Hand Therapy for Trauma

A BRIEF OVERVIEW.

Assess

- Gather information from referral, surgeon's notes, including PMH, DHx
- Essential to record handedness along with all else regarding mechanism, injury, timescale, surgery
- Dig down to find out detail re ADL for work, home, recreation
- Understand effect of injury on personal circumstances eg self employed, any sick pay, dependants
- Work out any barriers to successful treatment/rehabilitation and how to tackle these.
- Pain - score

Assessment

- OBJECTIVE
- Colour, Deformity, Wounds,
- Oedema- how much ?
  measure and record
  Is it causing deformity,
  Will it create resistance?
- Range of Motion – measure what you can,
  record what is limiting movement?
  Is it swelling, tight soft tissue
  contracture, joint stiffness, pain?

Aims of Treatment

- Reassure
- Reduce oedema
- Reduce pain
- Protect
- Regain range of movement
- Keep tendons gliding
- Prevent deformity
- Restore function

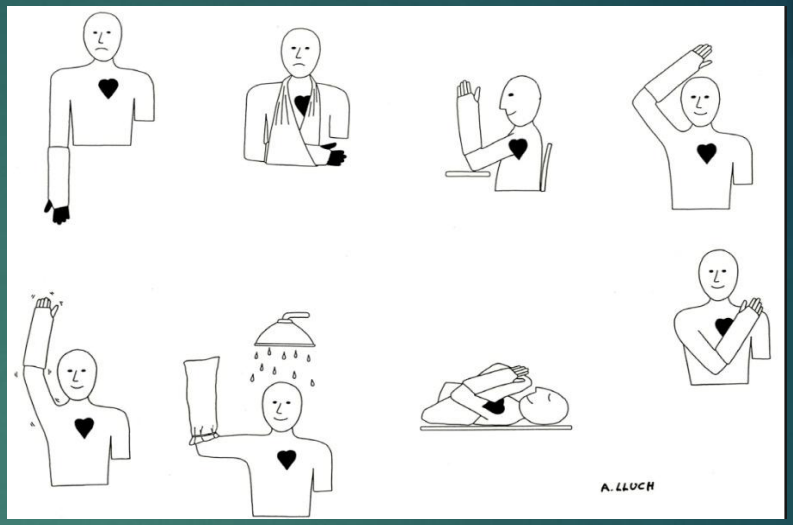
Oedema A swollen hand adopts the intrinsic minus position

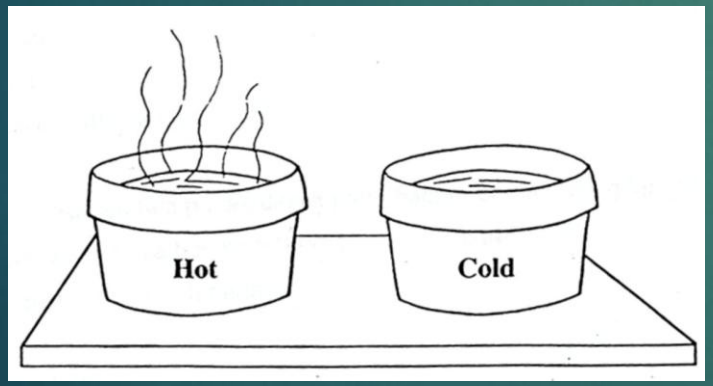
.

Reducing swelling allows a safer resting position, less resistance to motion and helps with pain and stiffness

Oedema Management

ELEVATION
COMPRESSION
SPLINTING
COOLING
ACTIVE EXERCISE
MASSAGE





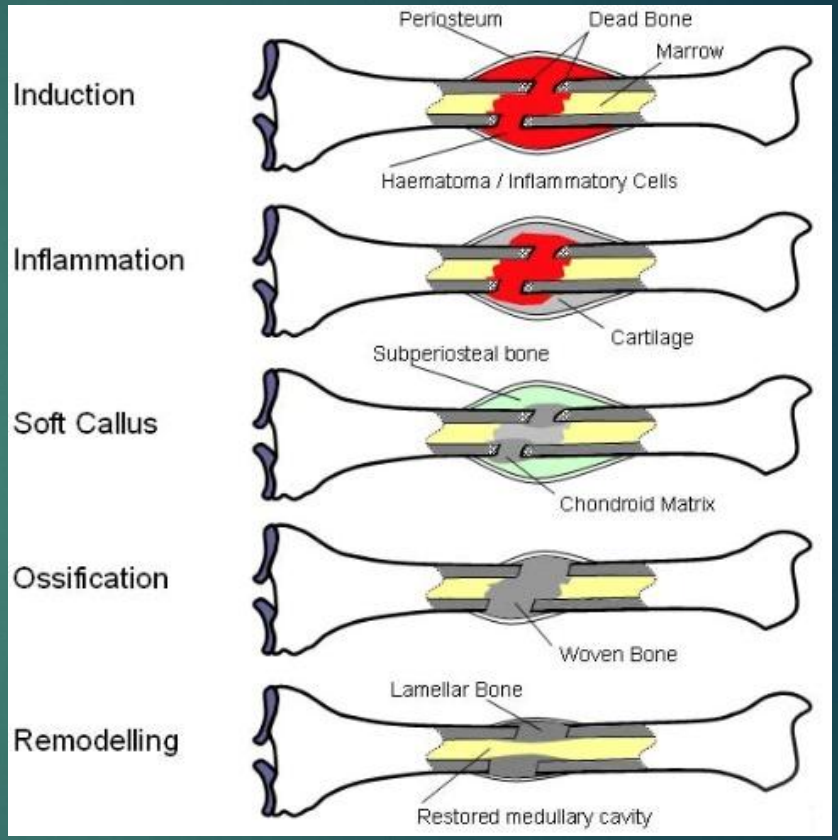
Careful of compression bandage

PAIN MANAGEMENT

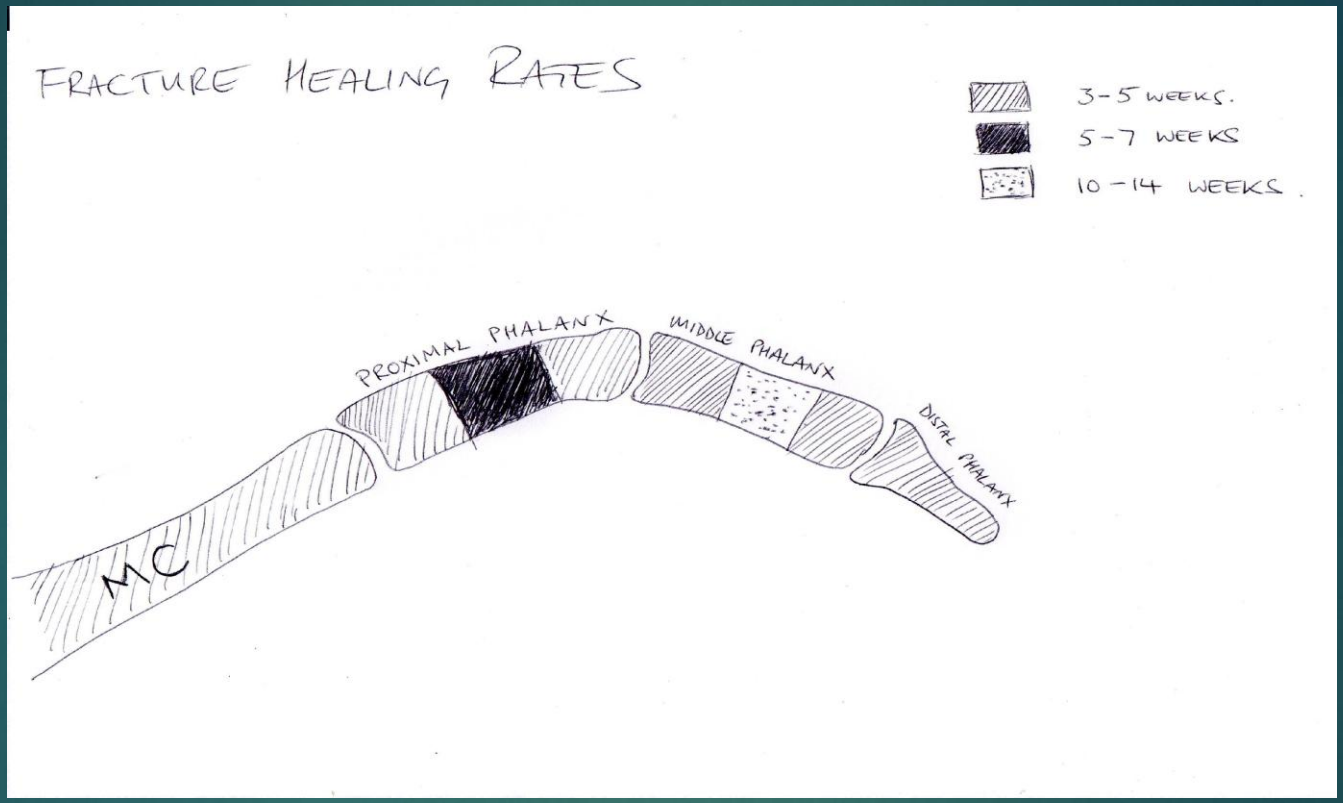
- Reduce Oedema!
- Movement
- Splinting
- Cool/Warmth
- Pain killers
- Wax – not at the inflammatory phase
- Reassurance
- Education

