Compartment syndrome
&
Volkmann Ischemic Contracture

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Faculty, Targetortho

Which is false ?

- A. Compartment syndrome is less common in elderly because of hypertension
- B. Compartment syndrome can be present even if distal pulses are palpable.
- C. Compartment syndrome is more common in females because of more bulk/ girth of extremity
- D. All are true
- E. All are false

Most sensitive sign for diagnosing Compartment syndrome ??

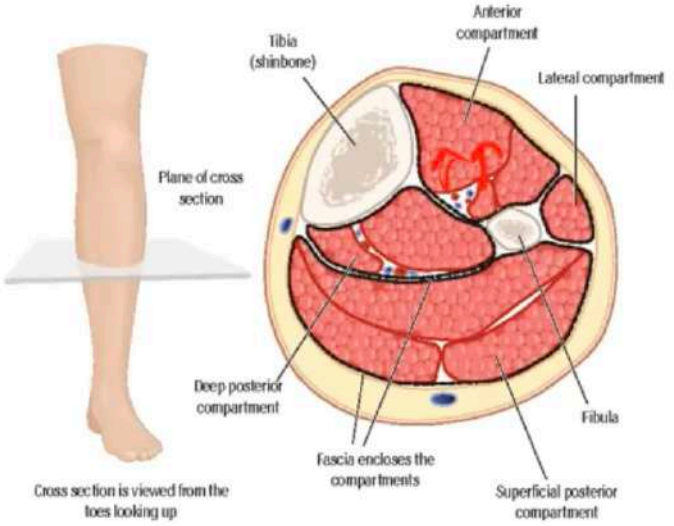
- A. Absent distal Pulse ✗
- B. Pain
- C. Paresthesia
- D. Increase in analgesic requirement → Pain out of Proportion
- E. Paralysis — late.

What is Compartment syndrome ??

- Elevation of interstial pressure in a closed osteofacial compartment

to the extent

that it causes ischemia of muscles and nerves.



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Compartment Vs Compartment ??

Compartment in general – osteofacial compartment

Vs

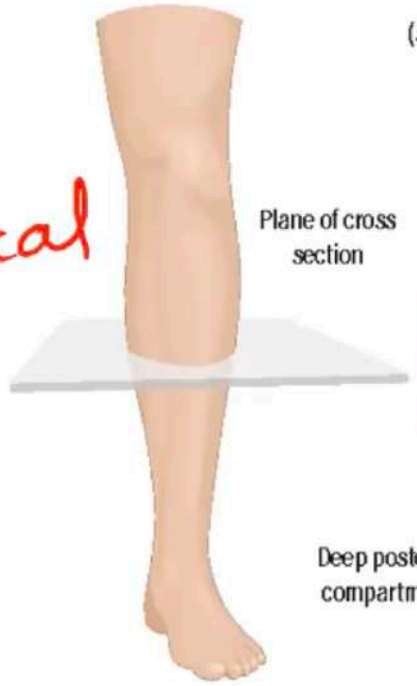
Compartment in Oncology

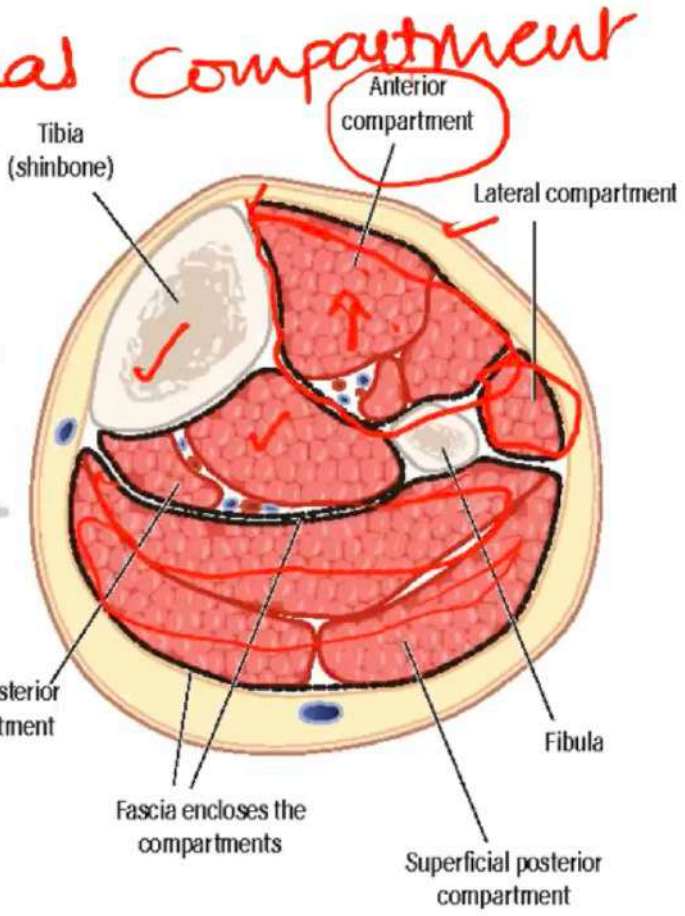
Single anatomical sts.

