



Singapore  
General Hospital  
SingHealth

SingHealth **DukeNUS**  
ACADEMIC MEDICAL CENTRE  
**MUSCULOSKELETAL  
SCIENCES**

# Common Conditions of the Hand seen in Primary Care

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ACADEMIC MEDICAL CENTRE

PATIENTS. AT THE HE<sup>ART</sup> OF ALL WE DO.®



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# Pain = Loss of Function

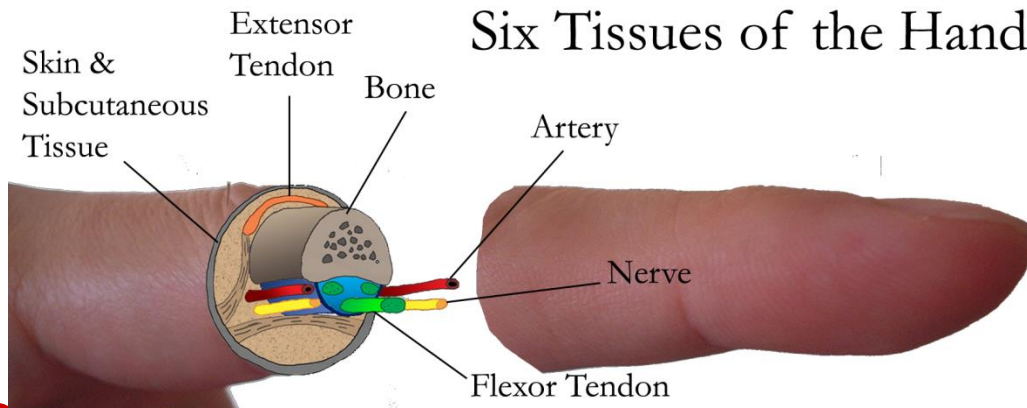
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- Sharp pain, Burning pain, Stiffness, Numbness, Soreness, Rheumatism
- Movement
- Manipulation
- Loads
- Sensation
- Expression
- Aesthetics



# Examination

- Tissue-specific examination



- Site-specific examination
  - Mechanism
  - Anatomy

# Examination

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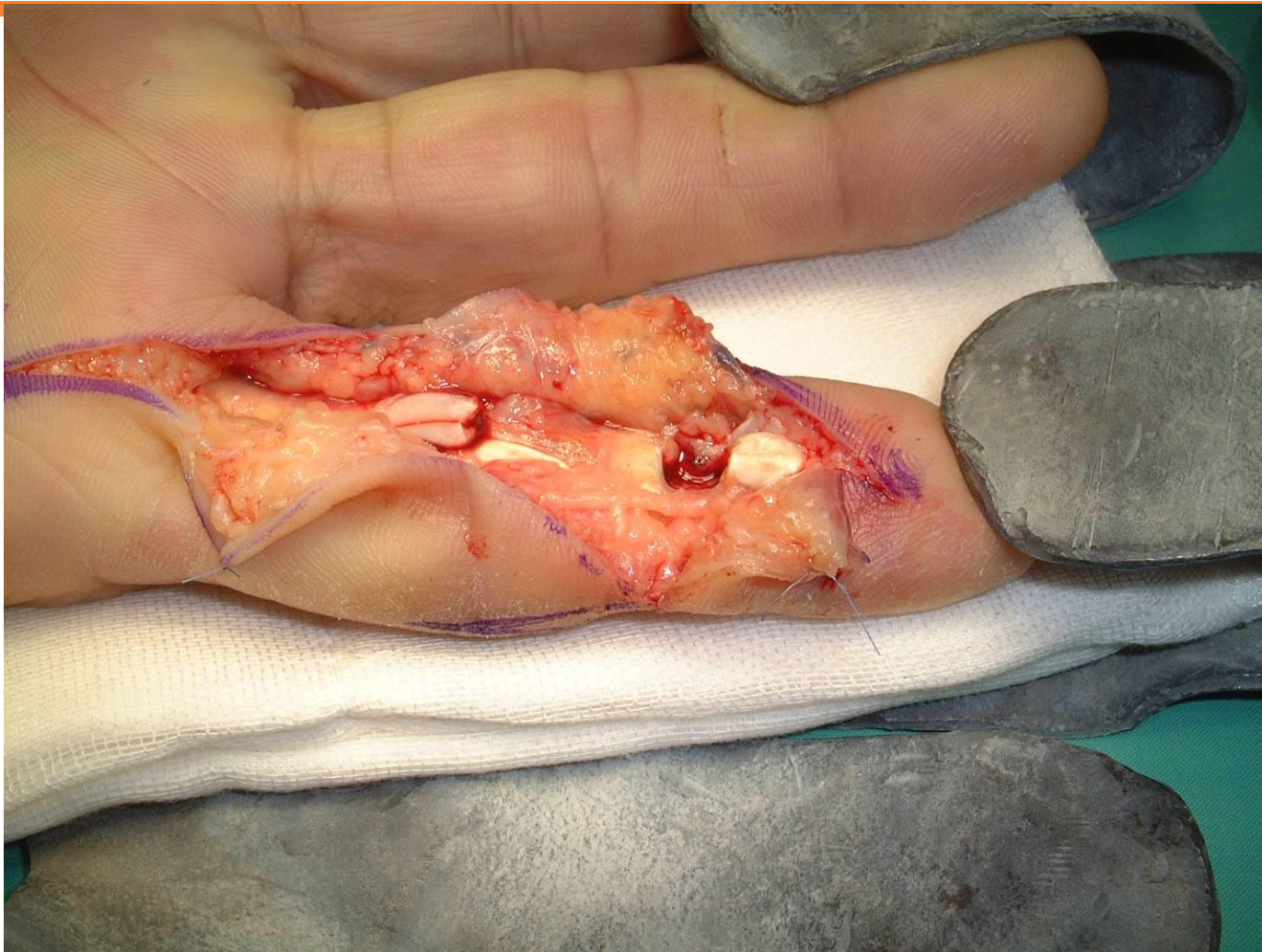
- Nerves
  - Comparative light touch or 2 PD
- Vascular
  - Arterial or venous or both
- Tendons
  - Flexor and extensor tendons
- Skeletal
- Skin

# Simple Lacerations?

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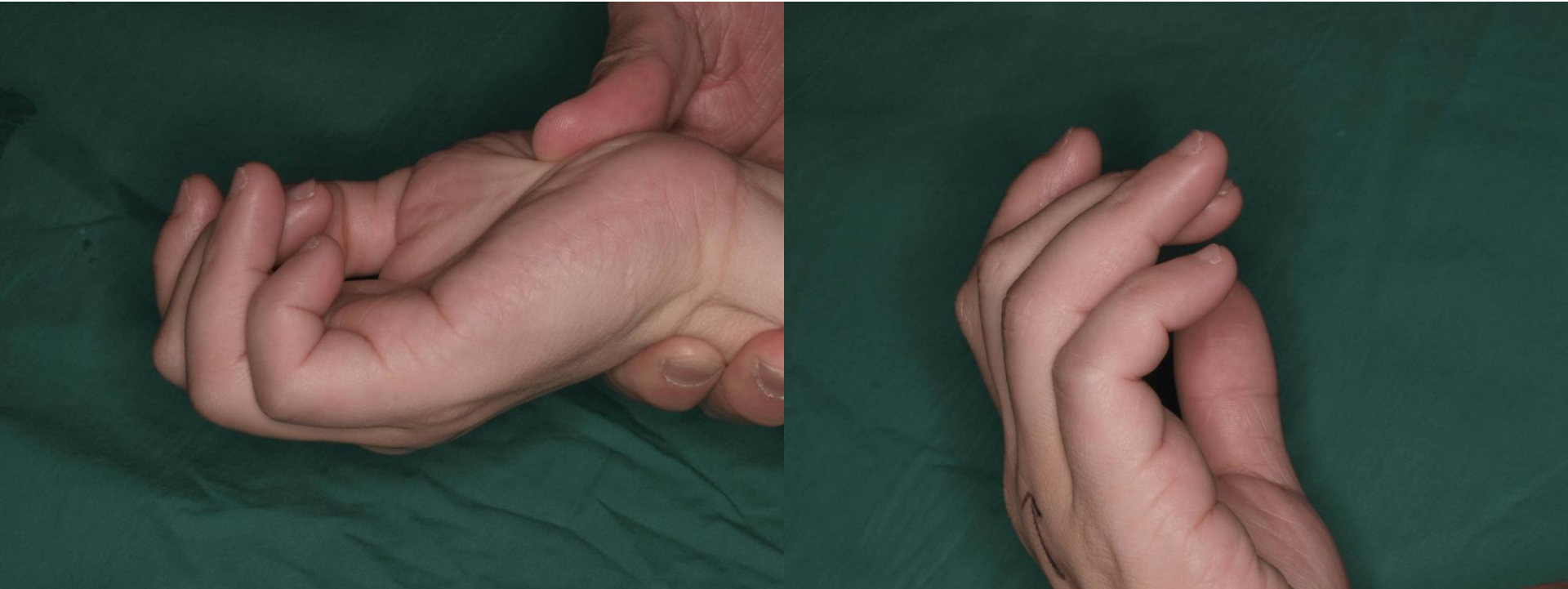






