

# Best Practice in Hand Therapy

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# Purpose

- Introduction to Hand Therapy
- Overview of (non-pharmacological) conservative management of base-of-thumb osteoarthritis (BTOA)
- Overview of conservative management of carpal tunnel syndrome
- Resources to support best practice

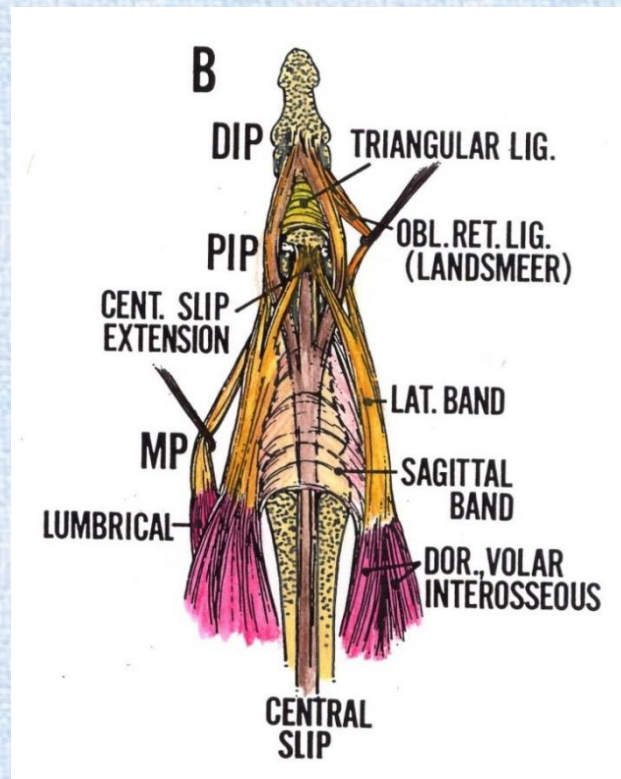
# What is Hand Therapy?

- The specialty of hand therapy has emerged from the professions of Occupational Therapy and Physiotherapy.
- This was in response to advances in surgical techniques that enabled greater functional restoration of injured and diseased upper extremities.
- Has built a body of knowledge and expertise that can contribute to improved outcomes from a range of acute and chronic conditions affecting the hand and upper limb.



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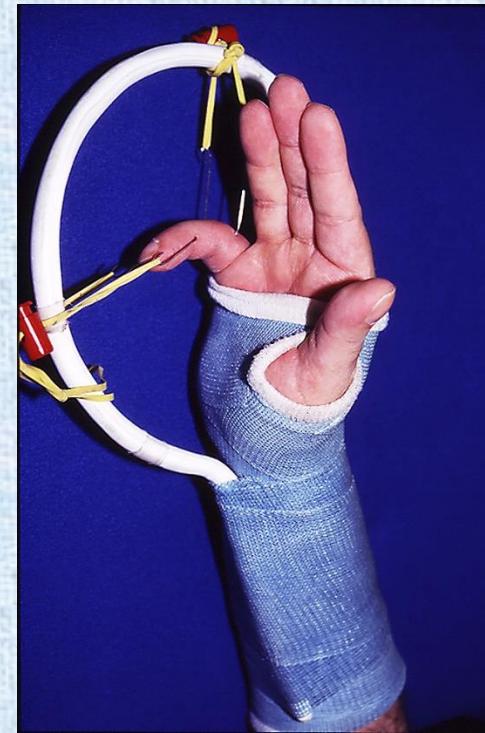
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  - Tendon system
  - Retinacular system
  - Joint kinematics
  - Intrinsic / extrinsic muscle function



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  - Joint kinematics
  - Intrinsic / extrinsic muscle function
- Surgical procedures of the upper extremity and their postoperative courses



# Hand Therapists have.....

Familiarity with the following assessment techniques for the upper limb:

- Range of motion
- Biomechanics
- Strength
- Vascularity
- Dexterity
- Hand function
- Oedema
- Sensibility
- ADL
- Work capacity
- Psychosocial skills
- Wound and scar condition

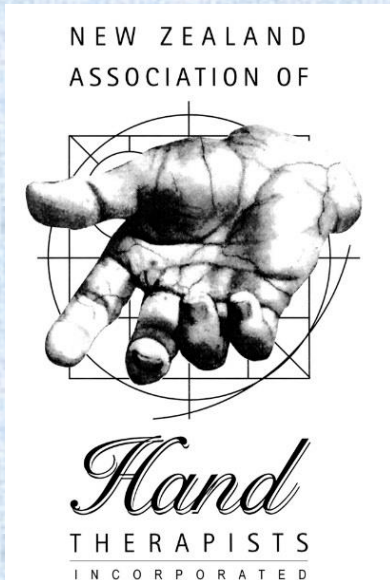




# Expertise with the following treatment regimens:

- Wound care
- Scar management
- Splint fabrication
- Oedema control
- Tendon rehabilitation programs
- Fracture and sprain management
- Functional re-education
- Desensitization programs
- Sensory re-education training
- Active and passive joint ROM exercise
- Work site visits
- Work conditioning
- Muscle re-education
- Pain management
- Joint mobilization
- Prosthetic training