Enneking

1. A
2. B.

II.





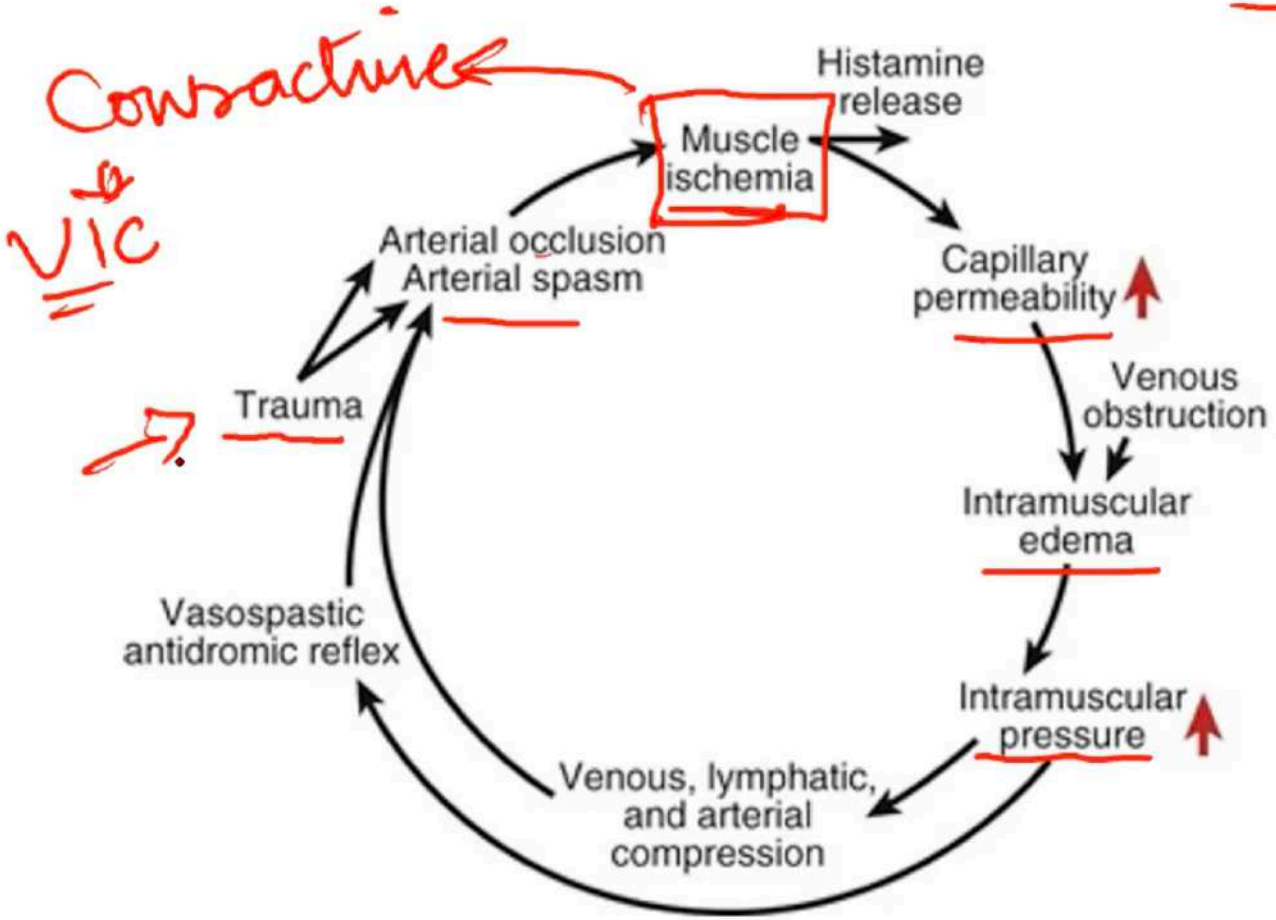
Etiology

- ↓ Compartment size → "encircling tight bandages"