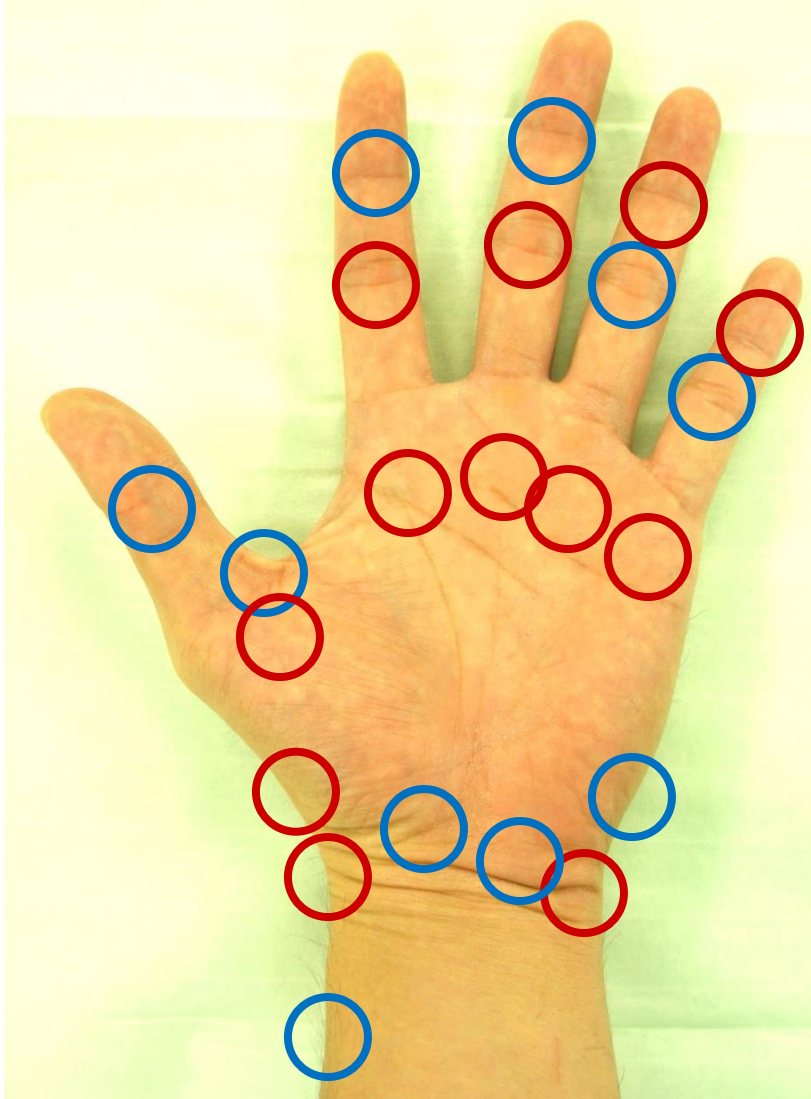
# Example

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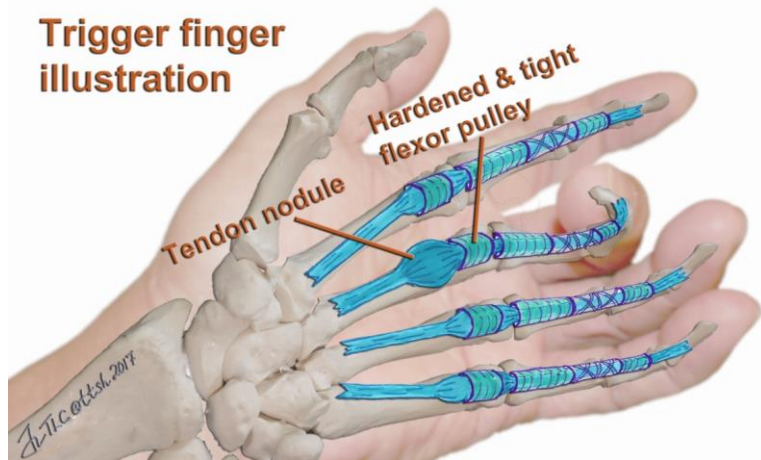
# Pain generators

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# Trigger finger



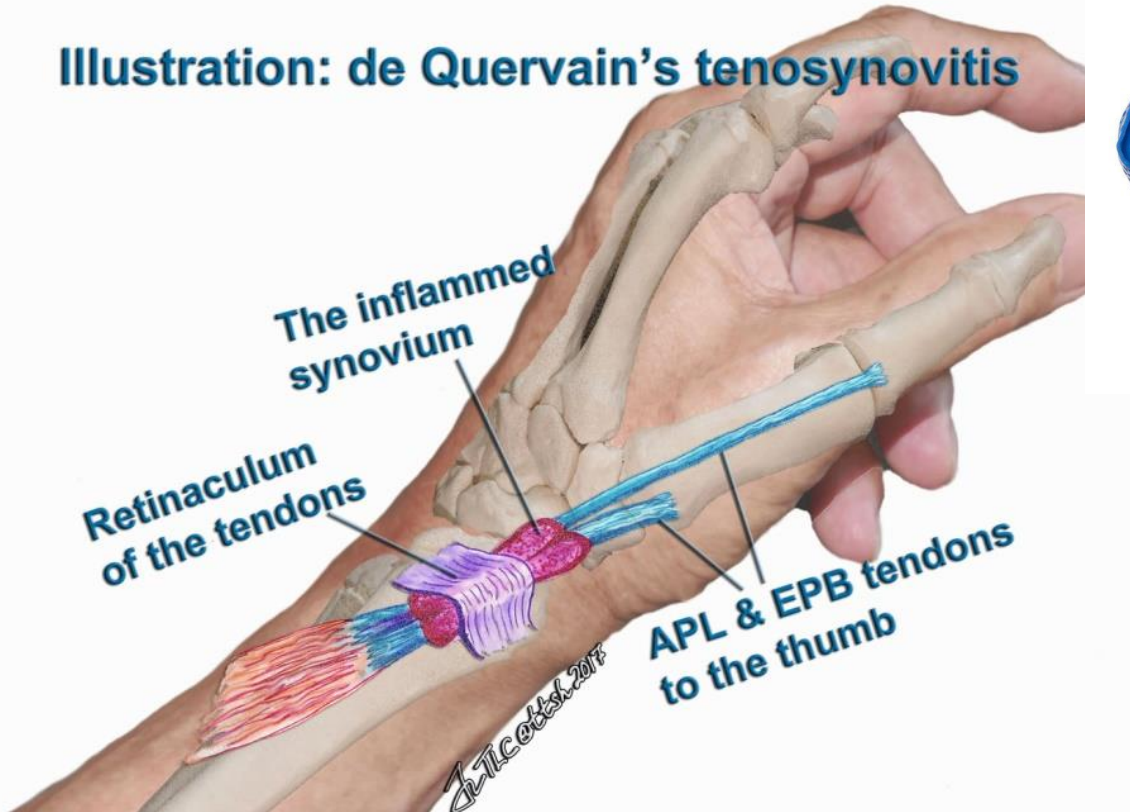
# Trigger finger

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- Activity modification
- Splint
- Steroid injection
- Surgery

# Tendinitis (Dequervain)

Illustration: de Quervain's tenosynovitis



# Dequervain

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- Activity modification
- Splint
- Steroid injection
- Surgery