What is a fracture?

- A partial or
- complete break
- in the bone or
- cartilage



Fracture Healing Times



Fractures

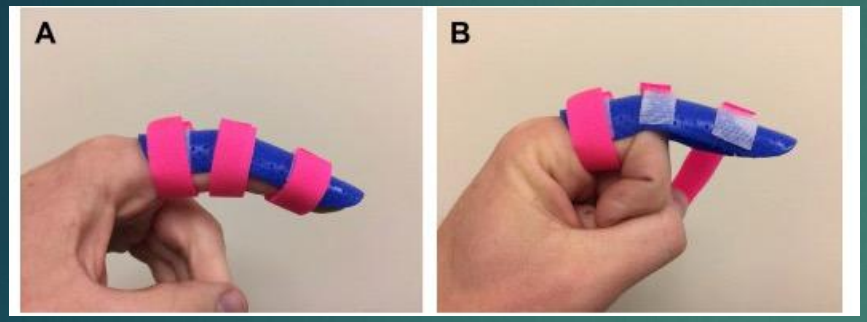
Fractures

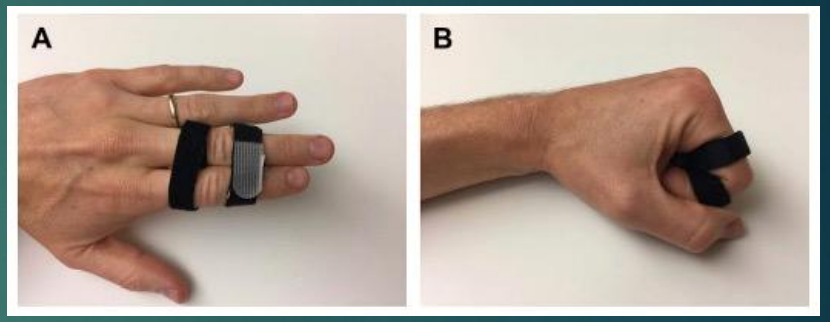
Protect: know what is stable

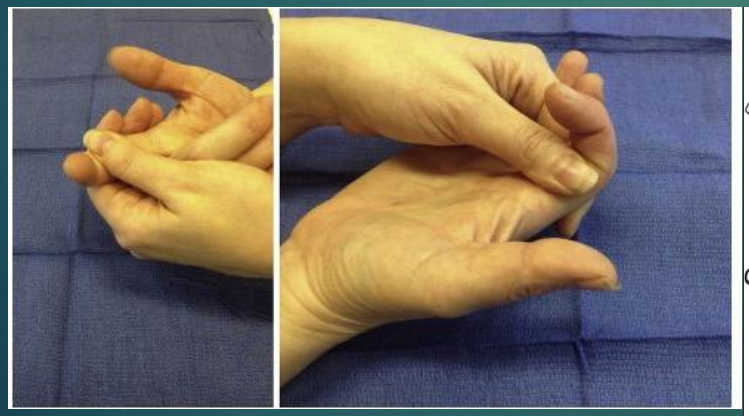
RESTORING/MAINTAINING Range of movement

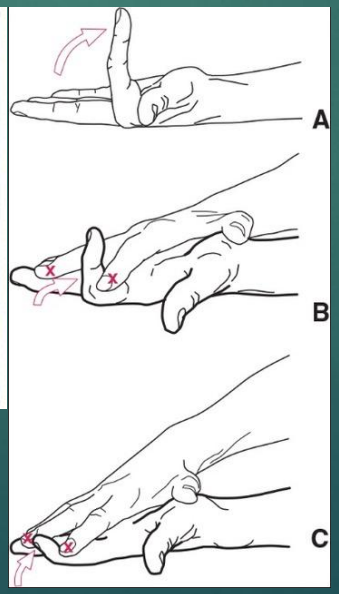
- Finger Fractures
- Active Only until 4-6 weeks
- If stable start ROM at 24 to 36 hours
- Check what you shouldn't move
- Start isolated supporting other fingers and individual joints then progress to composite
- Rest between exercises
- Little and often – at least 2 hourly
- EDUCATE