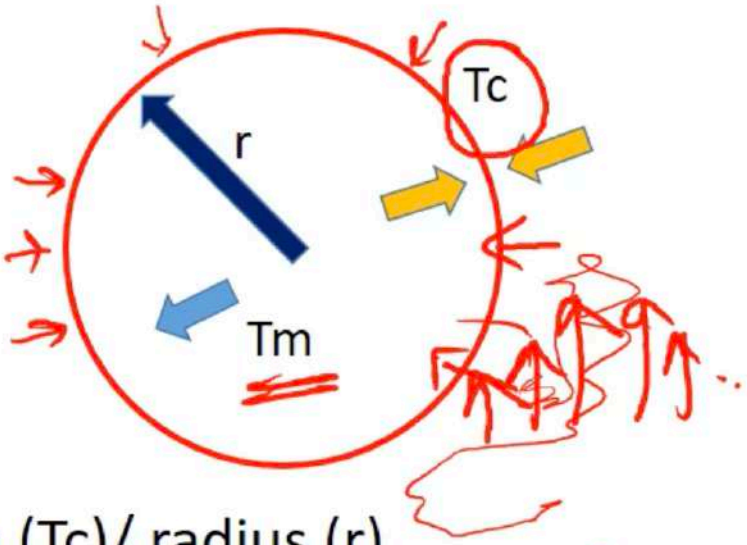
Or

- ↑ Compartment contents/ pressure
  - Hematoma
  - Burns
  - Snake bite

Eaton and Green ischemia edema cycle



Pathophysiology



- Critical closing pressure theory-

Transmural Pressure (Tm) = Tension (Tc)/ radius (r)

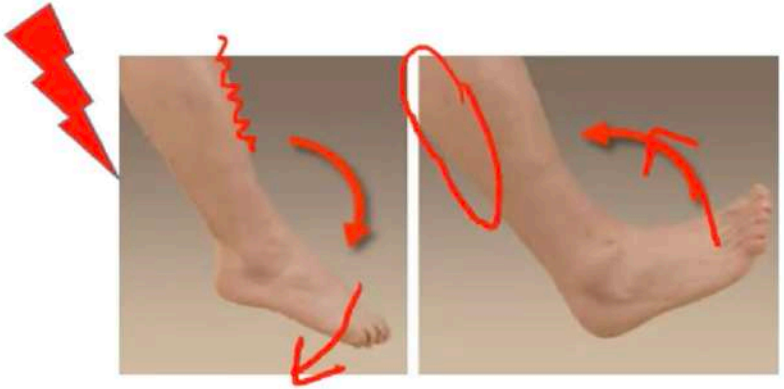
(Laplace law).

- AV gradient theory-

Local Blood Flow = (Pa- Pv) / R

Clinical presentation- 6 P's

- Palpable Swelling
- **Pain out of proportion -**
- **Pain on passive stretch**
- Paresthesia → sensory nerves -



- Pallor
- **Paralysis**
- **Pulselessness**

→ late -

→ "irreversible ischemia."

Diagnosis _ clinical.