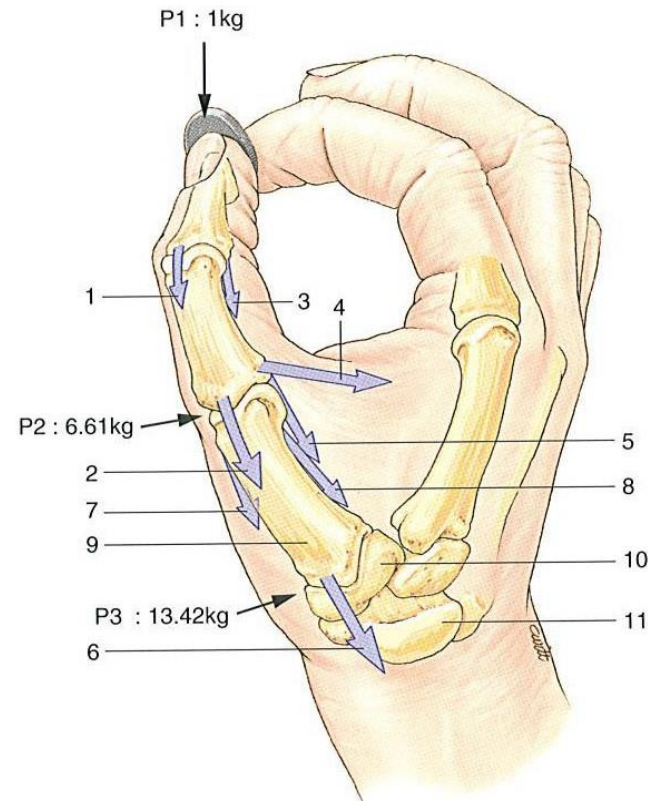


# Basal thumb arthritis

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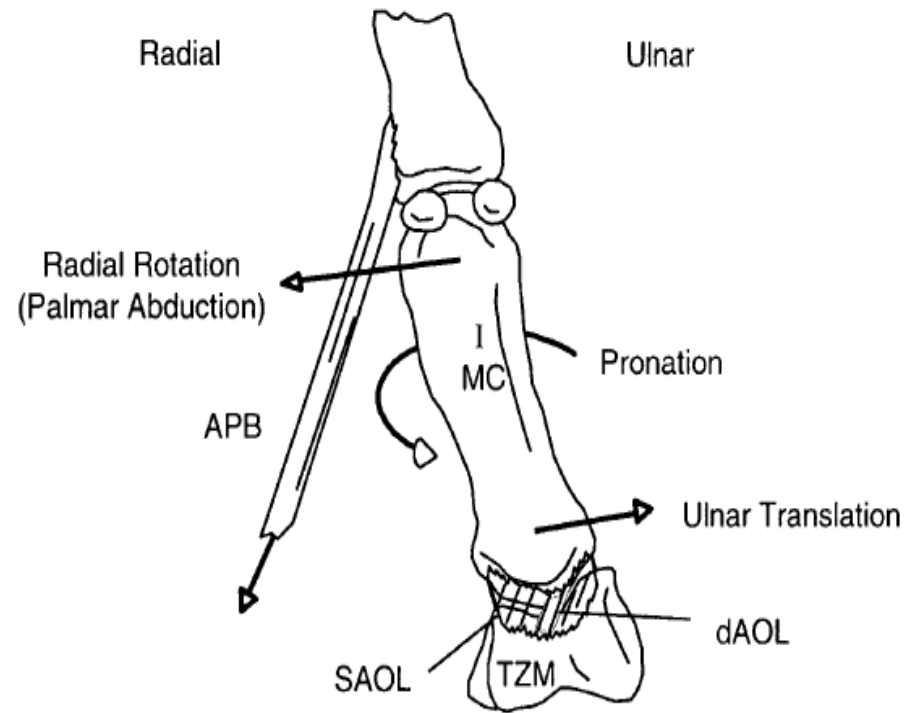
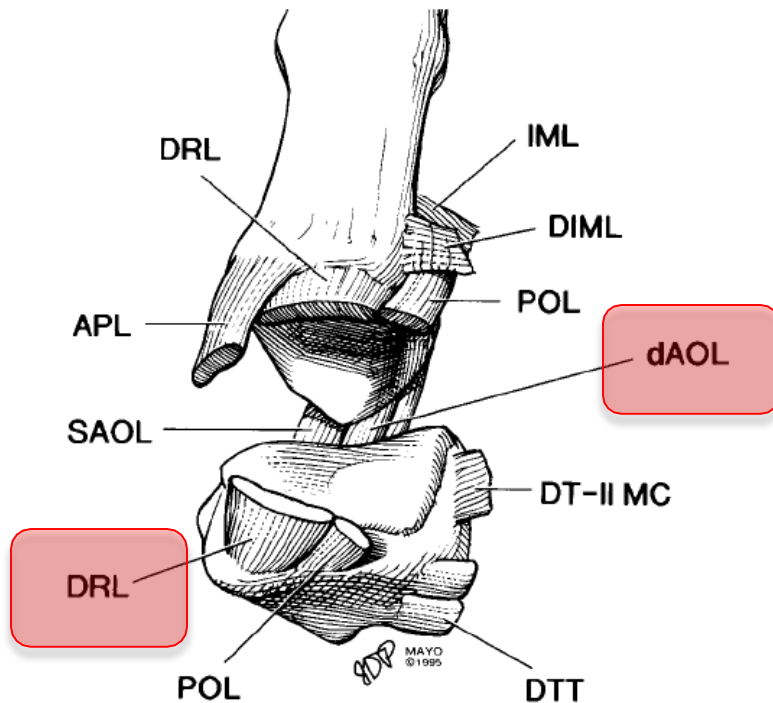
# PATHOANATOMY

- Double saddle joint  
→ multiplanar motion
- Intrinsically unstable
- 8 muscles acting on the thumb
- Significant force transferred to CMCJ during pinch



# PATHOANATOMY

- **AOL:** Pivot for 1<sup>st</sup> MC during palmar abduction to allow rotation (pronation), resisted ulnar translation in abduction
- **DRL:** resist dorsal radial subluxation



# PELLEGRINI'S HYPOTHESIS

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Palmar beak ligament degeneration



Dorsal translation of the metacarpal on trapezium during flexion-adduction of the thumb ray in lateral pinch



Generation of abnormal shear forces in the palmar contact areas of the joint

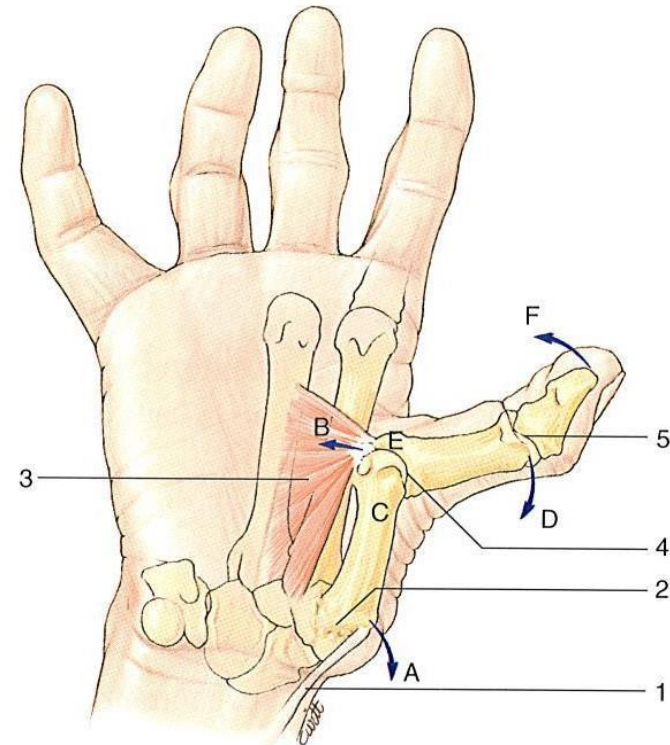


Eventual articular cartilage



# ISSUES

- Pain aggravated by pinch with difficulty in activities such as opening jar, turning keys, writing
- Deformity: thumb adduction, MCPJ hyperextension
- Reduced webspan



# NONOPERATIVE MANAGEMENT

- Activity modification/Assistive devices
- Splinting
- NSAIDS
- Intra-articular injections



# Conservative Treatment of Thumb Base

## — Osteoarthritis: A Systematic Review —

Anne J. Spaans, MD, L. Paul van Minnen, MD, PhD, Moshe Kon, MD, PhD, Arnold H. Schuurman, MD, PhD,  
A. R. (Ton) Schreuders, MD, PhD, Guus M. Vermeulen, MD, PhD

- **Hand therapy** reduces pain, lack of long term follow up
  - **Intra-articular injection** steroids and hyaluronate both offer pain relief but hyaluronate has a superior longer lasting effect
  - **Orthoses** reduces pain without effect on dexterity/function/strength
- ➔ Thumb basal OA is a chronic disease with remission and exacerbations. Trial of conservative management is warranted prior to deciding for surgical intervention.

Spaans AJ et al. JHSA 2015;40(1):16-21

# SURGICAL MANAGEMENT

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- Indication: Persistent pain with significant functional impairment despite conservative treatment
- Dependent on stage of disease
- Joint preserving vs “deletive” surgery (arthrodesis, trapeziectomy, arthroplasty)
- Considerations