# New Zealand Association of Hand Therapists (NZAHT)

<http://www.nzaht.org.nz/>

## • Registered member

- Registered Physiotherapist or Occupational Therapist who is member of NZSP/NZOT
- 1800 hours treatment of hand conditions within 3 years
- Written case study or additional Post grad paper
- Completed NZAHT approved Hand Therapy training program - AUT
- Completed approved static and dynamic splinting course
- Recommendation from Hand Surgeon or Registered Hand Therapist
- Maintain - 80 points CPD every 2 years

## • Associate member

- Registered Physiotherapist or Occupational Therapist who is member of NZSP/NZOT
- Maintain - 45 points CPD every 2 years

## • ACC Hand Contract:

- NZAHT Registered Hand Therapist
- or NZAHT Associate with Supervisory agreement with Registered Hand Therapist + CV Hand Therapy experience + Registration pathway

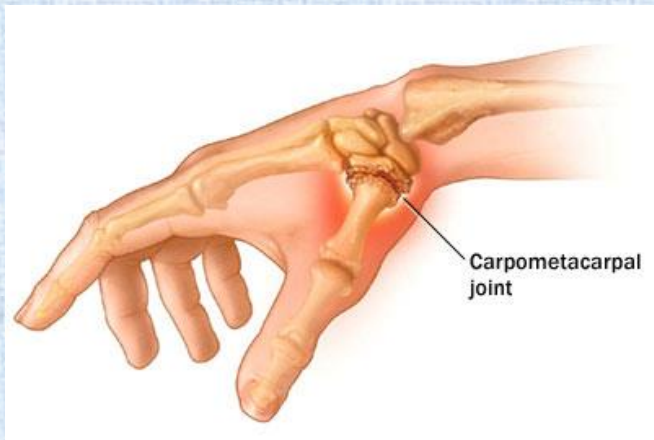
# What conditions?.....

- Trauma
- Disease
- Congenital

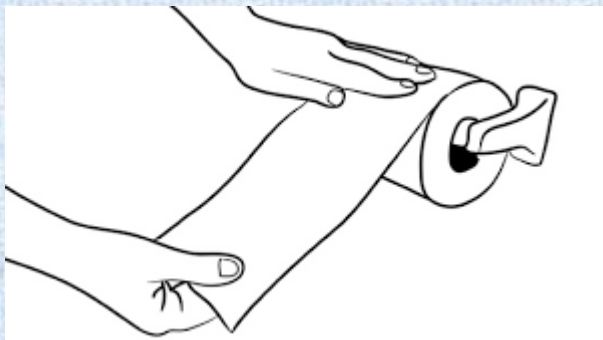


- Simple or complex
- Orthopaedic
- Burns and Plastics
- Neurological

Interdisciplinary care



# Base-of-thumb osteoarthritis (BTOA)



# Base of thumb osteoarthritis (BTOA)

- Also known as carpo-metacarpal (CMC) or trapezio-metacarpal (TMC), or ‘basal joint’ OA
- Highly prevalent condition
  - 8-12% in general population, more common in women
- The most debilitating subset of hand OA
- More mechanical in nature than OA of other hand joints
- Considered a ‘serious condition’ by older adults
- Little attention due to its relative invisibility and clinical uncertainty