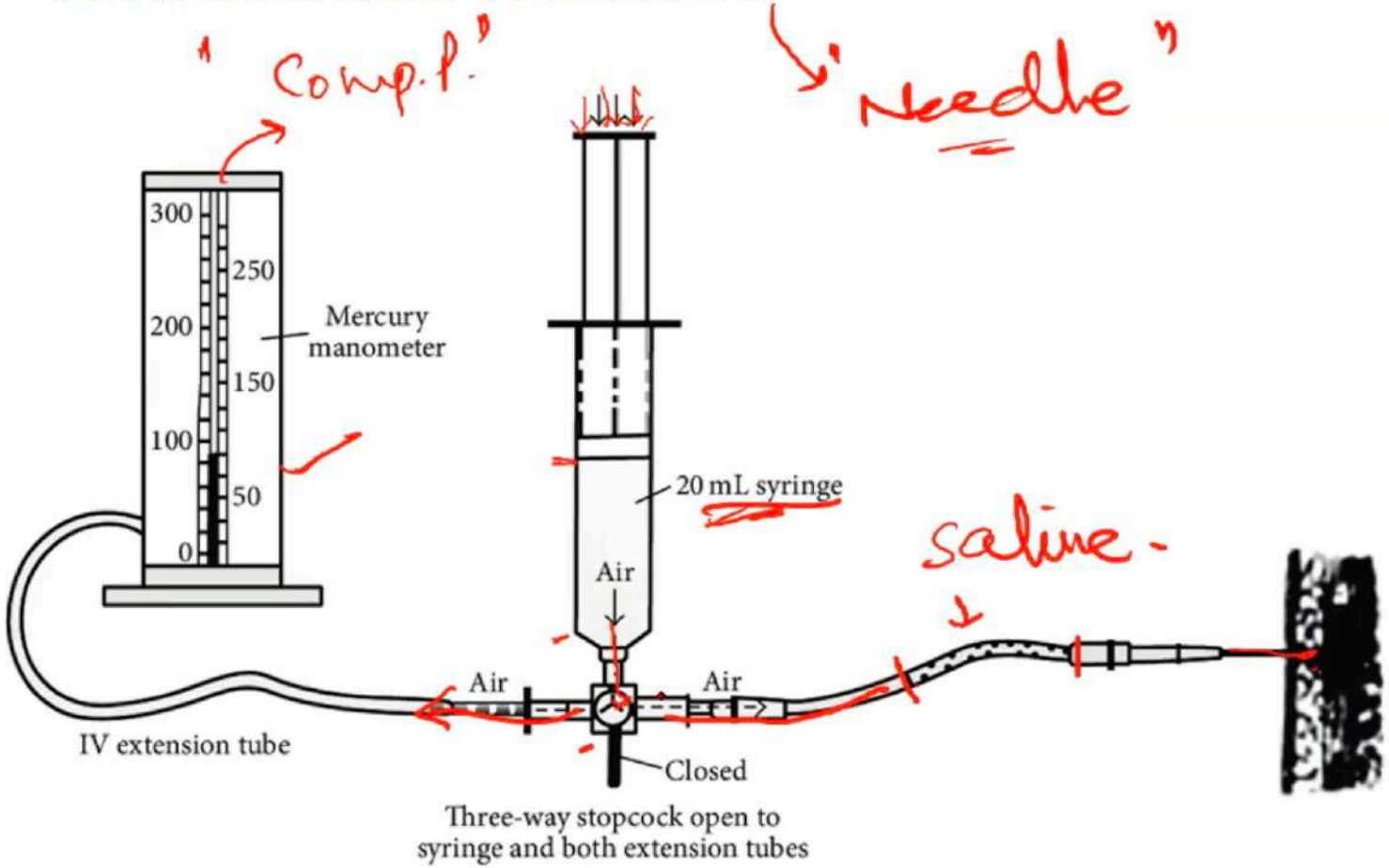
Compartment Pressure measurements

- More role in –
- Altered neurologic status
- Tourniquet palsy
- Peripheral nerve injury

Measuring devices

- Needle method (Whitesides method)
- Wick catheter (Mubarak method)
- Slit catheter
- Stryker Intracompartmental pressure (ICP) monitor

Whitesides method



Stryker ICP monitor

Threshold for Fasciotomy

- Compartment Pressure > 30mm
- ΔP (DBP- ICP) < 30 mmHg

Time after which fasciotomy should not be done ?