**Symptoms of 1<sup>st</sup> CMCJ OA**

Conservative tx for 3-6 months

**Persistent pain**

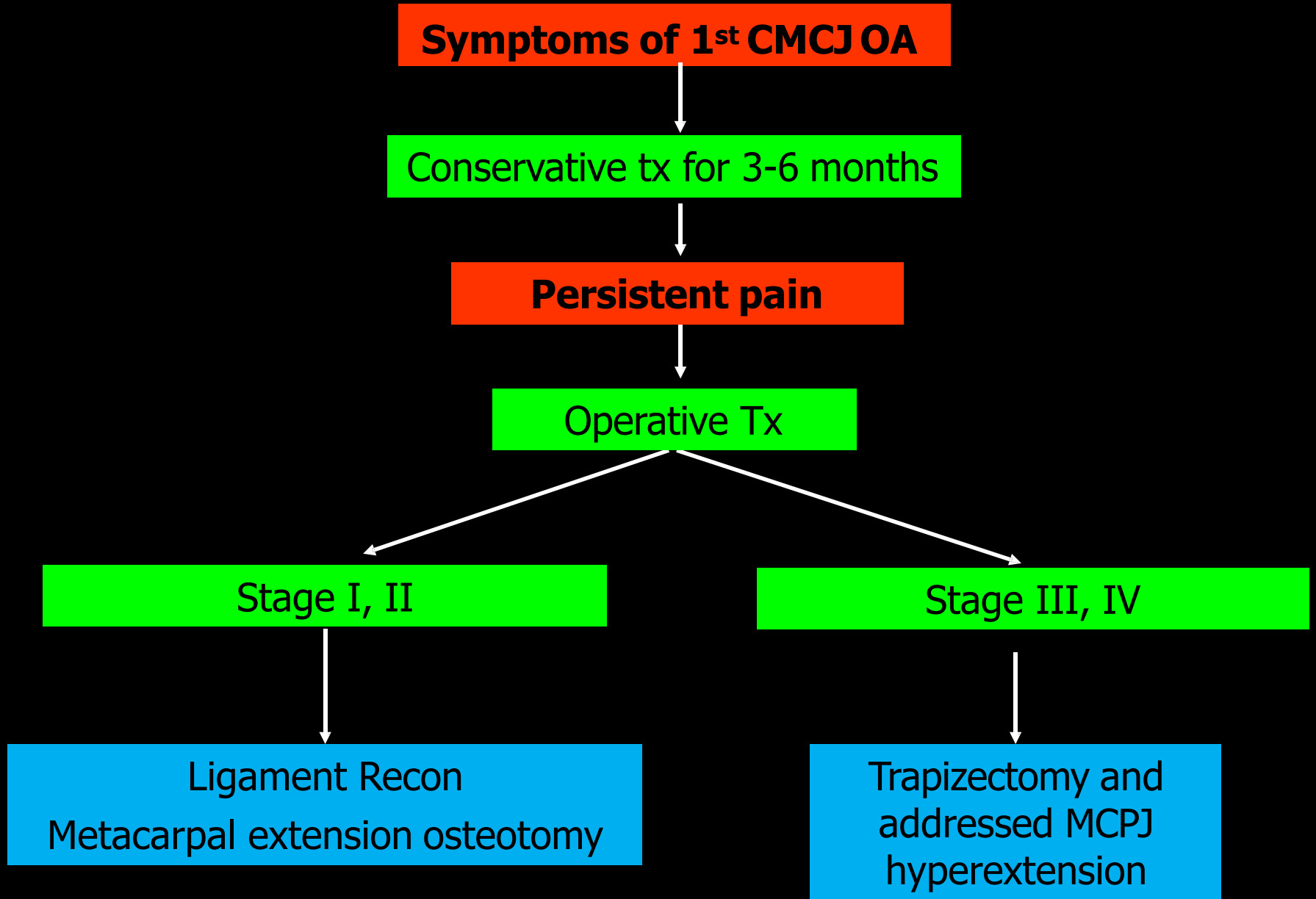
Operative Tx

Stage I, II

Stage III, IV

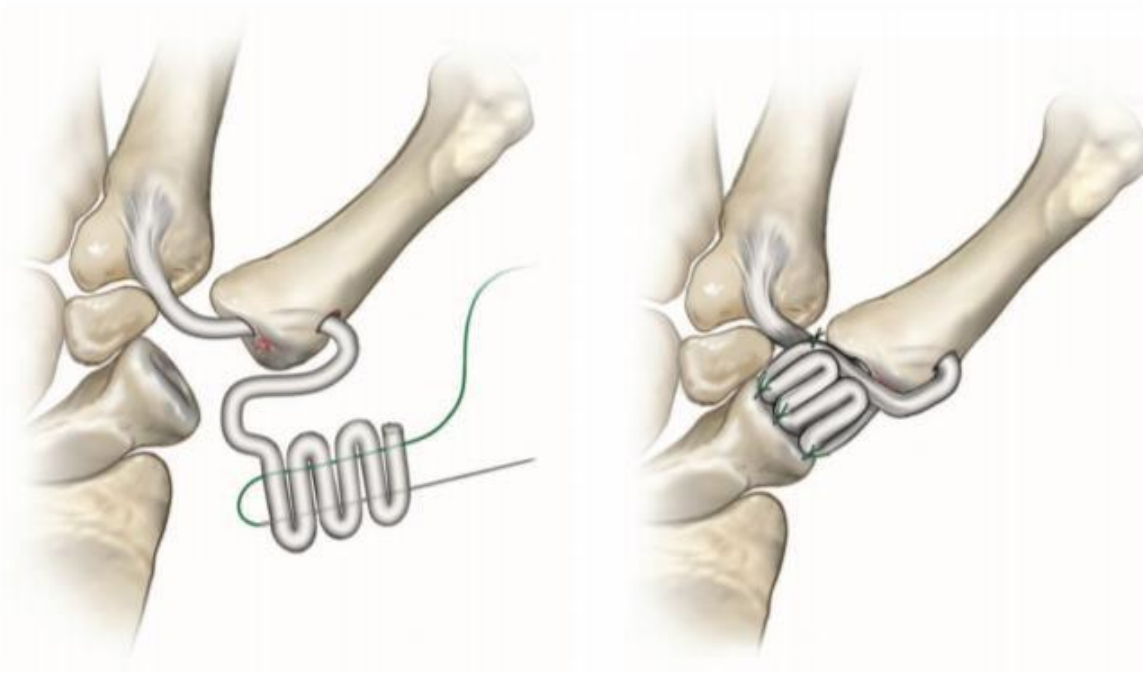
Ligament Recon  
Metacarpal extension osteotomy

Trapizectomy and  
addressed MCPJ  
hyperextension



# Trapeziectomy with LRTI

- ~~Burton and Pellegrini in JHSA 1986~~
- 1) Trapeziectomy: remove pain generator
- 2) Suspension by volar beak ligament reconstruction
- 3) Tendon interposition



# Trapeziectomy Alone

- No evidence of superiority of ligament recon or suspensionplasty (in terms of long term pain, mobility, strength)
- May have increased rate of complications

Major: infection, re-op, CRPS

Minor: paresthesia, symptomatic subsidence,  
wound/scar related issues, prolonged swelling

## Arthrodesis

- Indication: young patient needing a more reliable grip
- Contraindicated in STT or MCPJ OA
- Fusion angle 20° radial and 40° palmar abduction
- Disadvantage
  - inability to place hand flat
  - potential to provoke STT, MCPJ arthritis
  - nonunion 13%





# Implant Arthroplasty

- Indication: generally reserved for revision of failed trapeziectomy, arthrodesis or total joint arthroplasty
- Types of implant: Swanson silastic implant, TIE-IN trapezium implant
- Complications: silicone synovitis, subluxations



Umarji, S. I. M., Arnander, M. W. T., & Evans, D. M. (2012). The use of Swanson silastic interposition arthroplasty in revision thumb-base surgery for failed trapeziectomy; a case series of 10 patients. *Journal of Hand Surgery (European Volume)*, 37(7), 632–636.

# Total Joint Arthroplasty

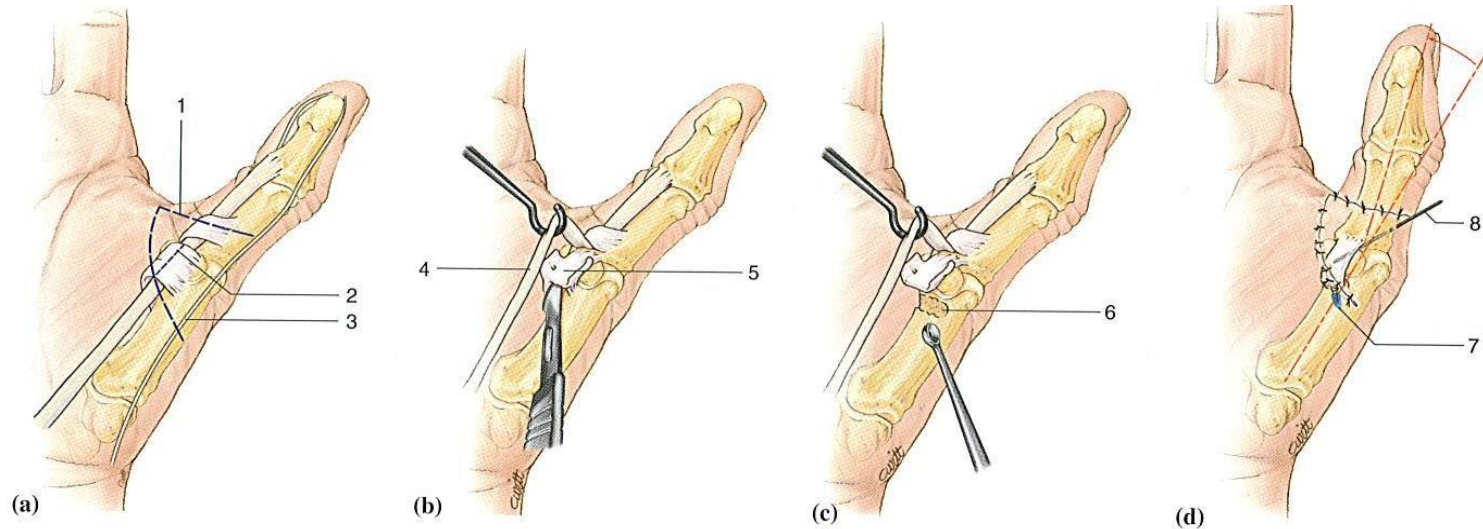
- First described by de la Caffiniere and Aucouturier 1979
- Proposed for older patients with less demands
- Complications:
  - Silicon synovitis
  - Loosening
  - Subluxation
  - Trapezial fractures



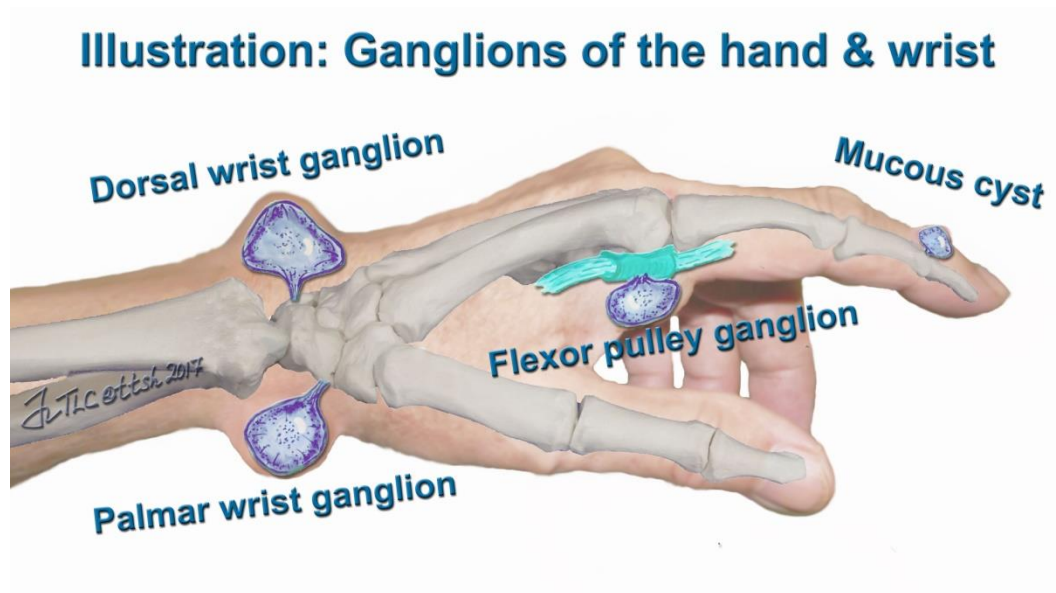
# MCPJ

## Hyperextension

- MCPJ hyperextension  $< 30^\circ$ 
  - K wiring for 4 weeks
- MCPJ hyperextension  $> 30^\circ$ 
  - Arthrodesis
  - Volar capsulodesis