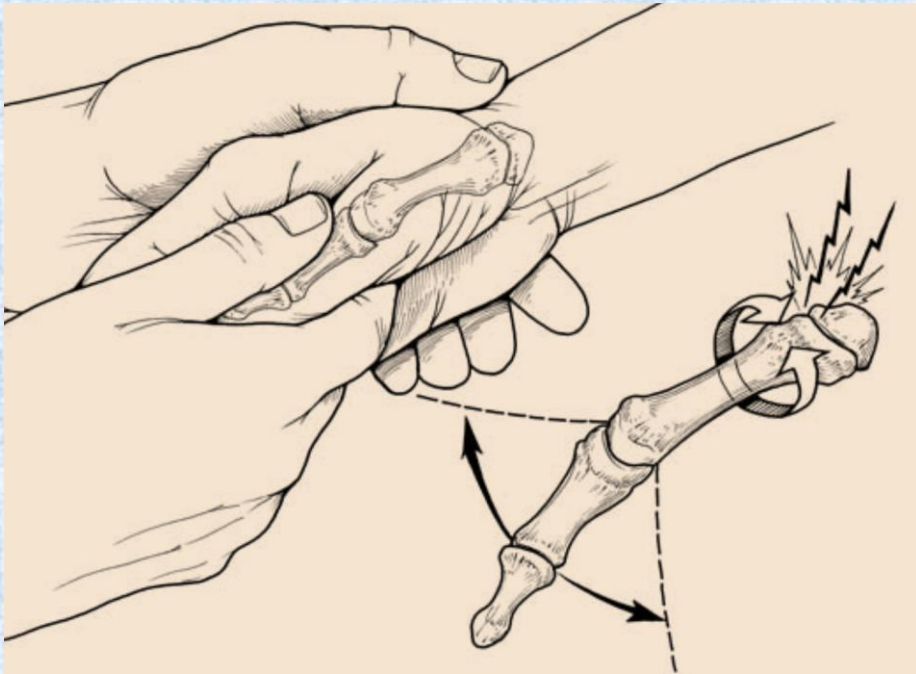
# Presenting signs & symptoms

## ***Every thumb is different!***

- Pain with pinching and gripping activities
- Impact on activities of daily living
- Clicking/grinding
- Tenderness on palpation CMC joint
- Swelling and warmth
- CMC subluxation +/- with MCP joint collapse
- Decreased joint ROM
- 1<sup>st</sup> web space contracture
- Wasting of thenar muscles
- Altered movement patterns
- Positive 'Grind test'



## Grind test



- High specificity
  - Positive predictive value 91-96%
- Moderate sensitivity
  - Negative predictive value 68-70%

Merritt et al. (2010) *J Hand Ther* 23(3):261-7.

# BTOA Classification

- Eaton-Littler (1973) – later modified as Eaton Glickel (1987)

Stage I	Stage II	Stage III	Stage IV
Widening of joint space, <1/3 subluxation	Slight joint space narrowing, minimal subchondral sclerosis, >1/3 joint subluxation	Narrowed joint space, osteophyte formation, subluxation, MCP hyperextension	Thumb immobile, minimal pain, scaphotrapezial joint changes

- Kellgren-Lawrence (1957 )

Stage I - Doubtful OA	Stage II – Mild OA	Stage III – Moderate OA	Stage IV – Severe OA
Doubtful narrowing of joint space	Possible joint space narrowing, minimum one osteophyte	Joint space narrowing, multiple osteophytes, sclerosis, possible deformity of bone ends	Large osteophytes, severe sclerosis, definite deformity of bone ends



# EULAR evidence-based recommendations for diagnosis of Hand OA

- Risk factors: >40 years, female, family history, obesity, occupation
- DIP/PIP/1<sup>st</sup> CMC involvement, short duration morning stiffness, symmetric/cluster pattern
- Heberdens and Bouchards nodes
- Functional difficulty
- Recognised clustering e.g. CMC and PIP, or CMC and knee
- Isolated base of thumb OA is a common occurrence
- Differential diagnosis depends largely on composite of features
- Plain radiographs gold standard for morphological assessment
- Blood tests may be required to exclude coexistent disease