- Upto 24 hours
- But > 12 hours → adverse outcome

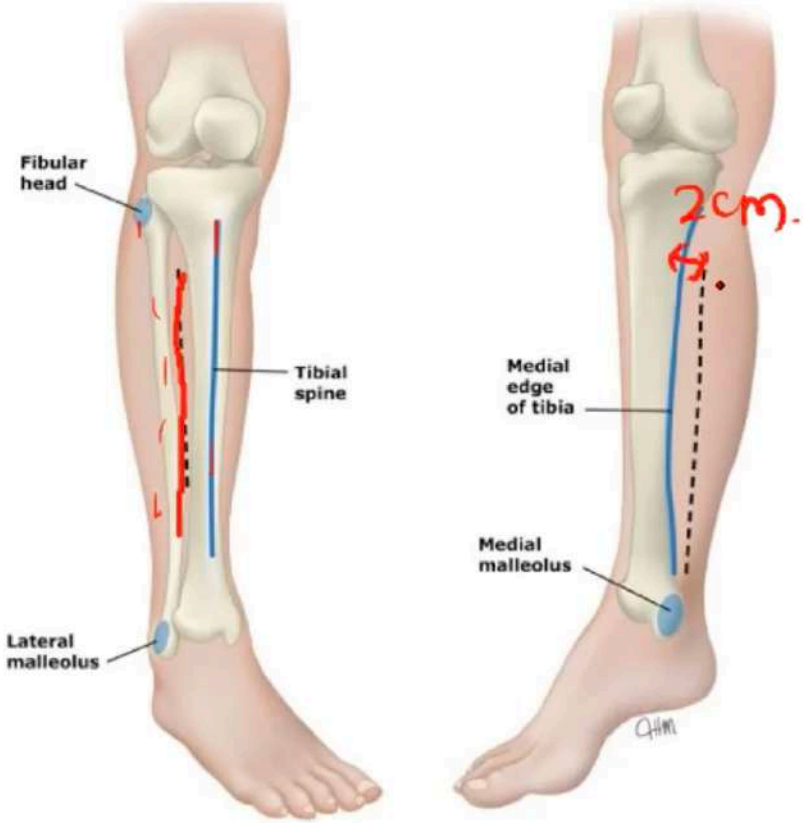
↳ Necrosis
↳ Infection

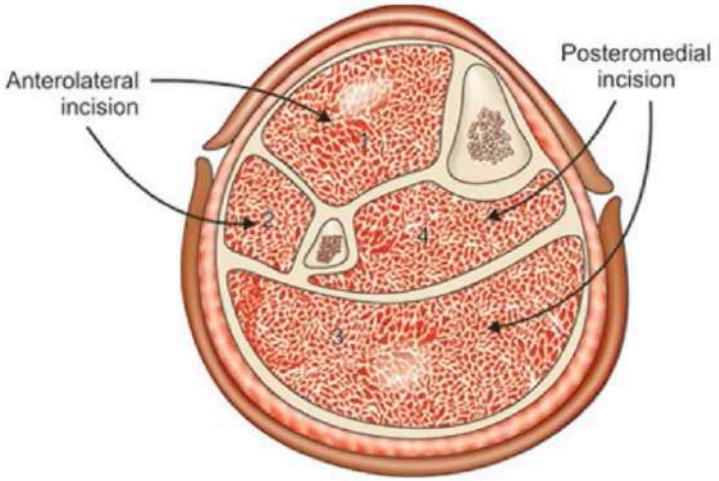
Fasciotomy of leg

- No role of limited or subcutaneous fasciotomy

- Two incision technique
- Single incision technique

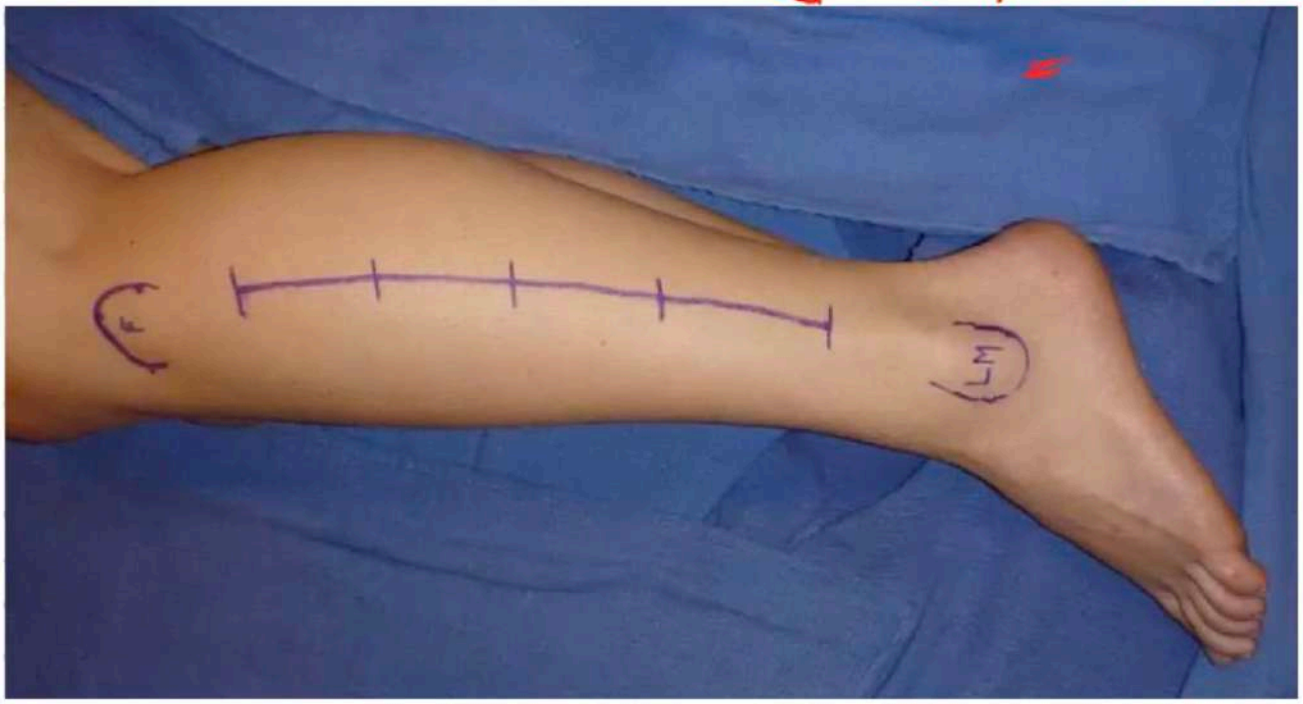
Two incision technique (Mubarak technique)