# Ganglion cysts







# Radiological Classification

Table 1

## Kellgren-Lawrence Classification Scale for Osteoarthritis Severity

Grade	Description
0	No radiographic features of osteoarthritis
1	Doubtful narrowing of joint space, possible osteophytic lipping
2	Possible narrowing of joint space, definite osteophytes
3	Definite narrowing of joint space, moderate multiple osteophytes, some subchondral sclerosis, possible deformity of bone ends
4	Marked narrowing of joint space, large osteophytes, severe subchondral sclerosis, definite deformity of bone ends







# Compressive Neuropathies

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- Carpal tunnel syndrome

# Presentation

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- Numbness- most frequent complaint of the radial 3 and a half fingers
- Onset early hours – relieved by hanging the limb
- Provoked - wrist flexed (driving , reading newspaper)
- Pain – maybe above the tunnel as far as the shoulder
- Clumsiness – loss of sensation, joint position, weakness in thenar muscles
  - » Lister's the Hand. Diagnosis and Indications 4<sup>th</sup> edition

# Inspection

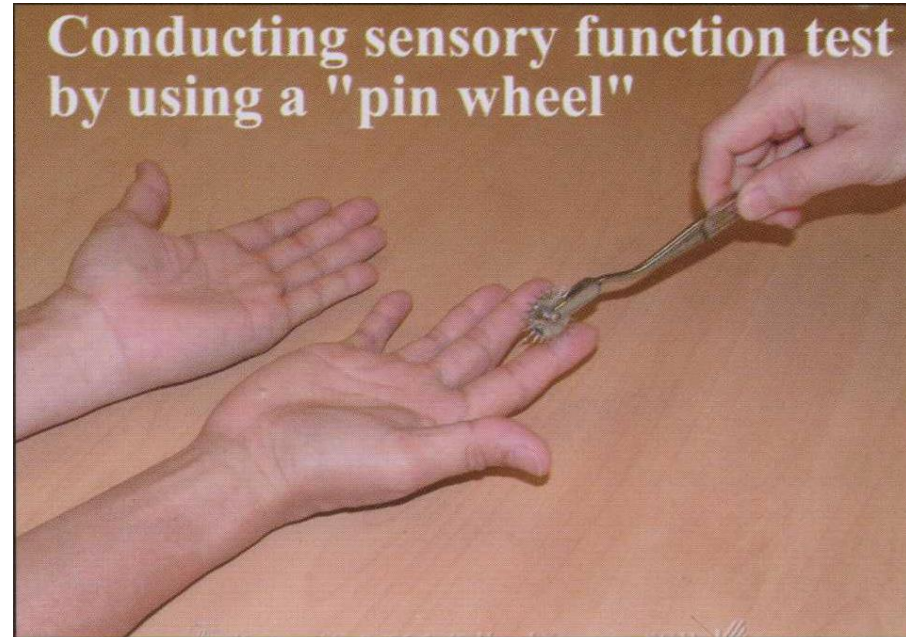
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- Thenar wasting



- Sensation in radial 3 and half fingers
- Semmes-Weinstein monofilament testing (Sensitivity 83%)
- Vibration reception thresholds (Sensitivity 87%)
- Abnormal two-point discrimination

» Hand Surgery – Berger and Weiss 2004



Painful conditions of the Hand and Wrist;  
Diagnosis and treatment

# Diagnosis of Carpal Tunnel Syndrome

- **Provocative tests:**

## **Phalens Test:**

Sensitivity: 42%-85%

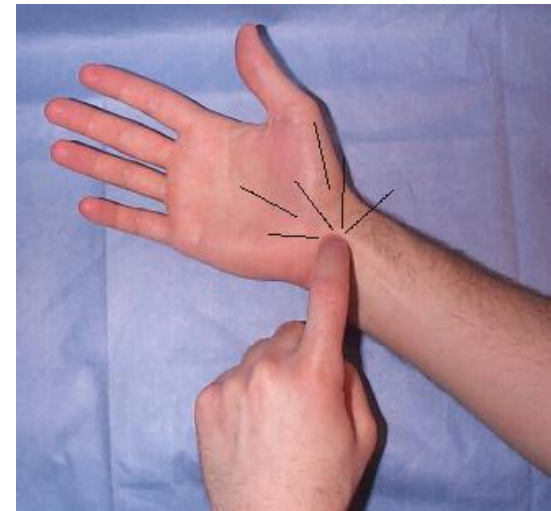
Specificity: 54%-98%



## **Tinnel' s Sign:**

Sensitivity: 38%-100%

Specificity: 55%-100%

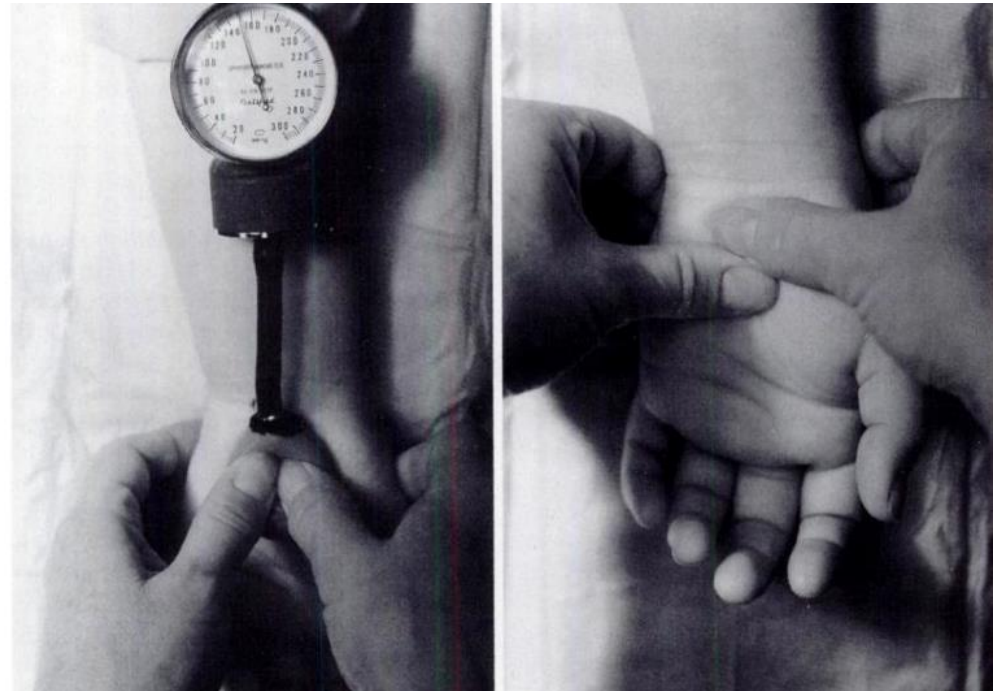


Heller L *et al.* (1988) Evaluation of Tinel's and Phalen's signs in diagnosis of the carpal tunnel syndrome. *Eur Neurol* 25: 40-42



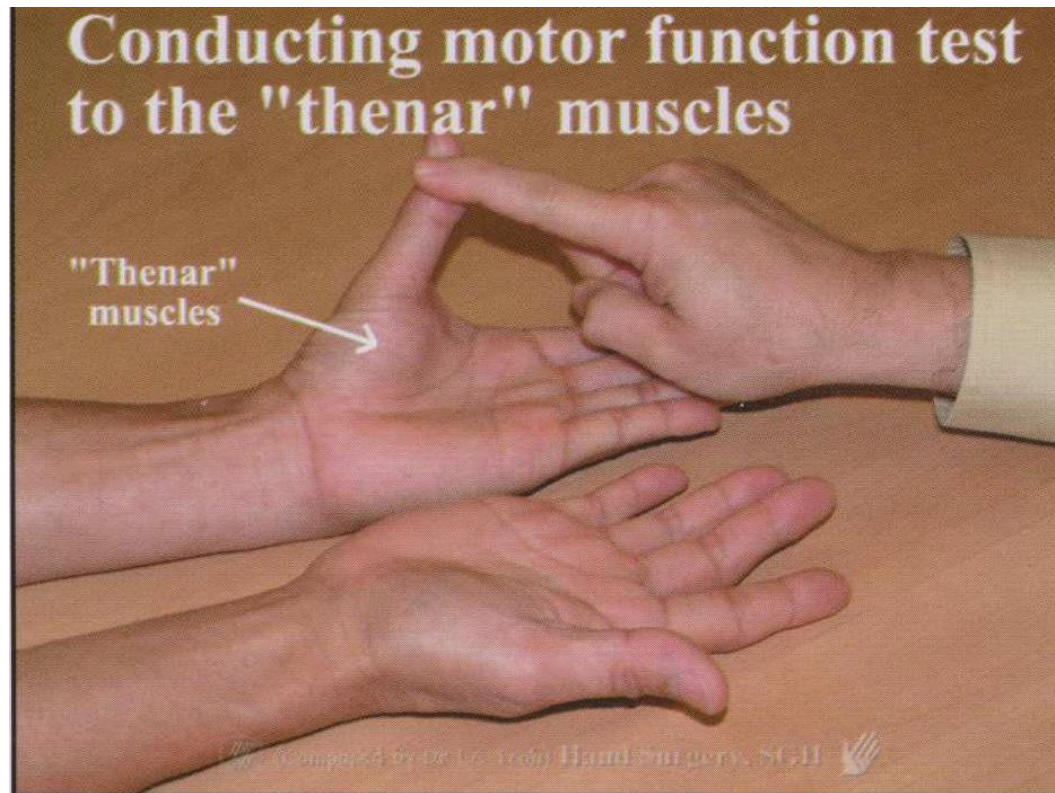
- 
- Durkan's test
    - 87% sensitivity
    - 90% specificity