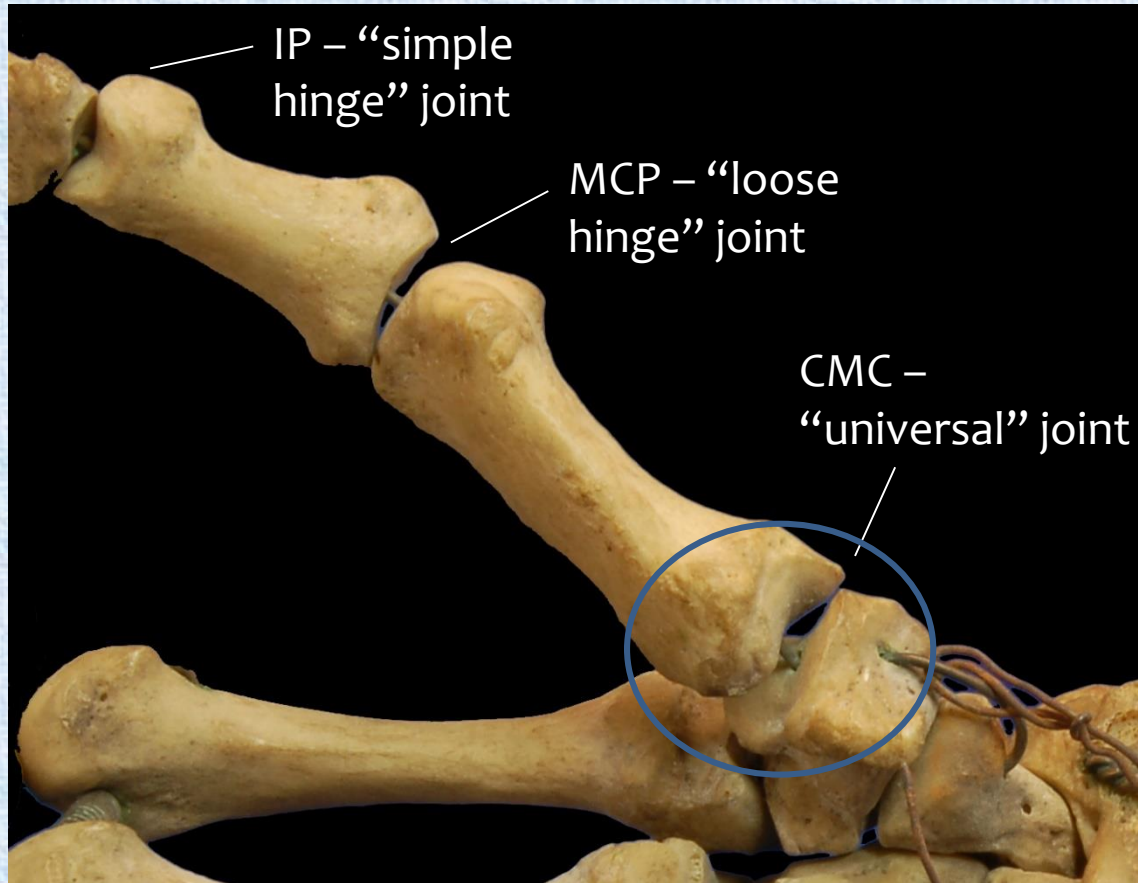


# Differential diagnoses

- De Quervain's tenosynovitis of 1<sup>st</sup> dorsal compartment
- Flexor carpi radialis (FCR) tendonitis
- Carpal tunnel syndrome
- Scaphoid pathology (fracture, non-union, osteonecrosis)
- Arthritis of thumb MCP, radiocarpal joints, and scaphotrapeziotrapezoid (STT) joint