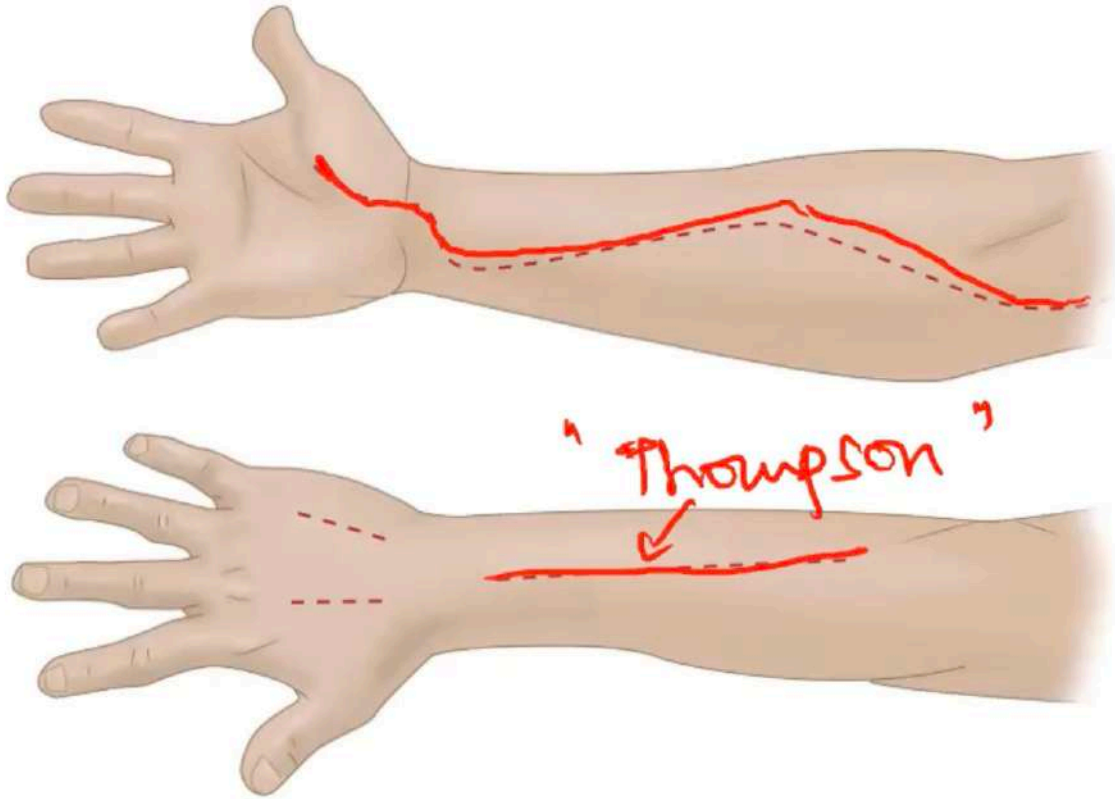
Single incision technique (Fibulectomy)

: 4 compartments!