Active exercise

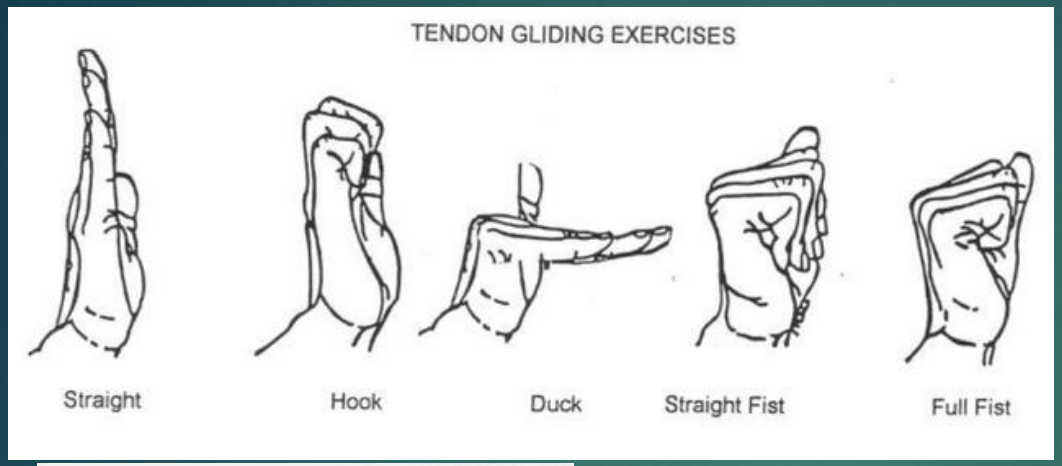


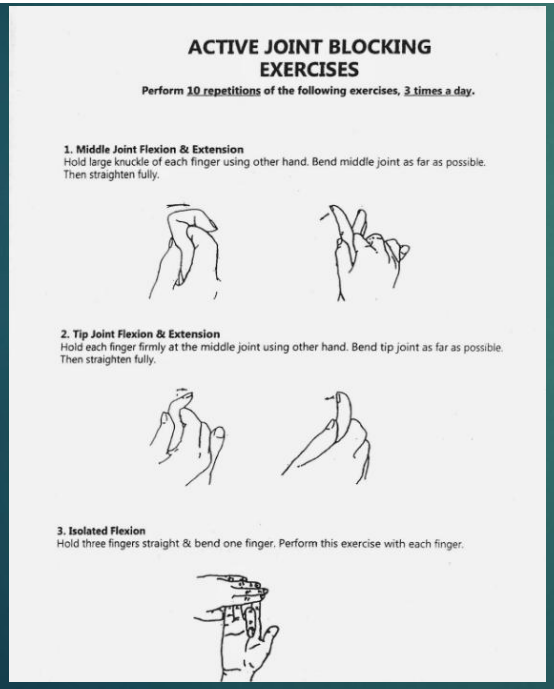






Tendon Gliding

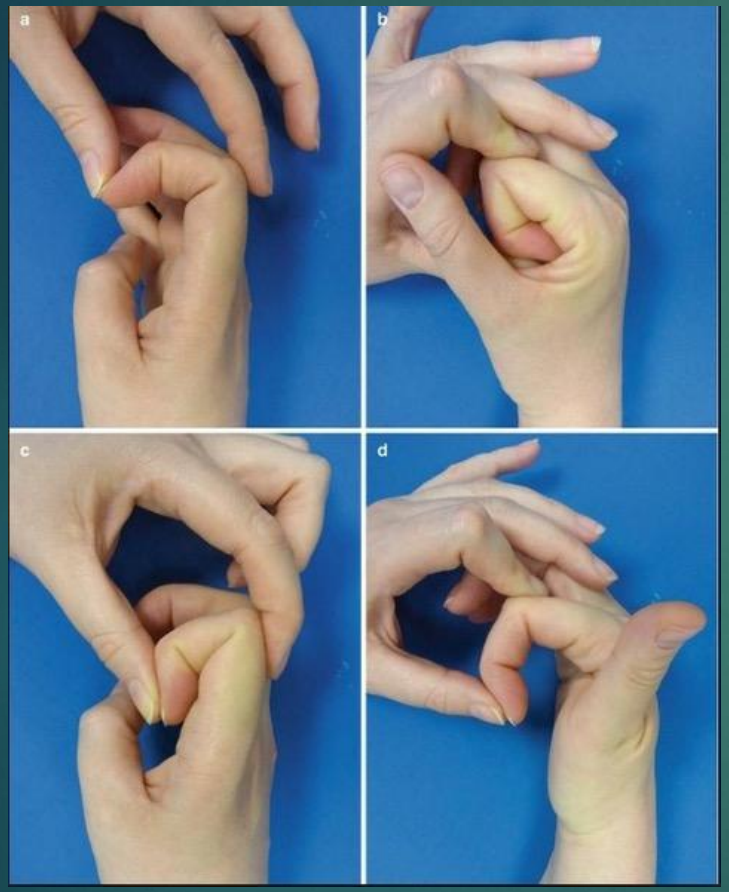




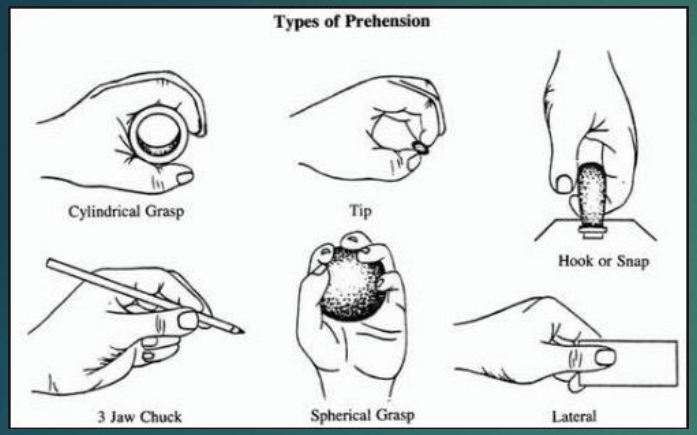
PASSIVE RANGE OF MOTION

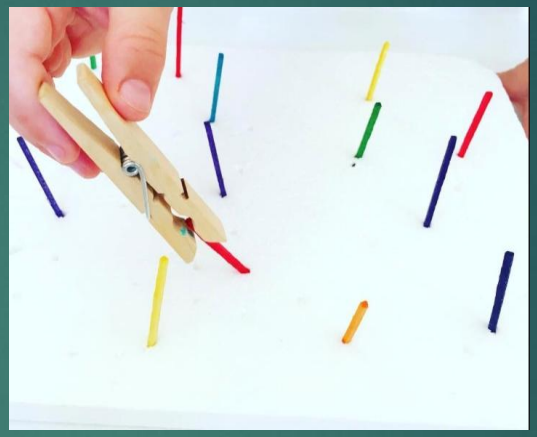
- Start at 4-6 week
- Isolated then composite
- Might need to be helped along with splinting.
- Use heat if safe

Passive exercises



Progress to functional exercise





Metacarpal Fractures

Metacarpal Shaft	Immobilization	AROM	PROM	Strengthening	Considerations
Nondisplaced, stable	Forearm-based radial/ulnar gutter splint in safe position IP joints free Removable for therapy	Immediate as tolerated Buddy tape to neighboring digit	~4 wk with radiographic evidence of healing	~6–8 wk with evidence of healing	—
Closed reduced, stable	Forearm-based radial/ulnar gutter cast in safe position ~3–4 wk IP joints free	~3–4 wk Transition to removable radial/ulnar gutter splint	~5–6 wk with radiographic evidence of healing	~6–8 wk with evidence of healing	—
CRPP	Initially, bulky volar resting splint Then, forearm-based radial/ulnar gutter cast in safe position IP joints free	~3–4 wk Transition to removable radial/ulnar gutter splint	~5–6 wk with radiographic evidence of healing	~6–8 wk with evidence of healing	Removal of hardware ~4–6 wk with evidence of healing
ORIF	Initially, bulky volar resting splint Then, forearm-based radial/ulnar gutter splint in safe position IP joints free	Begin at first follow-up visit Radial/ulnar gutter splint for protective and nighttime wear	~3–4 wk as tolerated	~6–8 wk with evidence of healing	Scar massage Tissue gliding

Metacarpal SPLINT for head and neck fractures.

Allows the IPJs to remain mobile, tendon gliding to occur and wrist is free

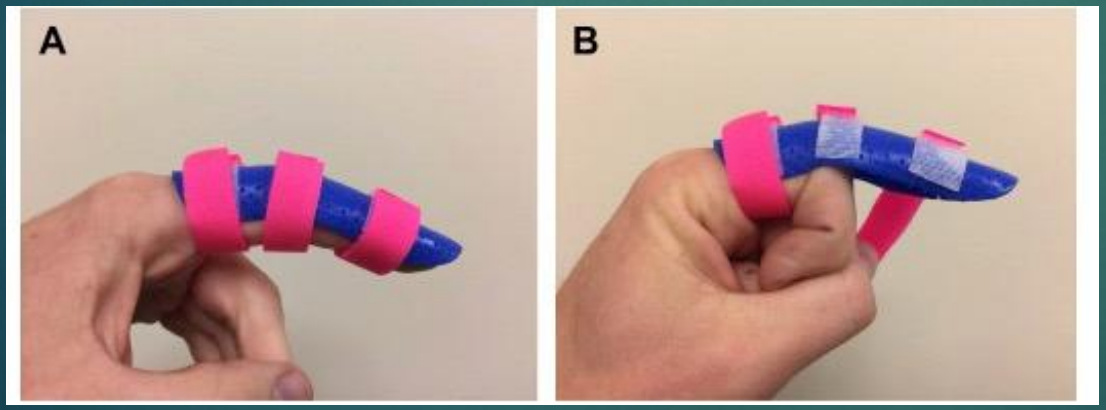
Metacarpal splint for base or shaft fractures

The position keeps the fracture stable but allows the IPJs to mobilise maintaining ROM and tendon excursion

Dislocations

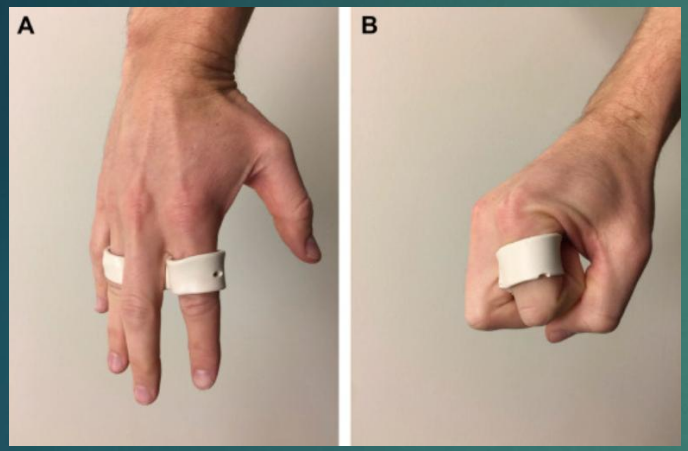
Fracture dislocations of the PIPJ

- Common injuries
- At risk of developing extensor lag
- At risk of developing FFD
- They do well with this regime but need to be kept an eye on.