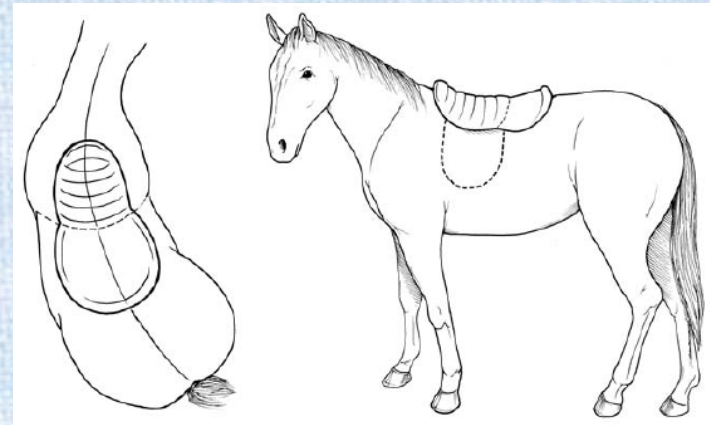


# Thumb anatomy



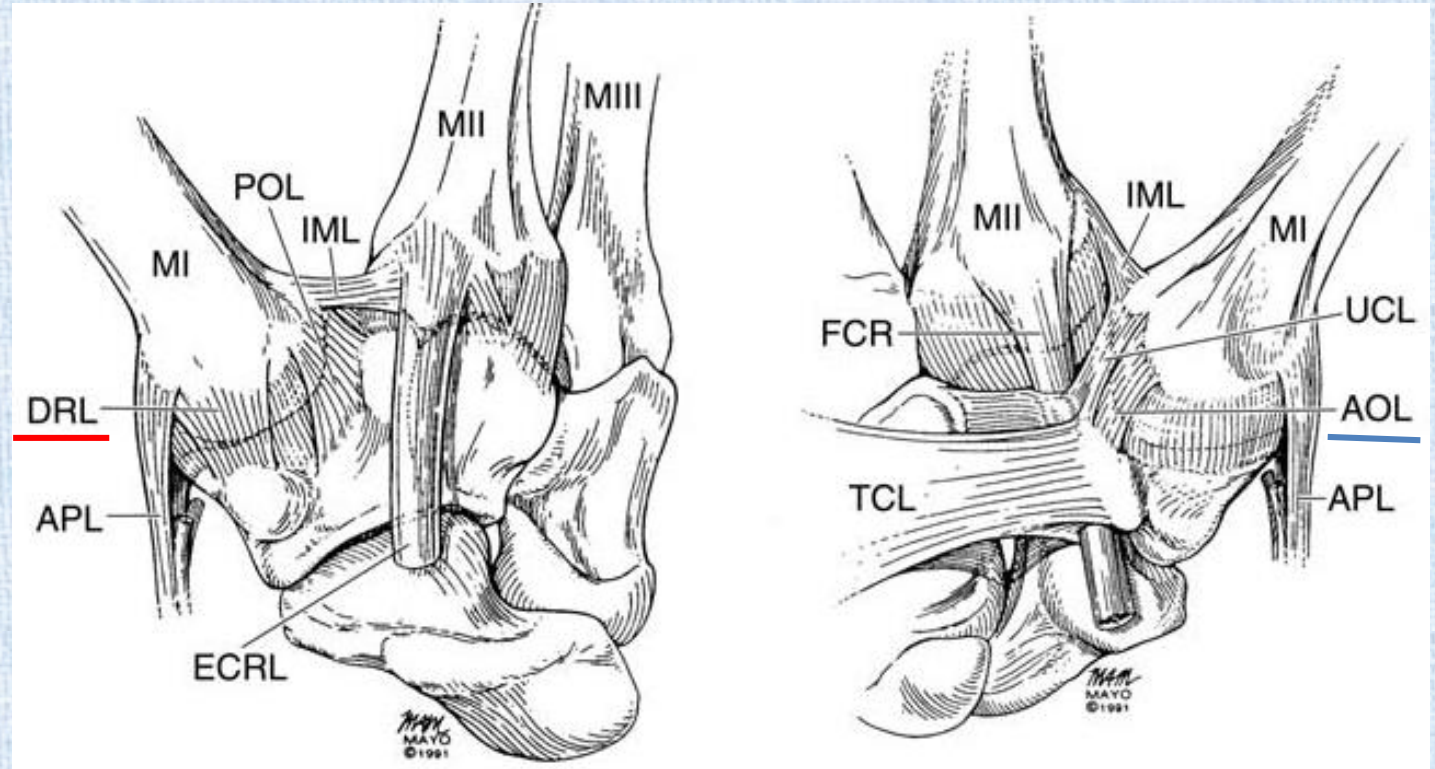
## 1<sup>st</sup> CMC “saddle” joint

- Minimal congruency allows for thumb motion
  - Extension, flexion, adduction, abduction
  - + Opposition, retropulsion, palmar abduction & radial abduction
- Stability is from soft tissues



# CMC joint ligaments

- “Girdle” of ligaments supports the CMC joint
  - Ulna collateral (UCL)
  - Intermetacarpal (IML)
  - Posterior oblique (POL)
  - **Dorsoradial ligament (DRL)**
  - Anterior oblique (“beak”) ligament (AOL)

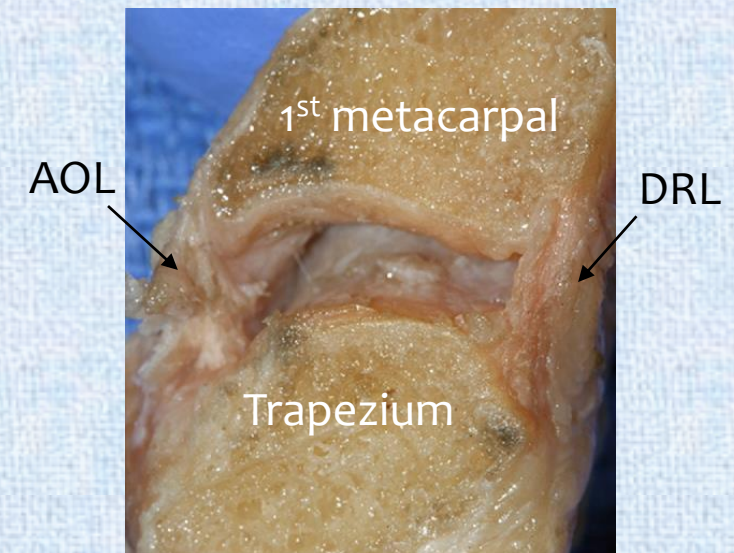
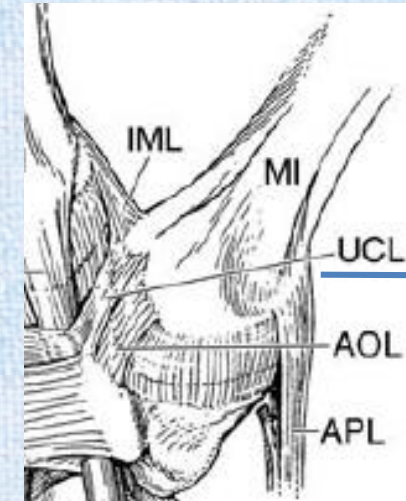