**A new diagnostic test for carpal tunnel syndrome** JA Durkan  
*J Bone Joint Surg Am.* 1991;73:535-538.



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- Testing the Abductor Pollicis Brevis



- 
- Durkan's test, Semmes-Weinstein monofilament threshold testing after Phalen's maneuver, - most sensitive tests for diagnosis

- » Szabo et al; the value of diagnostic testing in carpal tunnel syndrome; JHS 1999;24A:704-714

# Non surgical treatment

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- Splinting the wrist in neutral
- Steroid injections/ oral
- Pyridoxine ( vitamin B6)
- Management of underlying systemic disease

# Splinting

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- First line of intervention

Russel GS et al AAOS;1991.P 1-4



- 
- Splinting in wrist neutral position
  - 6 week nocturnal splinting with benefits evident at 1 yr f/u

- Robert A et al RCT of nocturnal splinting for active workers with symptoms of CTS; Arch Phys Med Rehab 2005; 86: 1-7



# Steroids

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- Reduce symptoms when taken orally
  - Chang MH et al A randomized clinical trial of oral steroids in carpal tunnel syndrome: a long term follow-up. J Neurol Neurosurg Psychiatry 2002;73:710
- As well when injected
  - Dammers et al. Injection with methylprednisolone proximal to the carpal tunnel: randomized double blind trial. B Med J 1999: 319:884

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- Treatment for mild CTS

- Practice parameter for carpal tunnel syndrome. Report of the quality standards subcommittee of the American Academy of Neurology. Neurology. 1993(43) 2406-409

- Transient relief in 80% of patients

- 22% symptom free after 12 month

- Szabo et al; the value of diagnostic testing in carpal tunnel syndrome; JHS 1999;24A:704-714

# Complications

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- Direct needle injury to the median nerve
  - chronic disabling pain or paresthesiae
  - Sensory loss in the distribution of the median nerve

# Pyridoxine

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- Controversy still exists regarding the role of pyridoxine (Vitamin B6) as a component in the treatment of CTS
- Amadio PC. Pyridoxine as an adjunct in the treatment of carpal tunnel syndrome. J Hand Surg 1985;10A:237–41.
- [38] Franzblau A, Rock CL, Werner RA, et al. The relationship of vitamin B6 status to median nerve function and carpal tunnel syndrome among active industrial workers. J Occup Environ Med 1996; 38:485–91.
- [39] Kasdan ML, Janes C. Carpal tunnel syndrome and vitamin B6. Plast Reconstr Surg 1987;79:456–62.
- [40] Keniston R, Nathan P, Leklem J, Lockwood R. Vitamin B6, vitamin C, and carpal tunnel syndrome. A cross-sectional study of 441 adults. JOEM 1997;39(10):949–59.

# Surgical treatment

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- Gold standard surgical treatment
  - Leartmonth JR. The principle of decompression in the treatment of certain diseases of the peripheral nerve. Surg Clin No Am 1933;13:905
- 96% rate of patient satisfaction and improvement of symptoms
- 84% returning to original jobs after op
  - Osterman A. The double crush syndrome. Orthop Clin North Am 1988;19:147-155
- Open carpal tunnel
- Endoscopic
  - 2 portal ( Chow)
  - 1 portal (Agee)

# Hand Infections

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# Principles of Management

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- Early recognition & accurate diagnosis
  - Delay in diagnosis can lead to morbidity and loss of function
- Early Antibiotics
- Early Surgical treatment
  - Await reversal , Elevate the limb
- Early Reconstruction
- Early Rehabilitation

# EPIDEMIOLOGY

	General population <sup>1</sup>		Local population <sup>2</sup>		ESRF <sup>3</sup>	
Numbers	418		198		47	
Type of infection	Subcutaneous	45%	Subcutaneous	44.5%	Subcutaneous	34%
	Tendon	27.3%	Tenosynovitis	16%	Gangrene	25%
	Bone/joint	23.2%	Septic arthritis	9%	Osteomyelitis	11%
	<u>Subfascial</u>	1.9%	Paronychia	8.5%	Tenosynovitis	9%
	Multiple/other	1.4%	Felon	8%	<u>Nec fasc/myositis</u>	9%
	Paronychia	1.2%	Gangrene	5%	Multiple/other	6%
			Osteomyelitis	5%	Septic arthritis	4%
			<u>Nec Fasc</u>	2.5%		
Amputation rate	3.3%		8.5%		36%	

1. Houshian S, Sevedipour S, Wedderkopp N. Epidemiology of bacterial hand infections. International Journal of Infectious Diseases (2006) 10, 315–319

2. Chew-Wei Chong, Vicky Ellen Ormston, Agnes Beng-Hoi Tan: Epidemiology of Hand Infection – A Comparative study between year 2000 and 2009; Hand Surgery, Vol. 18, No. 3 (2013) 307–312

3. Germaine G Xu, Andrew Yam, Lam Chuan Teoh, Fok Chuan Yong, Shian Chao Tay; Epidemiology and Management of Surgical Upper Limb Infections in Patients with End-stage Renal Failure; Ann Acad Med Singapore 2010;39:670-74

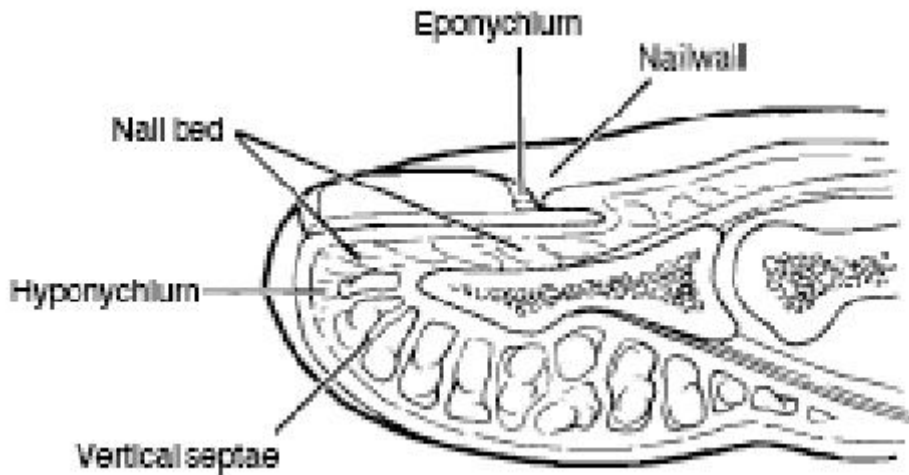
# Aetiology

**Table 4** Types and numbers of organisms in relation to etiologies

Organism	Laceration puncture	Foreign body	Animal bites	Previous surgery	Human bites	Spontaneous	IV drug user	Secondary focus	Unknown	Others	Total	%
<i>Staphylococcus aureus</i>	71	30	1	44	1	13	3	2	15	4	184	44.0
<i>Staphylococcus epidermidis</i>	6	0	0	1	0	1	0	0	0	0	8	1.9
$\beta$ -hemolytic streptococci	21	9	1	3	4	2	5	2	0	0	47	11.2
Non- $\beta$ -hemolytic streptococci	8	4	0	0	2	0	0	0	0	0	14	3.3
Mixed	16	9	2	12	1	3	2	0	4	0	49	11.7
<i>Pasteurella multocida</i>	1	0	17	0	0	0	0	0	0	0	18	4.3
Micrococci	15	3	2	8	0	2	1	0	2	0	33	7.9
<i>Pasteurella canis</i>	0	0	3	0	0	0	0	0	0	0	3	0.7
Enterobacteriaceae	1	2	1	1	0	0	0	0	0	0	5	1.2
<i>Corynebacterium spp</i>	2	0	0	0	0	0	0	0	0	0	2	0.4
Pneumococci	1	0	0	0	0	0	0	0	0	0	1	0.2
<i>Bacillus spp</i>	0	1	0	0	0	0	0	0	0	0	1	0.2
<i>Proteus mirabilis</i>	0	0	0	0	0	1	0	0	0	0	1	0.2
<i>Citrobacter spp</i>	0	0	0	1	0	0	0	0	0	0	1	0.2
<i>Escherichia coli</i>	0	0	1	0	0	0	0	0	0	0	1	0.2
<i>Klebsiella oxytoca</i>	0	0	0	1	0	1	0	0	0	0	2	0.5
<i>Klebsiella pneumoniae</i>	0	0	0	1	0	0	0	0	0	0	1	0.2
<i>Proteus vulgaris</i>	0	0	0	1	0	0	0	0	0	0	1	0.2
<i>Pseudomonas spp</i>	0	0	0	1	0	0	0	0	0	0	1	0.2
No growth	4	13	10	2	0	5	3	1	7	0	45	10.8
Total	146	71	38	76	8	28	14	5	28	4	418	100

Houshian S, Seyedipour S, Wedderkopp N. Epidemiology of bacterial hand infections. International Journal of Infectious Diseases (2006) 10, 315—319