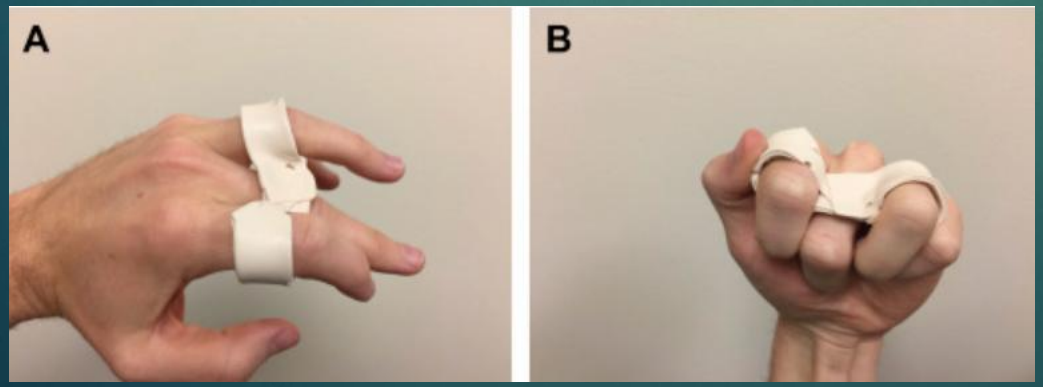
Ideas for complications

- Splints
- Relative Motion Flexion Splint

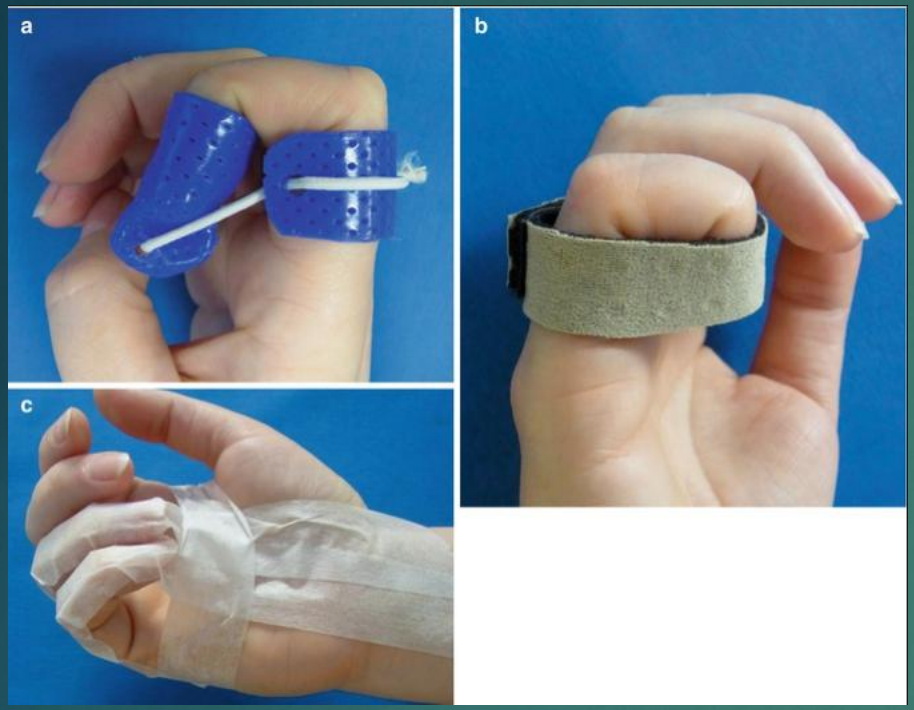


POP Serial splint.