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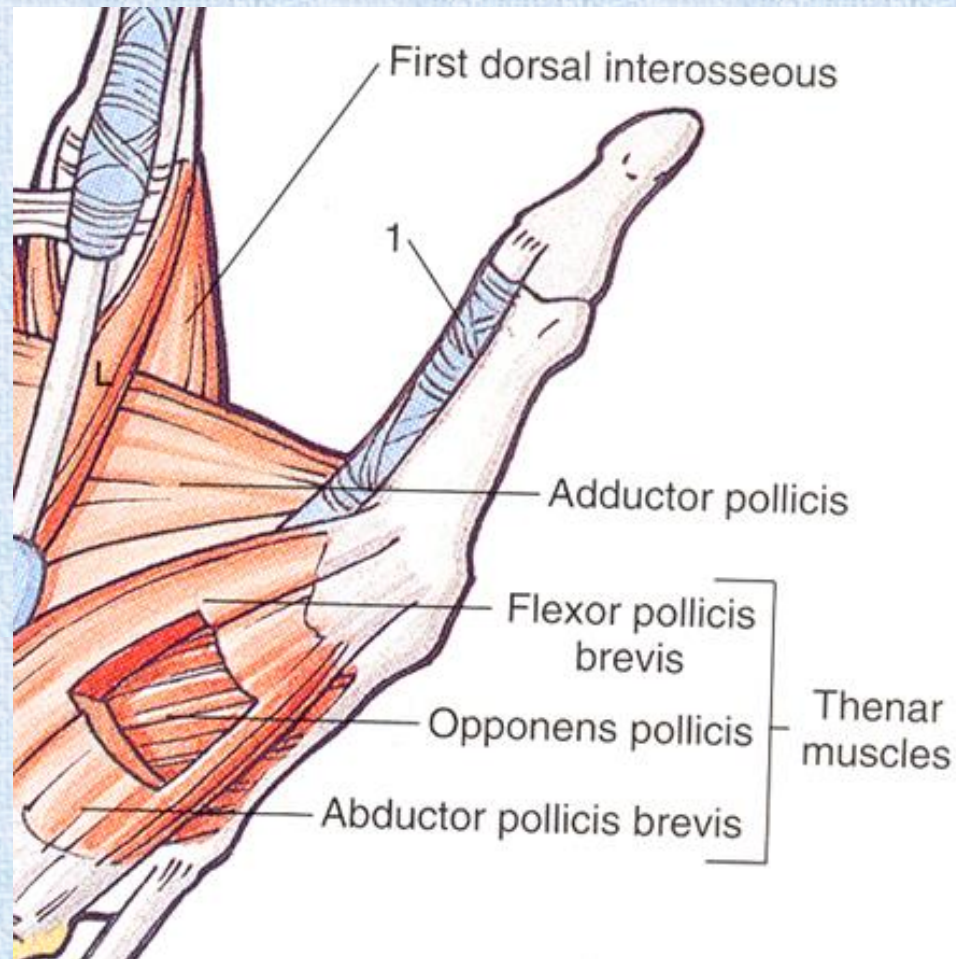
VOLAR

# Ligament roles – different theories

1. Volar beak/anterior oblique ligament (AOL) main stabilising ligament
  - Prevents dorsal translation of base 1<sup>st</sup> metacarpal
2. Dorsoradial ligament complex (DRL) main stabilising ligament
  - AOL plays no part in stabilising with pinch and grasp
  - Volar beak of 1<sup>st</sup> metacarpal articulates with volar recess on trapezium - locks in as part of cantilevered force couple in opposition, tensioned by the dorsal ligament complex.