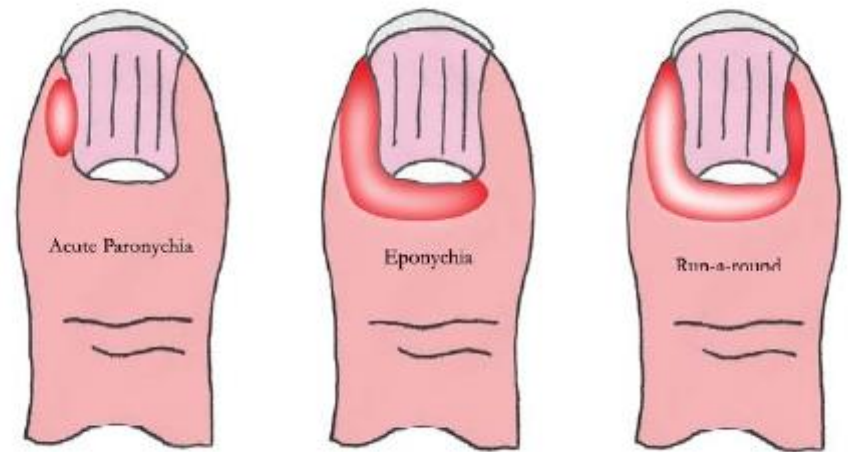
# Anatomy of the fingertip



- Fingerpad- closed sac of fat separated by multiple vertical fibrous septae
- Nail complex- nail plate, nailbed, eponychium, nail wall
- Distal phalanx
- FDP tendon

# Acute Paronychia

- Infection of lateral soft tissue fold surrounding fingernail
- common hand infection
- Types: Paronychia, Eponychia, Run-a-round infection
- Occurs following disruption of the seal between nail fold and nail plate and entry of bacteria

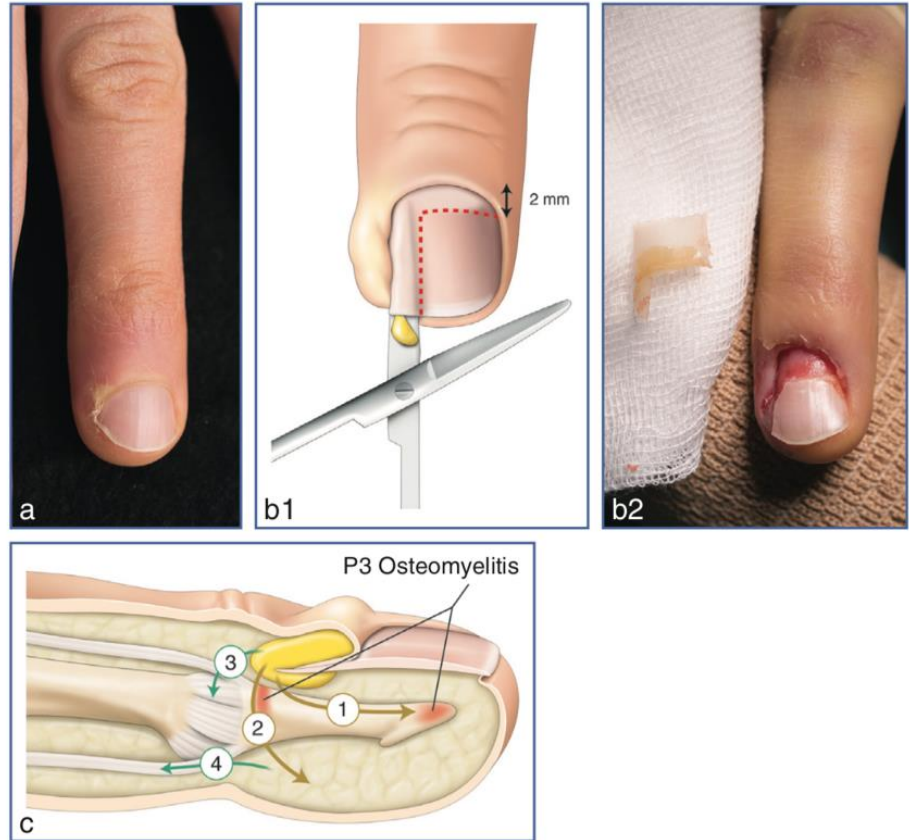






# Treatment

- Assess for pus below nail plate or in pulp
- Perionychial sulcus elevated gently with a flat, blunt instrument
- Removal of nail if abscess extends below nail



• **Fig. 19.1** (a) Acute paronychia. (b1, b2) The nail plate is elevated by the presence of pus and it should be excised. (c) A paronychia may progress to involve the distal phalanx (1), DIP joint (2), tendons (3, 4) and the pulp.

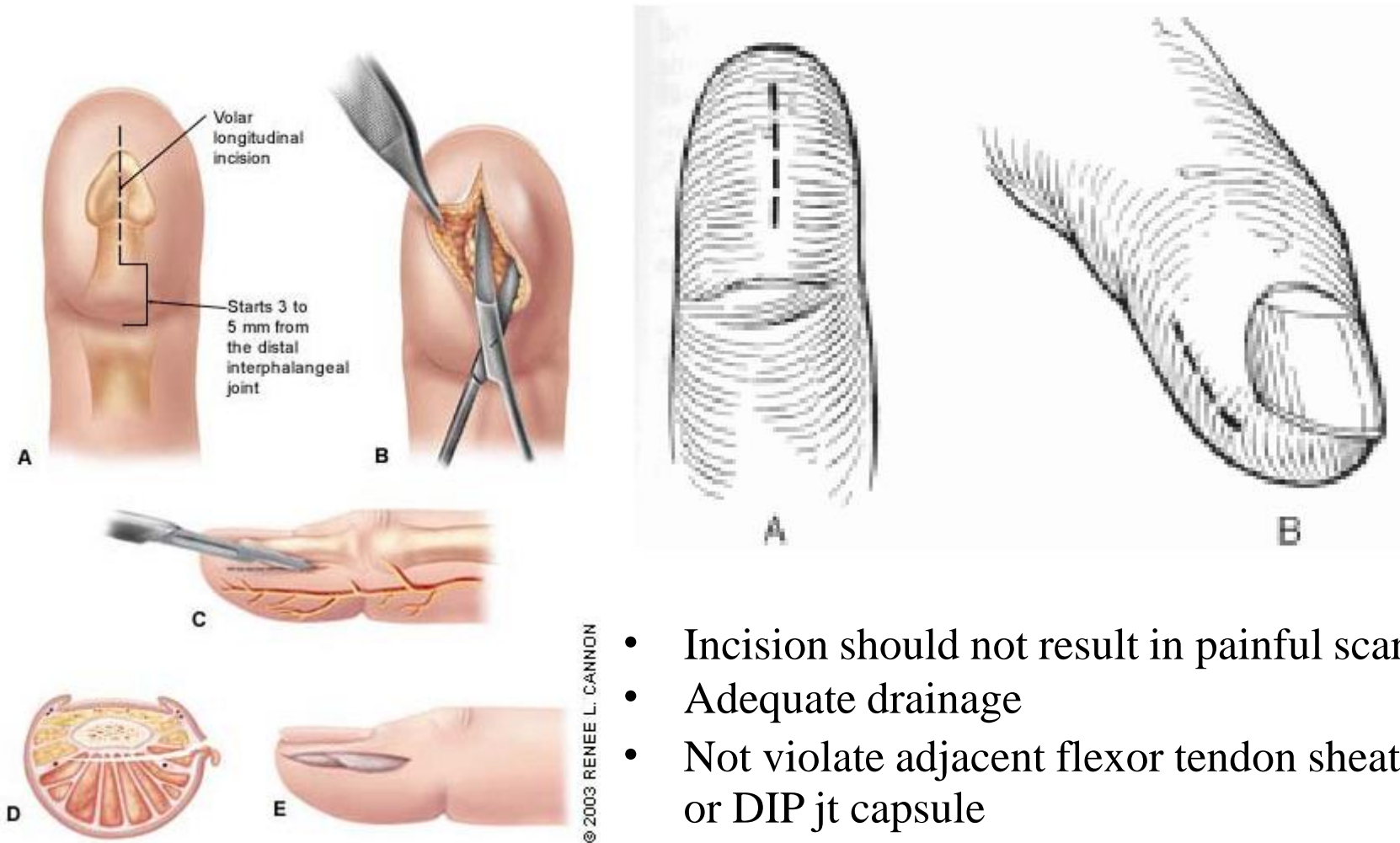


# Felon

- Subcutaneous abscess of distal pulp of fingertip
- Specifically infection of the closed space created by multiple vertical fibrous septae
- Often history of penetrating trauma
- Cx: osteomyelitis, skin necrosis and d/c, suppurative flexor tenosynovitis, DIP jt septic arthritis
- Clinically: rapid onset throbbing pain and swelling of pulp



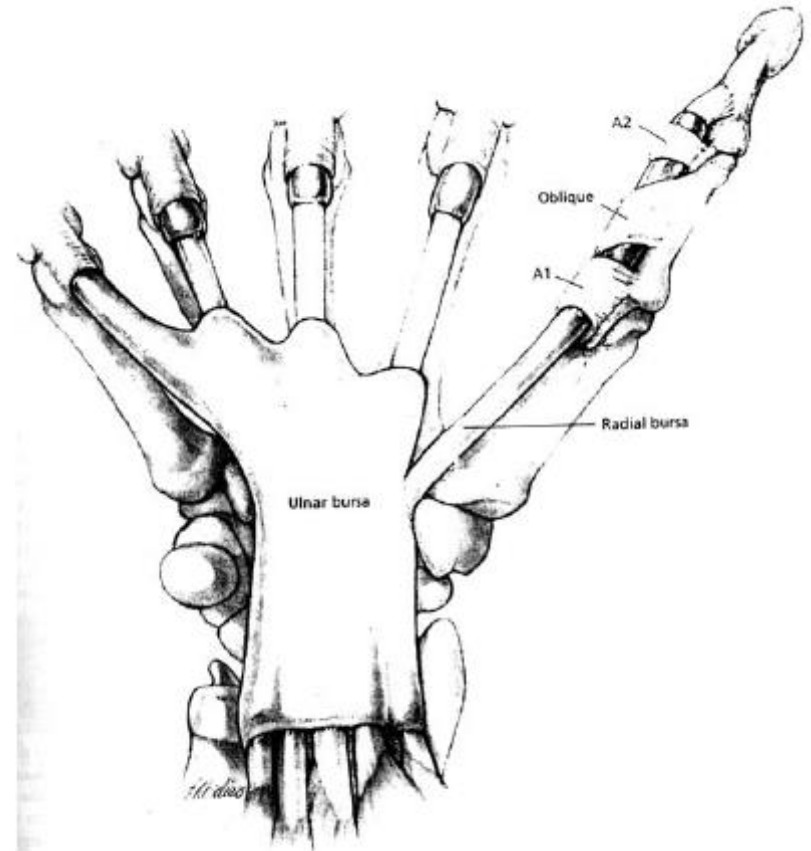
# Principles of surgical drainage



- Incision should not result in painful scar
- Adequate drainage
- Not violate adjacent flexor tendon sheath or DIP jt capsule
- Center incision over point of maximal tenderness