- Relative Motion Extension splint



More Ideas

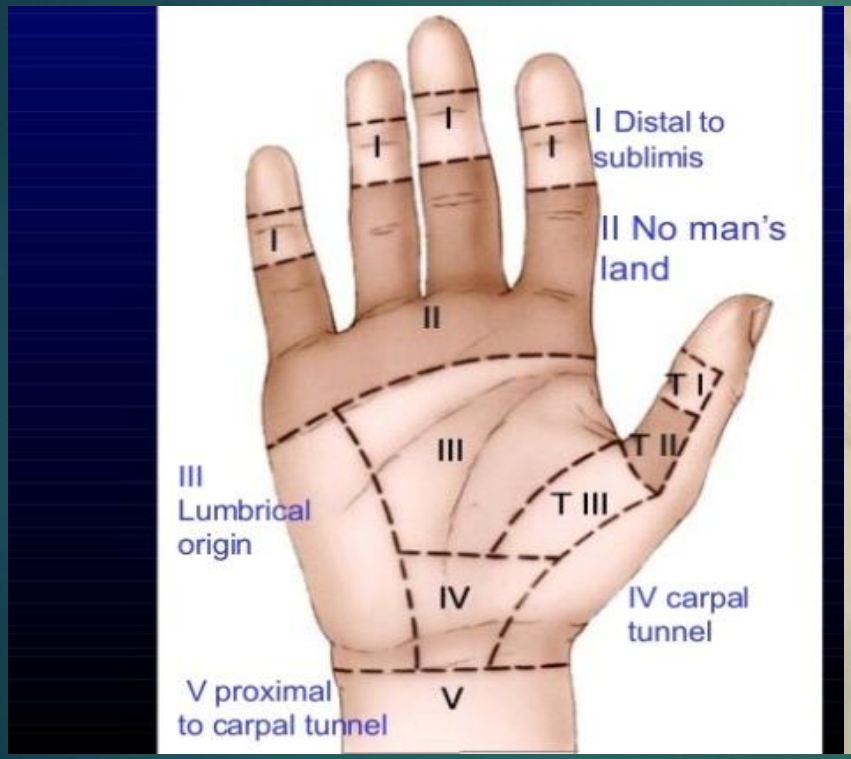


Tendon injuries

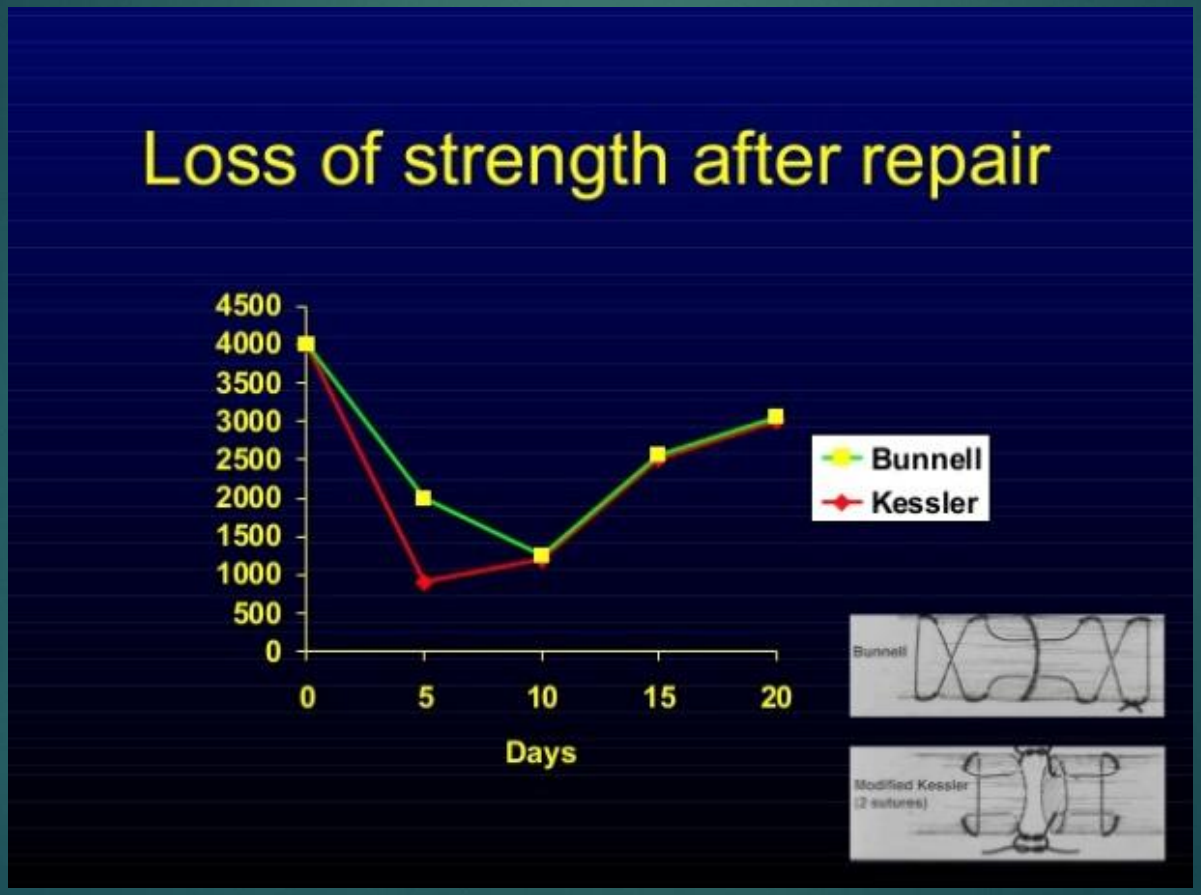
1. VERY COMMON
2. ANATOMY DICTATES SURGEY AND THERAPY
3. A PRIMARY REPAIR IS PERFORMED WITHIN A FEW DAYS OF THE INJURY
4. HEALING OCCURS FROM WITHIN THE TENDON – INTRINSIC HEALING AND FROM SURROUNDING TISSUE - EXTRINSIC HEALING.
5. EXTRINSIC HEALING ALSO PRODUCES ADHESIONS.
6. TENDON GLIDING ENCOURAGES INTRINSIC HEALING
7. TENDON GLIDING REDUCES EXTRINSIC ADHESIONS
8. THE EVIDENCE THAT EARLY MOBILISATION COMPARED WITH IMMOBILISATION IS MORE EFFECTIVE IS UNEQUIVOCAL

Flexor tendon repairs

ZONES



Tendon repairs are at their weakest in the second week BUT THERE IS GOOD EVIDENCE THAT THE GAP IS NO GREATER AND THE STRENGTH OF THE TENDON IS BETTER IN MOBILISED REPAIRS.



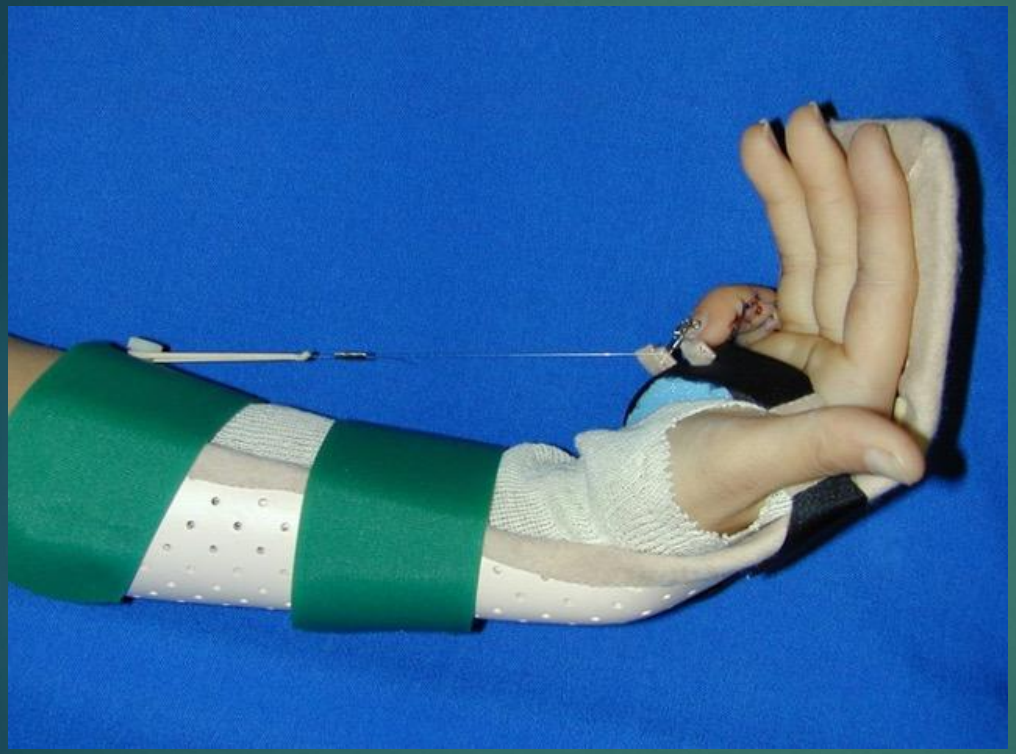
ALL HAND THERAPY Regimes – START 3-5 DAYS POST OP

- THERE ARE A NUMBER OF REGIMES BUT THE MOST COMMONLY USED ARE THE KLEINART AND EARLY ACTIVE REGIMES

KLEINART
ZONE II
USUALLY THOSE WHO ARE AT RISK WITH EARLY ACTIVE REGIMES e.g.-
POOR TENDON CONDITION
LATE PRIMARY REPAIR
POOR VASCULAR BED
COMPLICATION OF FFD AT PIPJ
REQUIRE VERY COMPLIANT PATIENT

EARLY ACTIVE REGIME
ZONE II
CURRENLTY USED IN DIFFERENT FORMS FOR ALL OTHER ZONE II REPAIRS, REPORTS OF 75% LESS SECONDARY SYGERY e.g. JOINT CONTRACTURES AND TENOLYSIS
THERE ARE VARIOUS DIFFERENT REGIMES AND SPLINT POSITIONS.

KLEINART



1. EXTEND THE FINGER AGAINST THE ELASTIC BAND
2. USE A BAR TO ALTER THE ANGLE OF PULL SO THE DIPJ IS FLEXED
3. REMAIN IN SPLINT 6 WEEKS
4. BE WATCHFUL FOR FFD – PT MUST BE COMPLIANT

EARLY ACTIVE MOTION

- RESISTANCE THROUGH THE REPAIR IS DECREASED BY PERFORMING PASSIVE FLEXION ON THE FINGERS PRIOR TO ACTIVE MOVEMENT.
- THE RESISTANCE TO DIGITAL FLEXION AND THUS TENSION ON THE REPAIR IS LEAST IN THE FIRST 2/3 OF MOVEMENT INCREASING 5-10 FOLD IN LAST 1/3.
- FOR THIS REASON ACTIVE MOVEMENT IS RESTRICTED TO THE FIRST 25% IN THE FIRST WEEK, 50% IN THE SECOND WEEK AND 75% IN THE THIRD FOLLOWED BY FULL FINGER FLEXION IN THE FOURTH.
- PATIENTS STAY IN THE SPLINT FOR 4-6 WEEKS DEPENDING ON THE REGIME, REPAIR AND PATIENT.
- ONCE OUT OF THE SPLINT FULL ACTIVE ROM IS ENCOURAGES, LIGHT RESISTANCE STARTS AT 6 WEEKS. RETUN TO HEAVY WORK /SPORT AT 12 WEEKS.