# Muscles acting on the thumb



## ☐ Muscular stability

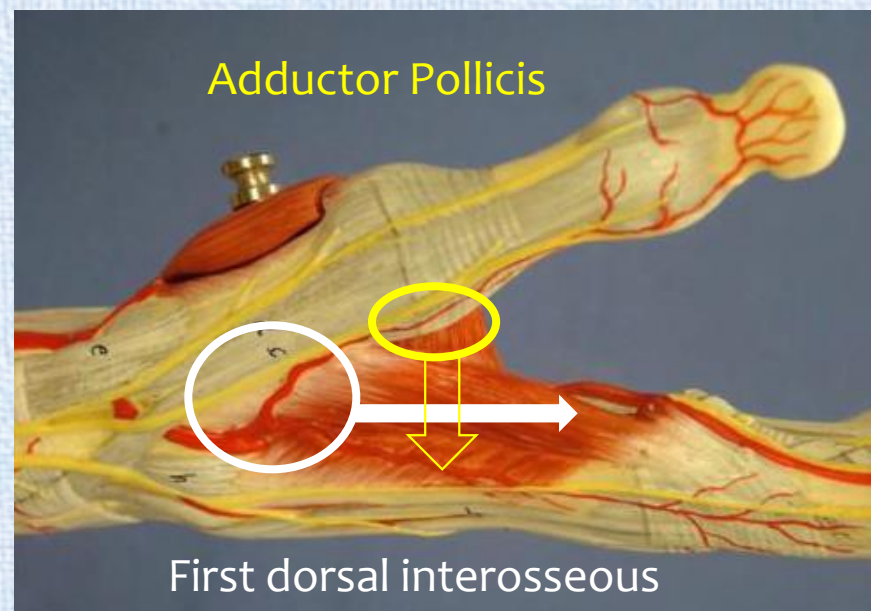
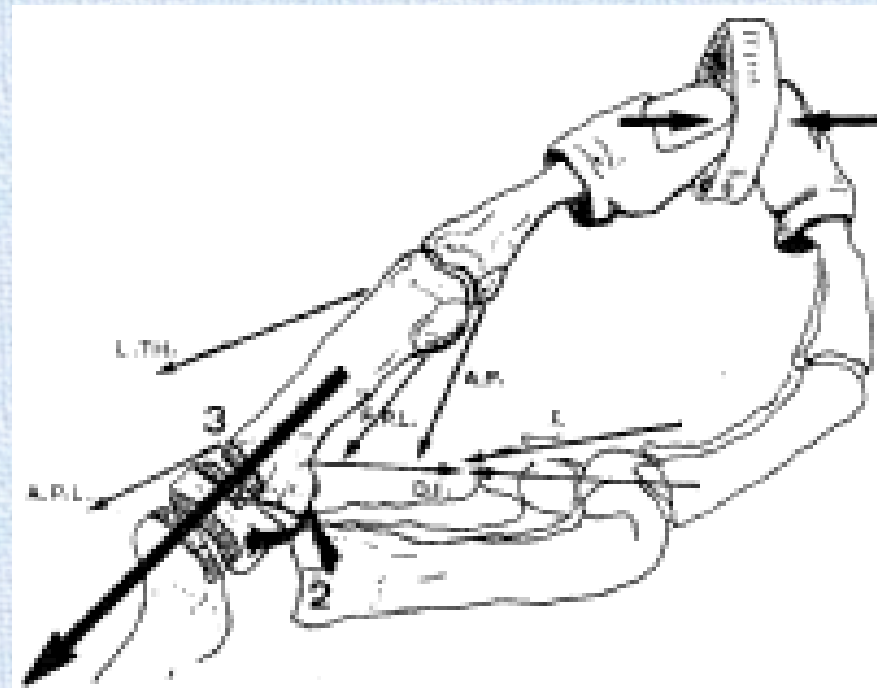
- Flexor pollicis longus (FPL)
- Extensor pollicis longus (EPL)
- Extensor pollicis brevis (EPB)
- Abductor pollicis longus (APL)
- Abductor pollicis brevis (APB)
- Flexor pollicis brevis (FPB)
- Opponens pollicis
- Adductor pollicis
- First dorsal interosseous



# Thumb forces

- ❖ Twelve fold greater compression force at CMC joint
  - 12kg load with just light pinch
- ❖ Muscular activity helps to “seat” the metacarpal on the trapezium
- ❖ “Screw home mechanism”
  - Muscles screw the thumb into position of function (opposition).
  - CMC joint more stable; joint surfaces more congruent.
  - Forces directed centrally = more even loading
- ❖ 1<sup>st</sup> dorsal interosseous assists to seat
- ❖ Tight adductor pollicis may “de-seat”

(Atkinson & Maher (2004) *J Man Manip Ther* 12(4):187-191.

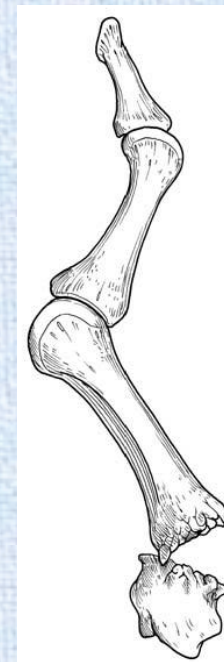




Adduction deformity with 1<sup>st</sup> web space contracture

CMC joint stiff and adducted

Compensatory MCP joint hyperextension



Pain → muscle inhibition, avoidance & weakness

## The cycle of CMC joint OA pain and deformity

Metacarpal (MC) volar tilt

Intrinsic muscles pull MC head volar-ward

Increase CMC joint volar contact force

**\*\*Articular cartilage trauma**

Changes that occur with aging impact on the ability of cartilage to tolerate stress.

Coupling of mechanical and biomechanical changes increase the force experienced by chondrocytes with loadbearing.

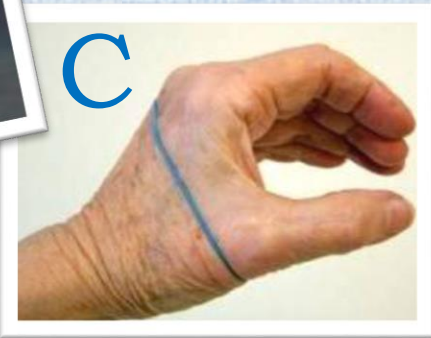
Van Heest & Kellemeir (2008) *J AAOS* **16**(3):140-151.  
Burkholder (2000) *J Hand Ther* **13**(2):79-89  
Falconer (2012) *J Hand Ther* **17**:47-50.