Fasciotomy of forearm and Hand

- Lazy S incision



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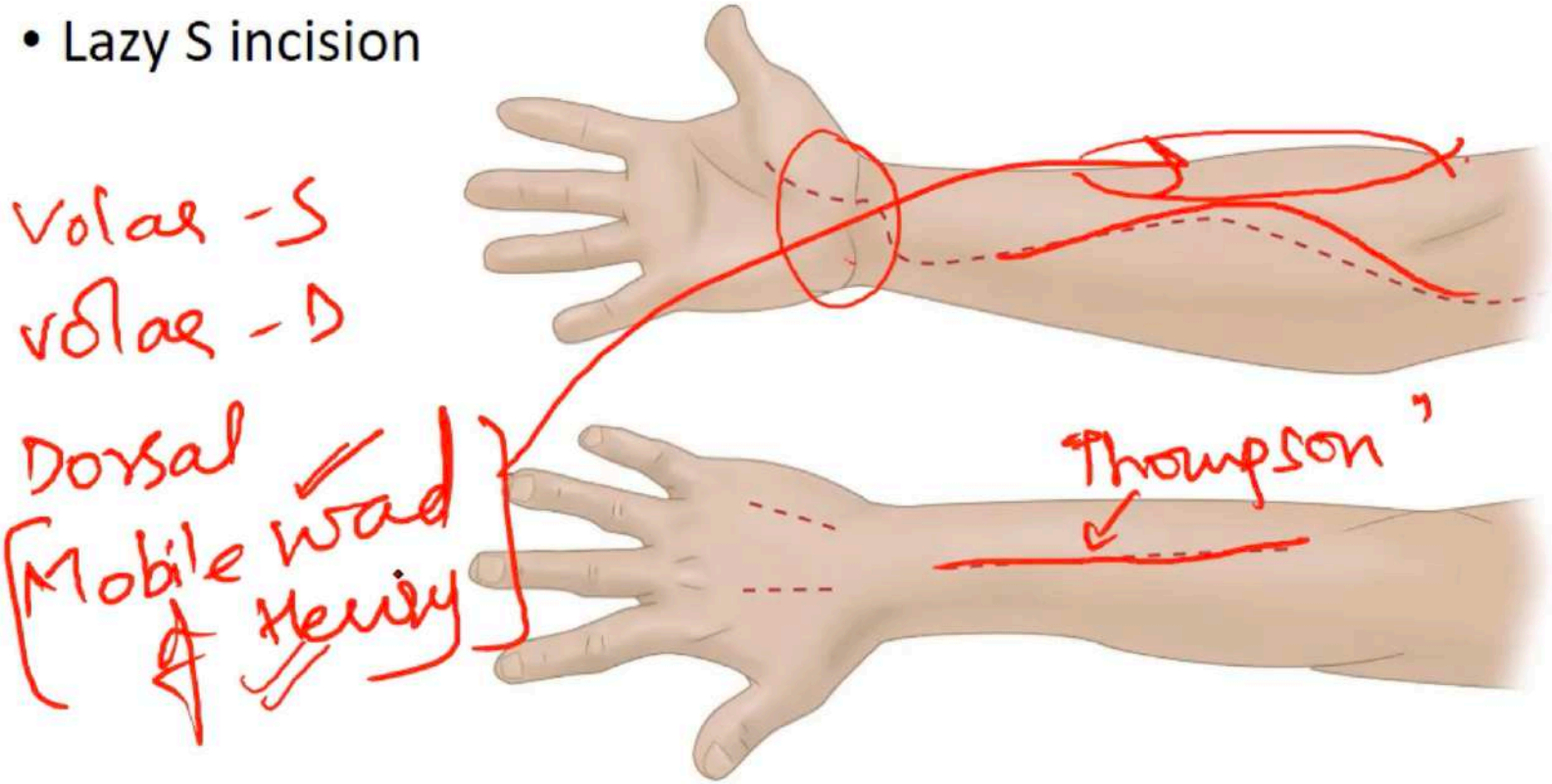


Number of compartments ??

- Arm → 2
- Forearm → 4
- Hand → 10

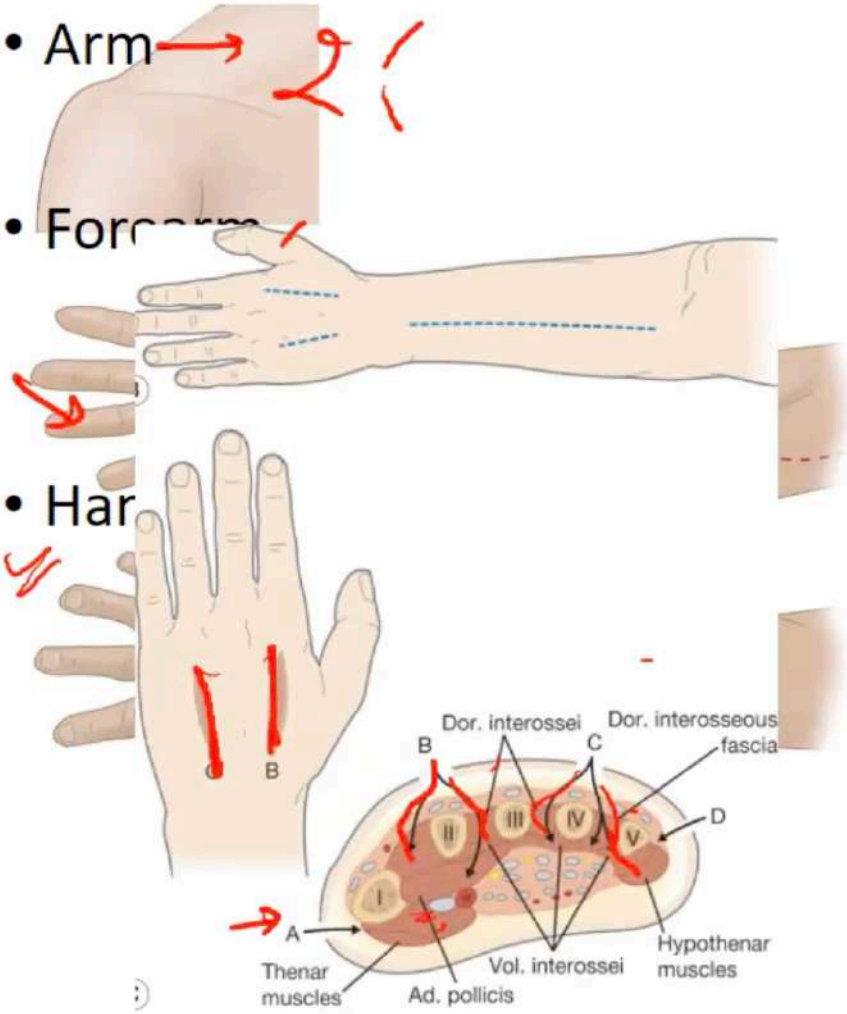
Thenar
Hypothenar
Add. Pollicis
Dorsal - 4
Volar i/o. 3.