EARLY ACTIVE MOTION. CAM REGIME

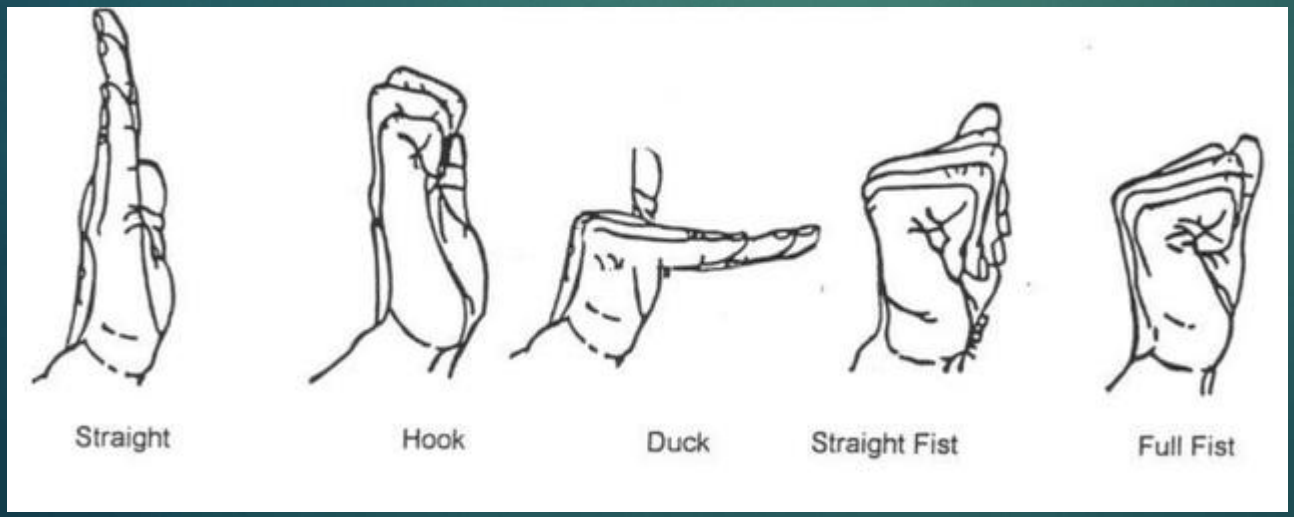
- THE SPLINT - WRIST 30°
  MCPJ 30°, IPJ's FULL EXT

PASSIVE FLEXION AS DRESSINGS
ALLOW FROM DAYS 3-5

Modified CAM – wrist neutral, MCPJ's 30° , PIPJs Full extension
Modified Belfast – wrist neutral, MCJ's 60-80° , PIPJ's full extension

EARLY ACTIVE MOTION

Tendon gliding and tenodesis effect



Early Complications

As the health care professional who sees these patients most frequently, hand therapists are in a position to recognise and treat or discuss with the surgeons in a timely fashion

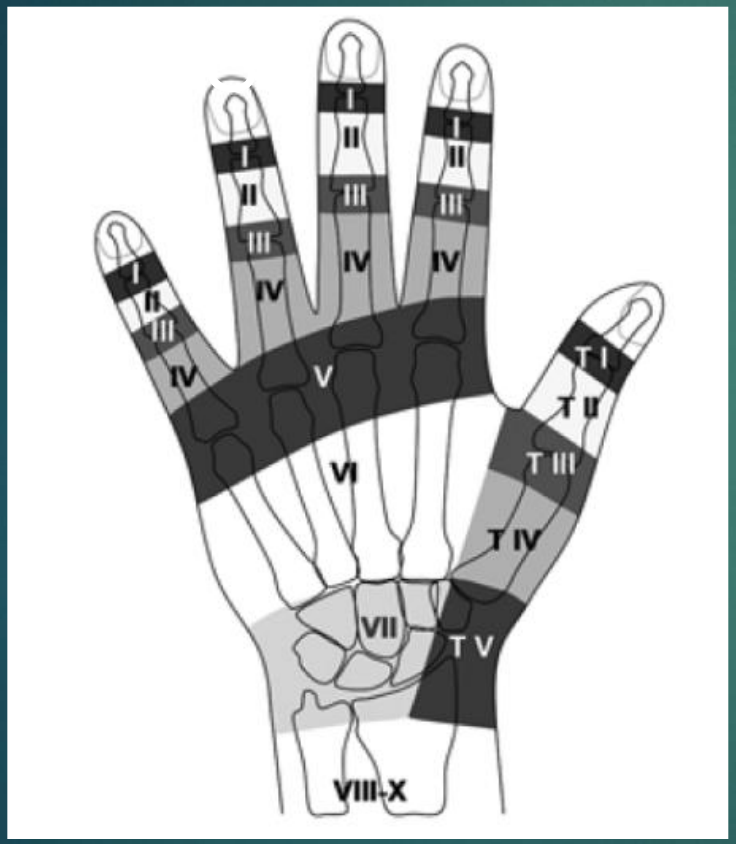
- Oedema – manage with elevation and pumping exercises.
- Pain – analgesia
- Infection – Antibiotics, Wound checks, Education++
- Joint Stiffness – caused by oedema and non compliance
- Rupture – caused by poor rehab, poor repair, poor understanding by patient.

Late complications

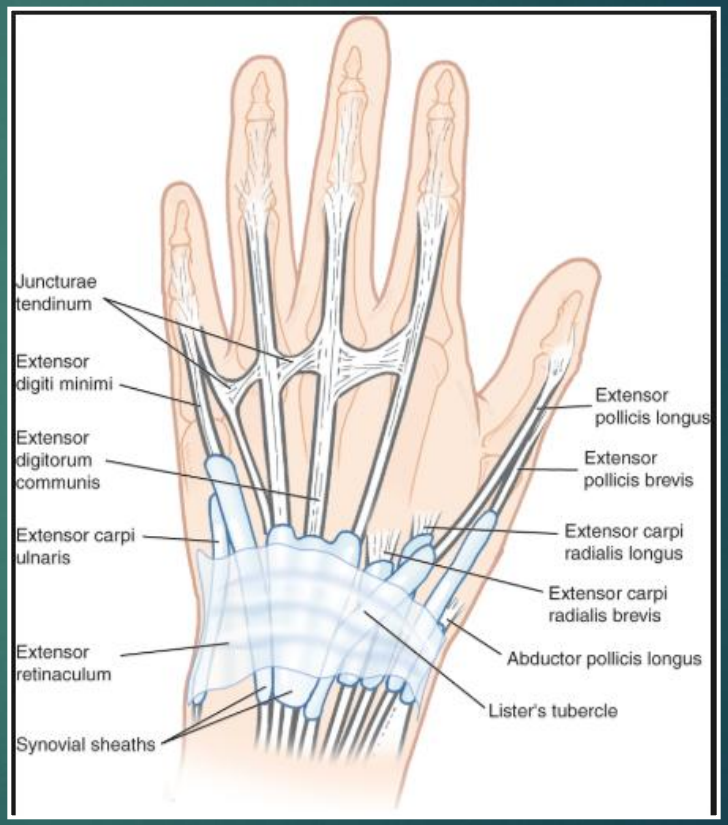
- Rupture – caused by attenuation or adhesions
- Persistent Oedema – manage with compression, massage, pumping exercises
- Joint Contracture – use mobilisations, passive stretches, exercises, static and dynamic splints.
- Limited tendon excursion and differential glide – avoid by achieving your ROM in 10 days. Treat with tendon gliding excs and activities, blocking splints, surgical tenolysis.
- Adherent tendon – treat with resisted exercises, massage and ultrasound, serial splinting, activity ++