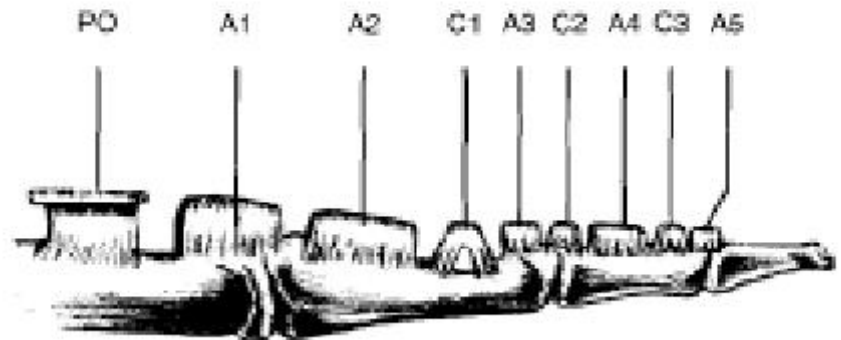
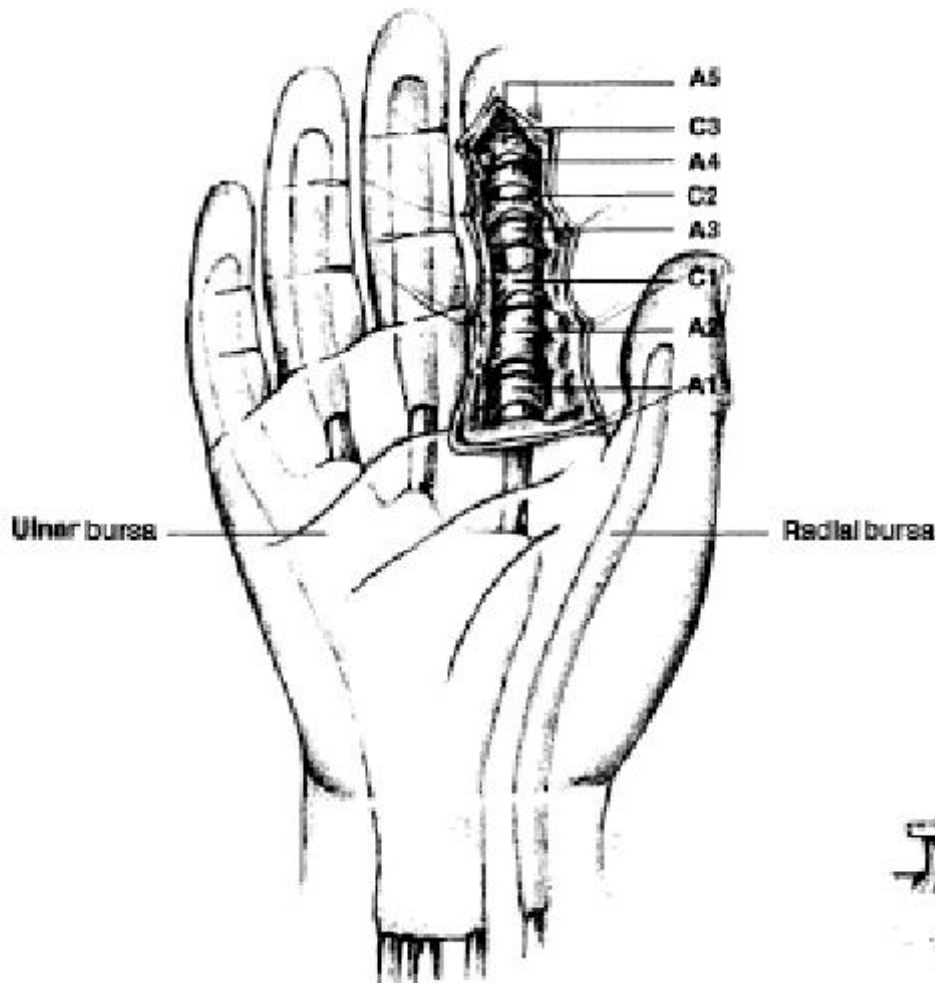
# Pyogenic flexor tenosynovitis

- Closed space infection of the finger or thumb flexor sheath
- **Four signs of Kanavel**
  - Exquisite tenderness over course of entire sheath
  - Semi flexed posture of involved digit
  - Pain on passive extension of digit
  - Fusiform swelling of finger



# Anatomy of the finger flexor tendon sheath and hand bursas

- Synovial space between outer (parietal) synovium and inner (visceral) synovium



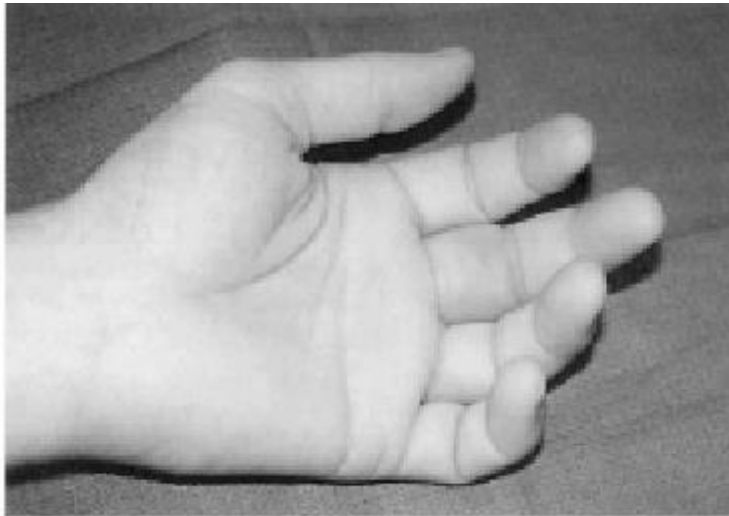
# Pathophysiology of infection

- Flexor tendon sheath inoculated with bacteria
- Synovial fluid becomes nutritional source for bacteria
- Closed anatomic confines of the sheath limit ability of host immune system to combat infection
- Limited antibiotic penetration
- Increased sheath pressures → decreased blood flow to tendon → leads to tendon necrosis and rupture

# Clinical Presentation



- Pain and swelling along flexor tendon sheath
- H/o penetrating trauma
- Typically presents 48 to 72 hrs after trauma with Kanavel's signs
- Most reproducible sign: **pain with passive digital extension**



# Michon Classification of severity of pyogenic flexor tenosynovitis

Intraoperative Stage	Stage 1	Stage 2	Stage 3
Characteristic Findings	Serous exudate in sheath	Purulent fluid, granulomatous synovium	Septic necrosis of the tendon, pulleys, or tendon sheath
Treatment	Catheter irrigation	Minimal invasive drainage +/- indwelling catheter irrigation	Extensive open debridement and possible amputation

I



II



III





# Factors Affecting the Prognosis of Pyogenic Flexor Tenosynovitis

By Hee-Nee Pang, MBBS, MRCSEd, Lam-Chuan Teoh, MBBS, FRCS(Glasg), MMed(Surg), FAMS,  
Andrew K.T. Yam, MBBS, MRCSEd, MMed(Surg), Jonathan Yi-Liang Lee, MB, BCh, BAO, MRCSEd, MMed(Surg), FAMS,  
Mark E. Puhaindran, MBBS, MRCSEd, MMed(Surg), and Agnes Beng-Hoi Tan, MBBS, FRCS(Glasg), FRCSEd, FAMS

## 5 Factors:

1. Age > 43 years
2. Comorbidities – DM, PVD, ESRF
3. Subcutaneous purulence
4. Ischemic changes
5. 2 or more pathogens



Group	Positive Kanavel Signs	Presence of Subcutaneous Purulence	Presence of Digital Ischemia	Number of Patients	Number of Digits Amputated*	Percentage Return of Total Active Motion
I	Yes	No	No	21	0 (0%)	80%
II	Yes	Yes	No	37	3 (8%)	72%
III	Yes	Yes	Yes	17	10 (59%)†	49%

## Pang's classification for flexor tenosynovitis

Stage	Management
I	Antibiotics and elevation x 24 hours Limited incision drainage and irrigation
II	Open drainage and debridement with delayed direct closure when infection reversed
III	Open drainage and debridement with reconstructive surgery once infection reversed Consider primary amputation depending on severity and comorbidities



# Fight Bite

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# Mallet Finger

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# Treatment options

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- Acute
    - Splint
    - Dorsal Blocking K wires
    - Hook plate
    - Tension band wire
    - Figure-of-eight wire
    - Intramedullary wire fixation
    - External fixation with Kirschner wires
    - Screw fixation
    - Mini external fixators
  - Chronic
    - SPLINT (prolonged)
    - Tenodesis
    - PL reconstruction
    - Central slip tenotomy\*
    - Spiral oblique retinacular reconstruction\*
    - Arthrodesis (painful/stiff/arthritis)
- \*in presence of swan neck deformity