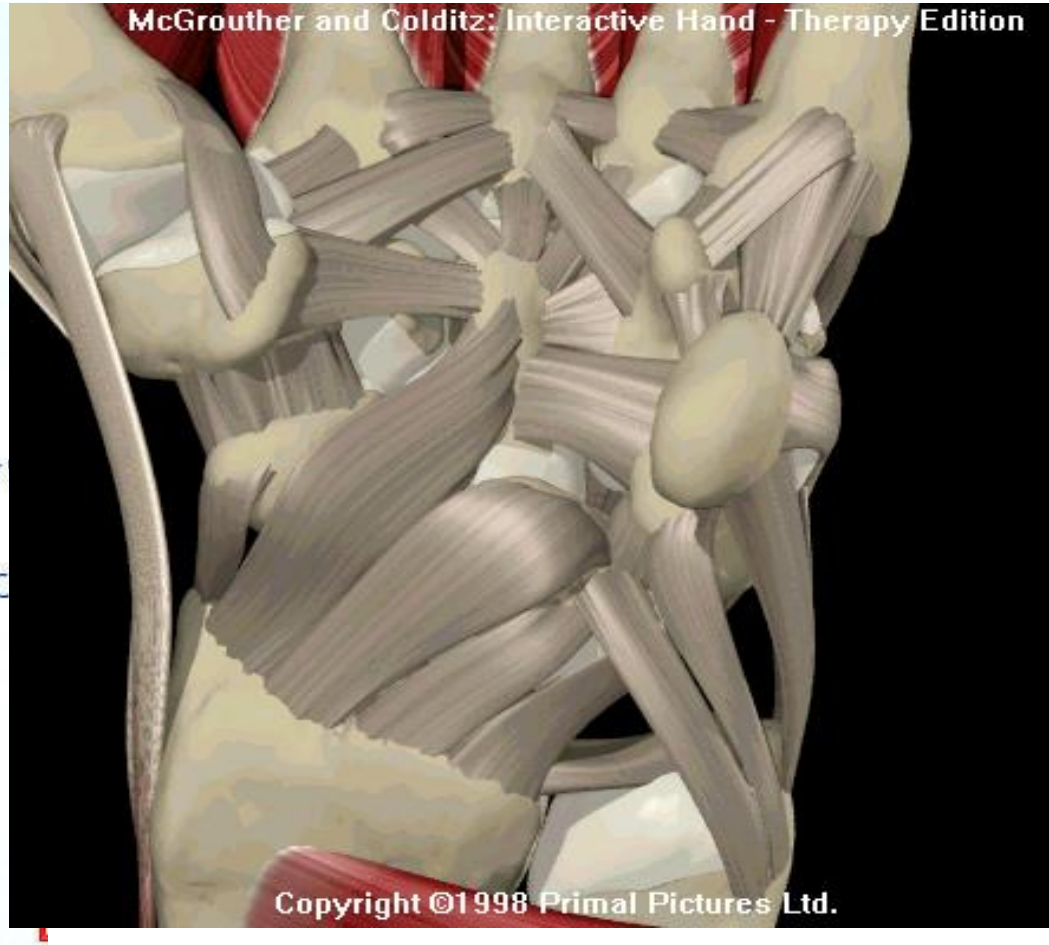


Figure 15. The dorsal carpal ligaments from a dorsal perspective. Ligaments: DRU = dorsal radioulnar; DRMA = dorsal radial metaphyseal arcuate, DRC = dorsal radiocarpal; DIC = dorsal intercarpal; DST = dorsal scaphotriquetral; SL = scapholunate; LT = lunotriquetral; TH = triquetrohamate; TT = trapeziotrapezoid; TC = trapezocapitate; CH = capitohamate. Bones: R = radius; U = ulna; S = scaphoid; L = lunate; T = triquetrum; Tm = trapezium; Td = trapezoid; C = capitate; H = hamate.

Volar Extrinsic Ligaments





HT approach to wrist pain

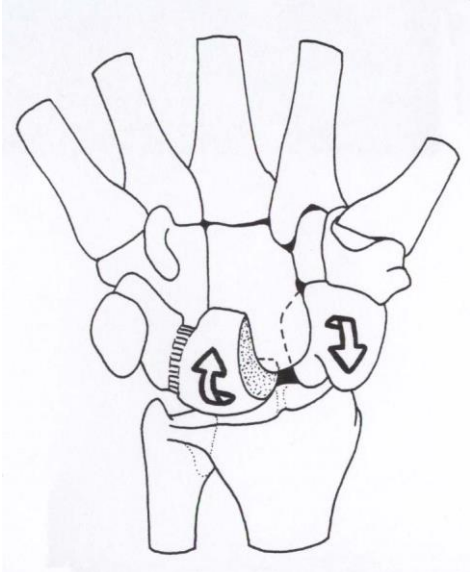
- Subjective history the key.
- Systematic objective assessment to determine, limitations, location of symptoms, with provocative tests to assess stability.
- Sprain or mild instability:
  - Tape or splint to allow tissue healing.Avoid provocation.
  - Strengthen & Restore function
- Suspect instability : splint to assist function and refer to HS.

Radio carpal pain

- Differential diagnosis
  - Scaphoid #
  - Scapholunate pathology
    - Dorsal wrist strain
    - SLD.
    - Keinbocks
  - Basal thumb pathology:CMC or STT
  - De Quervains or Intersection tendonosis/it is
  - Neural

SLLI symptoms.