"We do not do belly rubs, if that's what you are looking for."

# Goals of non-pharmacological conservative management



✓ Restore 1<sup>st</sup> web space & Adductor Pollicis length

- ✓ Massage/release Adductor
- ✓ Gentle stretch
- ✓ “Contract – relax”

✓ Optimise muscular activity for stability

- ✓ Isolate APB & Opponens
- ✓ Place and hold “C”
- ✓ 1<sup>st</sup> dorsal interosseous

# Goals of non-pharmacological conservative management

✓ Train pinch without collapse



✓

✓ Joint mobilisation

✓ Traction

✓ Butterfly stretch



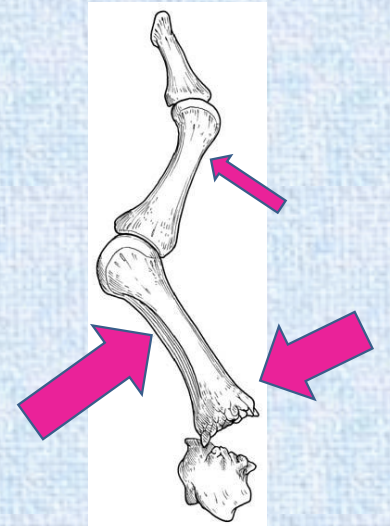
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✓ Support for positioning

✓ Taping

✓ Splinting

**But not forever!**





Splinting (Orthoses)

# Goals of non-pharmacological conservative management

- ✓ Protect from injury by using tools that reduce stress
  - ✓ Activity modification
  - ✓ Assistive devices

Wider grip & less slip =  
less stress on joints

- Relieve pain, preserve or improve joint function, and reduce physical disability



# Evidence for non-pharmacological conservative management

- Rigid night resting splint vs no splint for 1 year (n=112) (*Rannou 2009*)
  - ✓ Significant improvements in pain (VAS) and disability at 1 year
  - ↓ Assessors not blinded; no standardised 'usual care'; incomplete case definition.
- Rigid CMC splint during activities of daily living (ADLs) compared to no splint (n=40) (*Gomes Carreira 2010*)
  - ✓ Pain (VAS) lower at 45- and 90 days
  - No significant difference in function (DASH)
- Improvements in pain seem to be greater with rigid custom-made splint despite patients reporting preference for neoprene splint (*Weiss 2004, Sillem 2011*)
- Technical accessories (TA) vs TA + semi-stable orthosis vs TA + non stabilising orthosis (n=33) - awaiting arthroplasty (*Berggren 2001*)
  - ✓ 70% no longer required an operation at 7 months
  - ✓ At 7 years only 10% still requested surgery
  - No differences between groups
  - ↓ Assessors not blinded; method of randomisation not stated; small numbers

International guideline/ recommendation	NICE	European League Against Rheumatism (EULAR)	ACR
<b>Exercise &amp; joint protection</b>	“Exercise should be core treatment for people with OA irrespective of age, comorbidity, pain, severity or disability”	“Education concerning joint protection, together with exercise regime is recommended for all patients with hand OA”	ACR “conditionally recommend that health professionals should do the following, - Evaluate the ability to perform ADLs - Instruct in joint protection techniques”
<b>Assistive devices</b>	“Assistive devices should be considered as adjuncts to core treatment for people with OA who have specific problems with ADLs. Expert advice may need to be sought e.g. from OT”	-	“Provide assistive devices as needed to help patients perform ADLs”
<b>Splints</b>	“People with OA who have biomechanical joint pain or instability should be considered for joint supports”	“Splints for thumb base OA... to prevent/correct lateral angulation or flexion deformity are recommended”	“Provide splints for patients with trapeziometacarpal OA”
<b>Heat</b>	“Local heat... as adjunct”	“Local heat... beneficial”	“Instruct in the use of... “

ADL = Activity of daily living

Dziedzic (2013) *Int J Clin Rheumatol* 8(4):439-452.



# EULAR treatment propositions for Hand OA

- Individualised treatment based on combination of pharmacological and non pharmacological approaches.
- Advice and education with particular emphasis on joint protection and hand exercises.
- Local treatments (e.g. heat, splinting) preferred over systemic treatments, particularly if only selected joints affected.
- Consider topical pharmacological approaches
- Oral medication should be used at the lowest effective dose for the shortest duration with particular attention to efficacy, comorbid conditions and contraindications.



# 5 “Rules of Thumb”

1. Regain first web space
2. Activate thenar muscles
3. Control pinch – aim for ‘C’
4. Wider grip and non-slip
5. Splint for help



➤ Treat early, you can do something about it!