Extensor tendon INJURIES

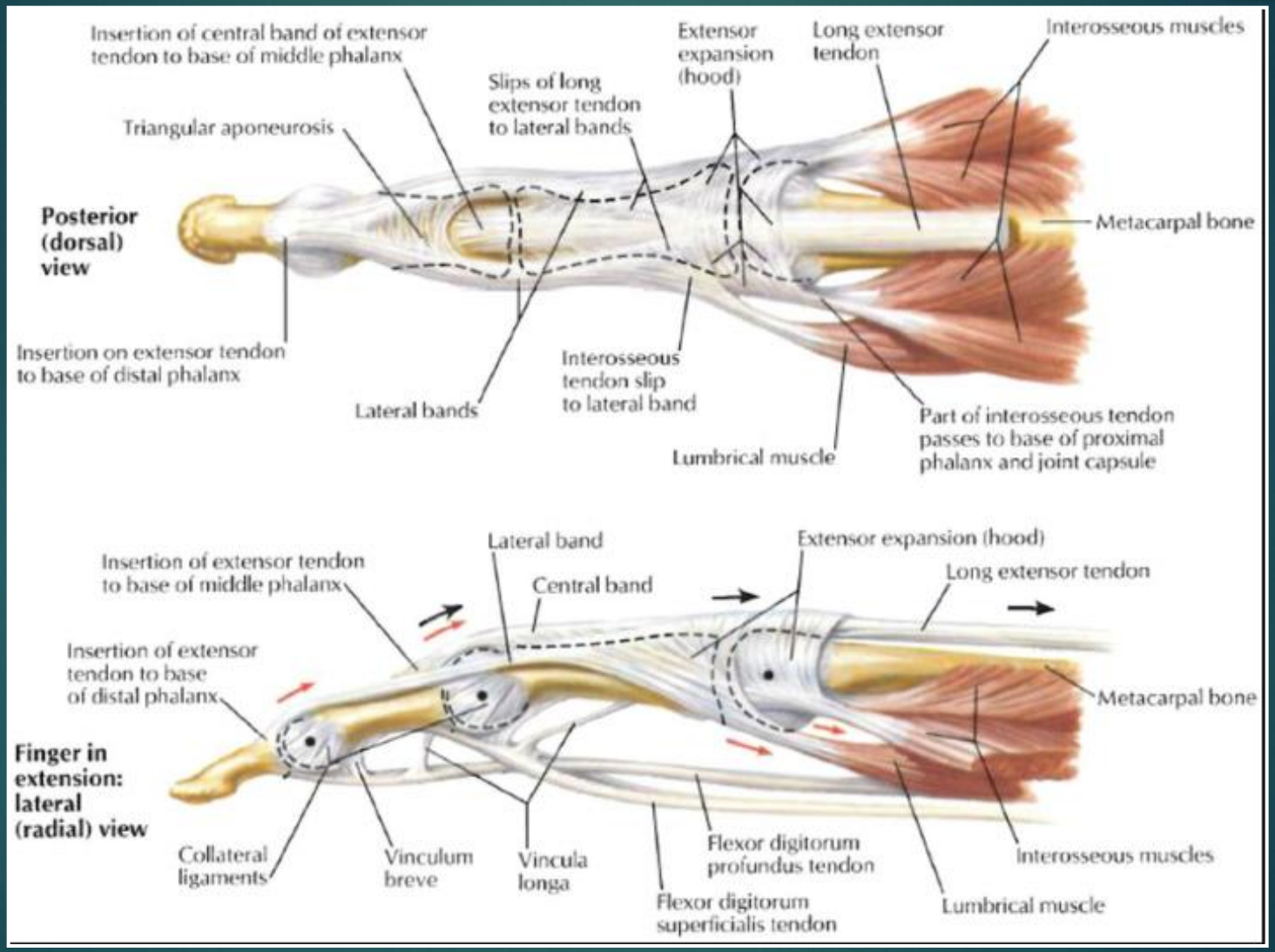
ZONE



EXTENSOR TENDONS



EXTENOT TENDON - FINGER



ZONE iii injuries

- INJURY OVER PIPJ EFFECTS CENTRAL SLIP
- MANAGEMENT CONSEVATIVE OR SURGICAL
- RX OBJECTIVES BY HAND THERAPIST ARE
  - I) PLACE JOINT IN OPTIMAL POSITION
  - II) PREVENT EXTENSOR LAG
  - III) ENCOURAGE TENDON GLIDE
  - IV)PREVENT DEFORMITY
  - V) RESTORE ROM
  - VI) RETURN TO FUNCTION

ZONE III INJURIES

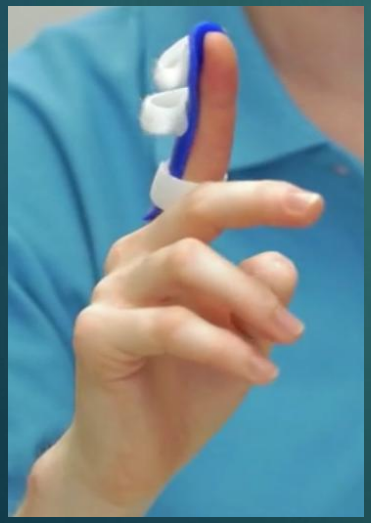
- CONSEVATIVE MANAGEMENT REGIMES ARE

1. IMMOBILISE PIPJ FOR 6 WEEKS
2. IMMOBILISE 2-4 WEEKS THEN CAPNER
3. DYNAMIC EXTENSION SPLINT WITH CONTROLLED ACTIVE FLEXION
4. CAM REGIME USING VOLRAR SPLINTS TO CONTROL DEGREE OF FLEXION.

- NB. ALL REGIMES ALLOW FREE DIPJ AND MCPJ MOVEMENT, MOST REQUIRE NIGHT SPLINTING FOR 6 A FURTHER 2-4 WEEKS.

CAM regime Zone iii injuries

Active DIPJ flexion with support at the PIPJ



Active PIPJ flexion to defined degree with support.

Zone iv - viii

- Managed in a similar way with the primary aims the same
- Protect
- Glide
- Reduce adhesions and tethering
- Regain range of motion
- Restore function.

There are 3 regimes commonly used.
There is not enough data to decisively choose one over the other.
It is best to use the regime that your access to equipment allows and you think best suits your patient.

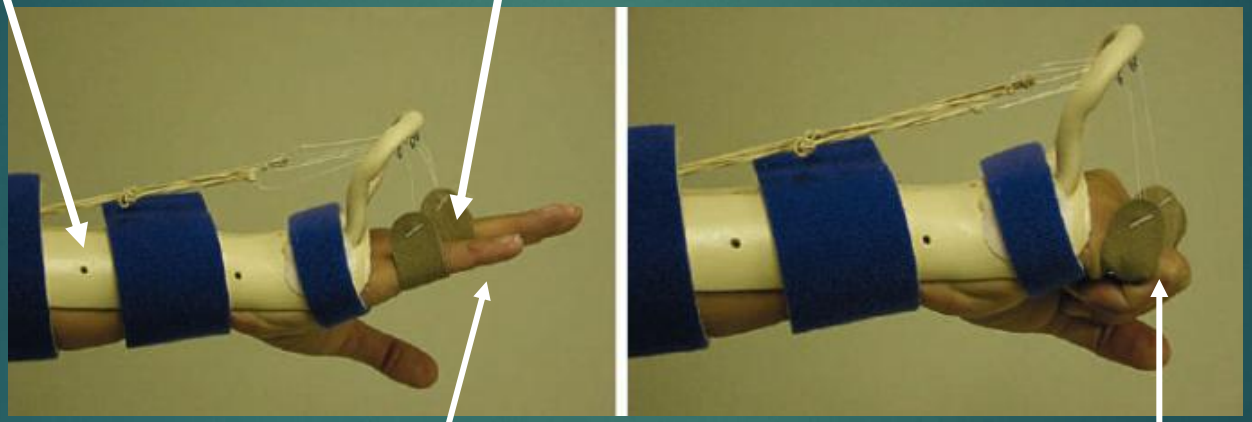
Dynamic extension splint

Continuous use for 4 weeks then for protection only. Continue with exercises. No passive flexion for 8 weeks, no heavy lifting 12 weeks.