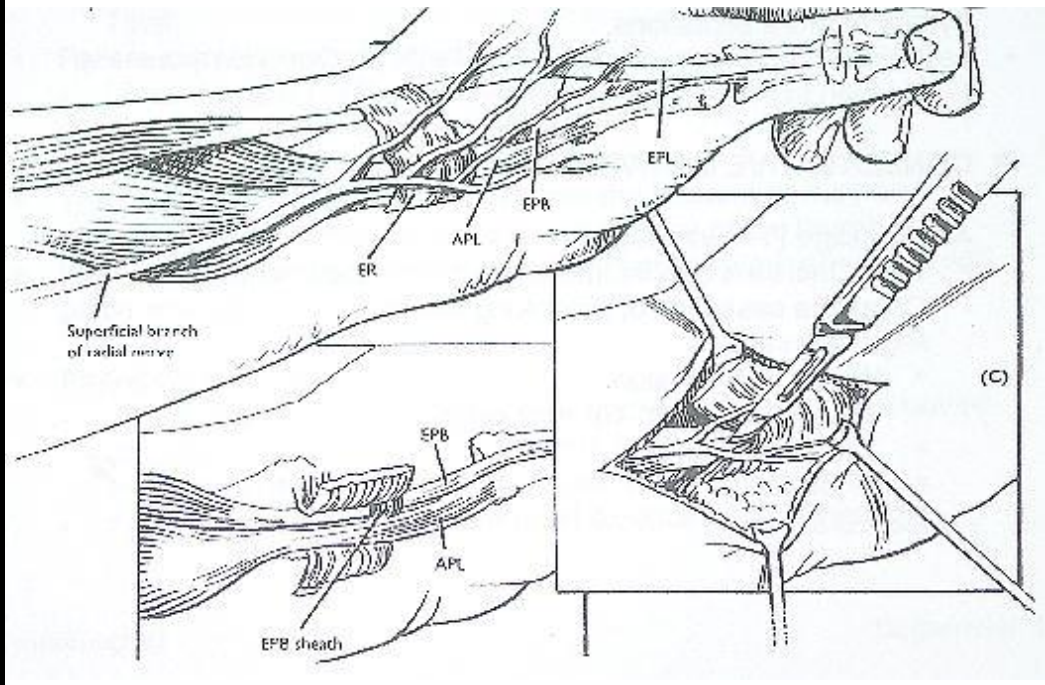
- S&S
  - history indicative. Weak grip. Loss of flexion
  - local tenderness & synovitis:SLI, scaphoid
  - STT tenderness
  - Watsons Scaphoid Shift test
  - FET
  - xray changes: clenched fist, DISI.



SLLI Management

- Predynamic: DWS
  - splint 6/52
  - avoid provocative activities
  - strengthen
- Dynamic
  - Assess, dynamic x-rays, splint
  - refer to specialist for investigations (MRI) and likely surgery.

Radial extensors



De Quervains

- Tenovaginitis or tendonosis of 1st compartment Extensor tendons.APL and EPB.
  - Triggered by overuse/overload. ? Often a muscle overload/injury initailly, alter mechanics at tendon pivot.
  - ? Inflammation v Degeneration: or other
  - Treatment
    - splint to rest+/-NSAIDS :activity modulation.
    - Treat whole MTU. Trigger point release /massage
    - Gradual mobilisation to restore normal MTU length
    - HCI if not improving by 3/52
  - Surgery to release compartment

Finklesteins test &splints

De Quervains splint

DISTAL RADIOULNAR JOINT INJURIES

- The triangular fibrocartilage complex (TFCC) consists of
  - Triangular fibrocartilage proper (articular disc)
  - Meniscal homologue
  - Radioulnar ligaments
  - ECU sheath
- The ulnocarpal complex (UCC) includes
  - Ulnotriquetral and ulnolunate ligaments
- DRUJ stabilised by these two complex ligamentous structures

Ulnar wrist pain

- Ulnar side wrist pain, often recalcitrant
- Prominent ulna head / supinated carpus
- changes with rotation, both alignment and grip strength
- Pain with gripping /twisting, esp loaded
- Pain with ulnar deviation, pronation,
- Tendency towards VISI on X ray.
- Provocative tests, Piano Key, Shear test, Ballottement, Relocation, GRIT, ECU

DIFFERENTIAL DIAGNOSIS.

DRUJ:

- Incongruity post #, oa
- Instability:
  - TFC tear radial (#DR)
  - TFCC tear peripheral
- Impingement:
  - TFC wear/tear central
  - Ulnar carpal abutment (+ve ulnar variance)

ULNAR CARPUS

- Instability:
  - TFCC (VUCLigs /ECU sheat)
  - LTL.
- Inflammatory
  - ECU tendonoitis
  - FCU tendonitis
  - Piso triquetral

Ulnar carpal management

- Specific structural diagnosis
- splint or strap to support weak or healing structure, eliminate pain and enhance function (3-8/52)
- avoid provocative activities
- local soft tissue Treatment
- strengthen muscle function.

Ulno carpal strap or splint

Arthritis

- Assessment, advice and education
- safe exercises to maintain range and strength
- joint protection strategies
- splints to support weak , unstable or painful joints. Neoprene (soft splints) or thermoplastic

Summary

- Consider Hand Therapists as a Health professional with considerable expertise and experience in management of Hand & Upper limb injury and pathology.
- Consider Early referral to minimise risk of morbidity.

The End !

Aknoledgement

Julie Rouse

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