Forearm based

Proximal phalanx in extension

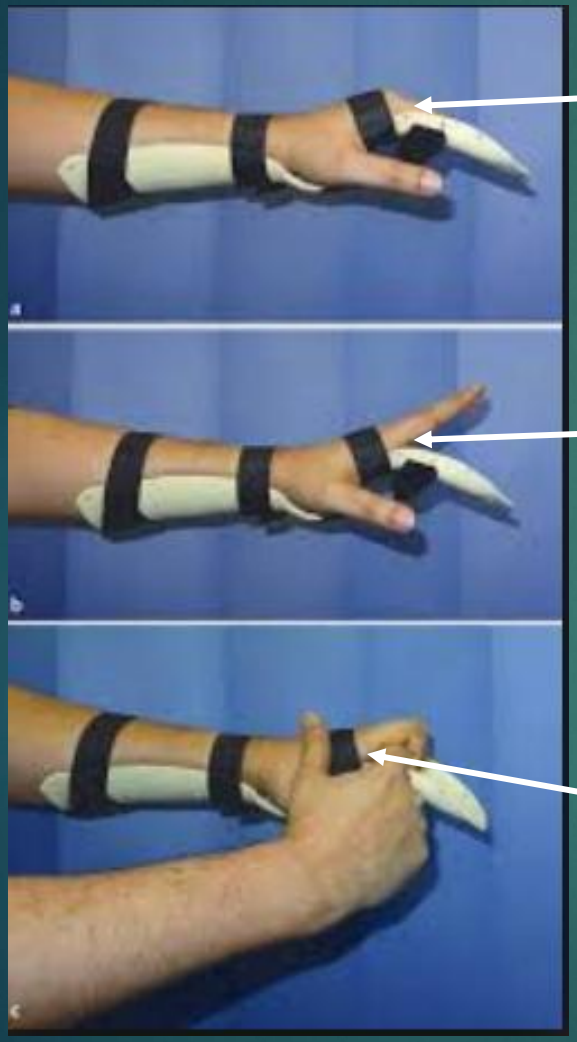
Include adjacent fingers if repair proximal to juncturae



Active extension at PIPJ and DIPJ

Active flexion at MCPJ, PIPJ and DIPJ

Norwich regime



Wrist 45° MCPJs 45° Flex, IPJs full extension

Active MCPJ flex/ extension to splint

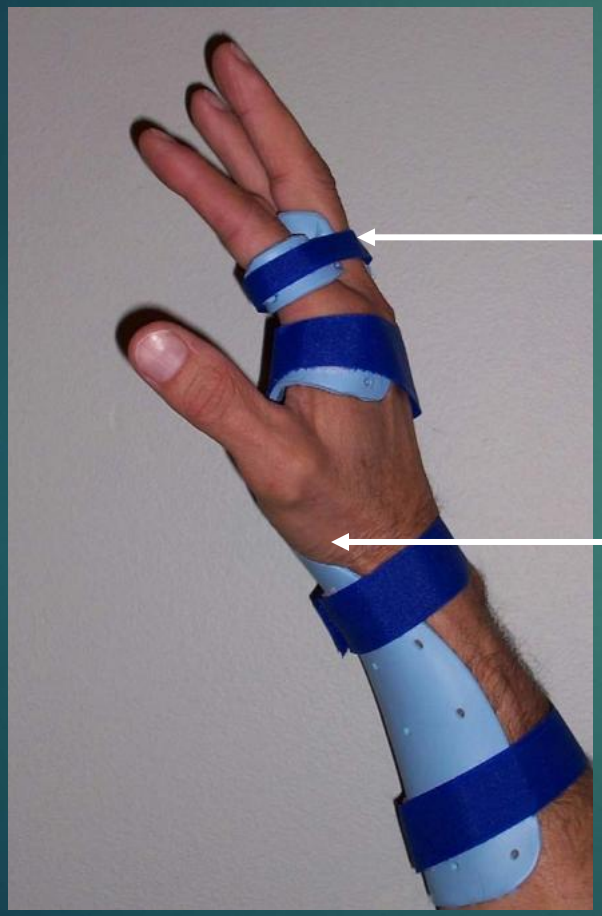
Active IPJ flexion with MCPJs supported.

After 4 weeks splint for protection only

No passive flexion and only very light resistance to flexion for 8 weeks

Heavy lifting 12 weeks.

Immediate controlled active motion regime

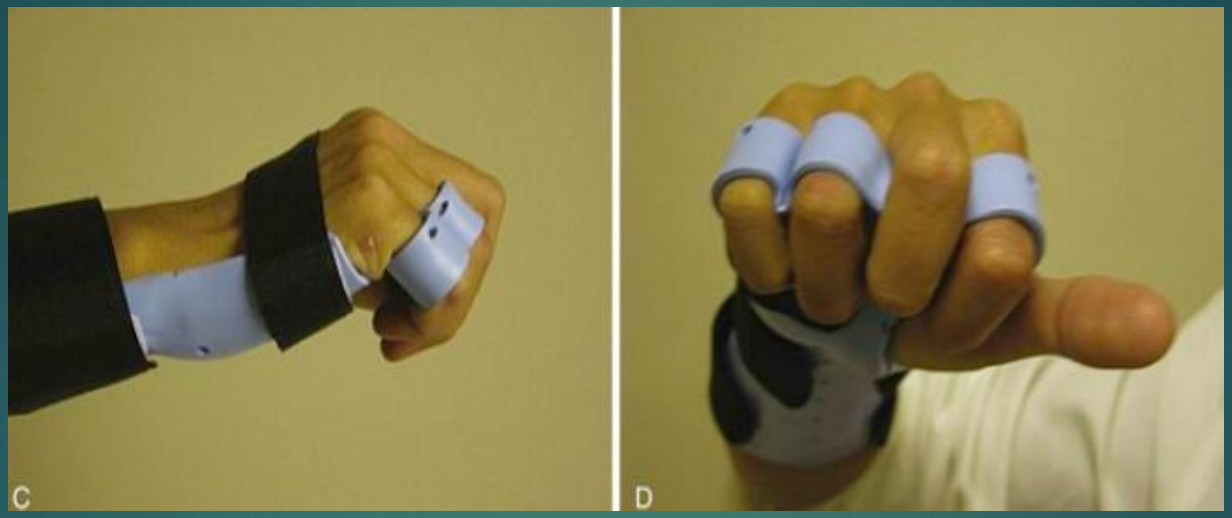


Yoke holds MCPJs at 15-20 degrees more extended than other fingers.

Wrist 20-25 degrees extension.

Time line

0-21 days - Patient wears both parts of the splint continuously and must achieve full active motion (in the splint)



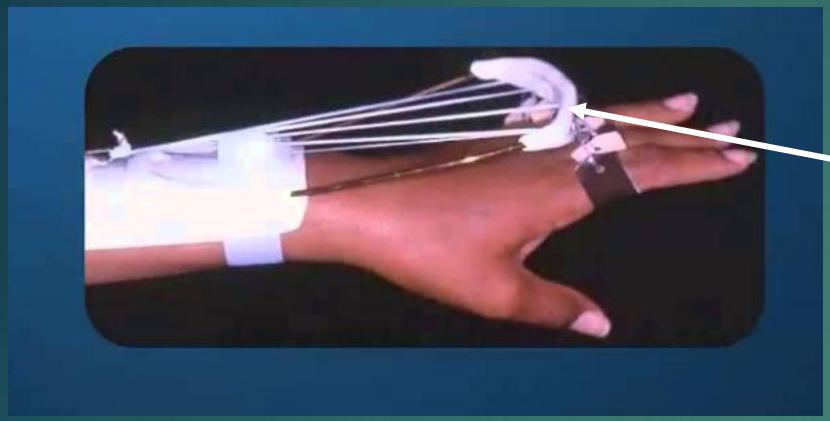
22-35 days - pt wears the yoke continuously and the wrist for activity unless light

36-49 days - wrist splint discarded, yoke worn for activity and removed for active exercises

Nerve injuries – principals of management

- SPLINT THE ARM OR FINGER TO PROTECT THE NERVE, MOST IMPORTANT IF A REPAIRED. KEEP PROTECTED FOR TWO WEEKS
- MAINTAIN PASSIVE ROM OF JOINTS AND LENGTH OF TENDONS WITHOUT COMPROMISING NERVE
- MAINTAIN WORKING MUSCLE GROUPS
- SPLINT FOR FUNCTION AS SOON AS ALLOWED.
- ASSESS AND PROTECT SKIN
- EDUCATE
- DESENSITISE

SOME SPLINTS.



RADIAL NERVE FUNCTIONAL OUTRIGGER

CLAW DEFORMITY FROM ULNAR NERVE DAMAGE AND CORRECTIVE SPLINT.