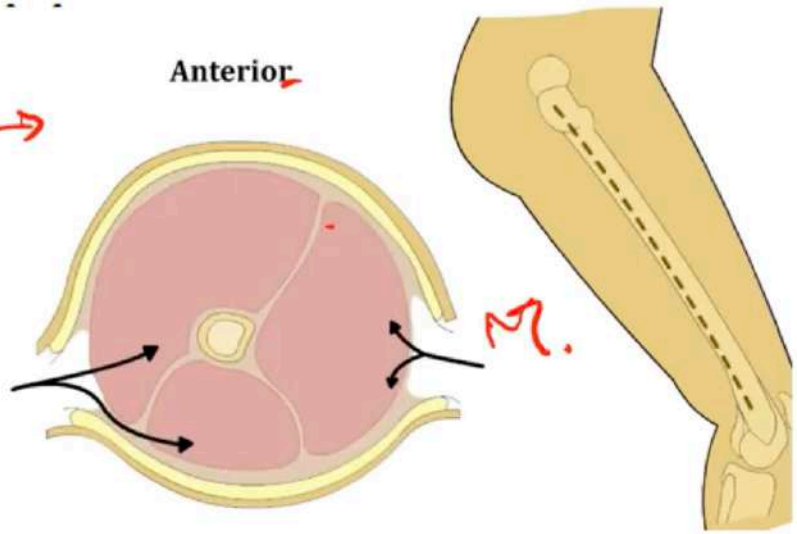
- Thigh → 3 (A, P, M.)
- Leg → 4 (A, L, SP, DP)
- Foot → 9

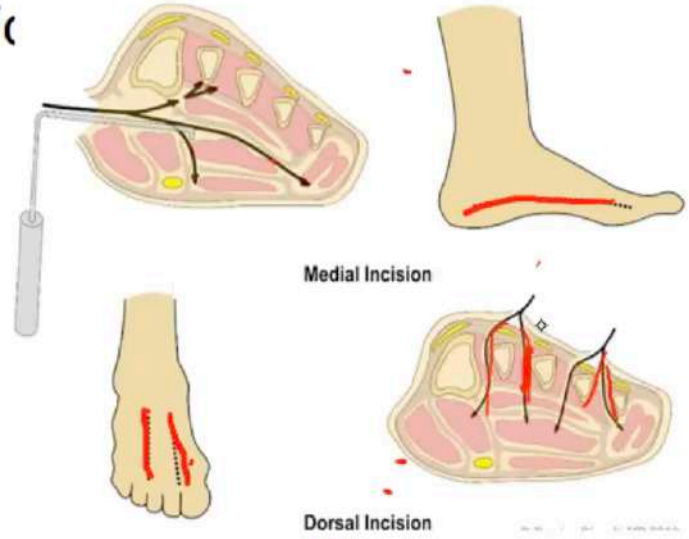
Medial
Lateral
Central (S, D)
4 i/o.
Adductor hallucis

Number of compartments ??

- Arm
- Forearm
- Hand
- Thigh
- Leg
- Foot







How to check passive stretch if posterior compartment of thigh involved?

A • Passive knee extension with hip in extension

B • Passive Knee flexion with hip in extension

C • Passive knee flexion with hip in flexion

D • Passive knee extension with hip in flexion

Hamstrings – hip
– knee

What, If the Compartment Pressure rises slowly ?

Acute CS.

Chronic Exertional Compartment Syndrome

"CECS"

- Reversible muscle ischemia, induced by exercise

Clinical presentation

- Exercise induced pain and tightness after 15-20 mins of running/exercise
- Pain is relieved within 15-20 mins of stopping exercise

- Tenderness of involved muscles
- Paraesthesia in involved nerve distribution

D/D

- Medial tibial stress syndrome
- Stress #
- DVT
- Claudication
- Myopathy

Diagnostic criteria- Pedowitz criteria

- Pre exercise , Pressure > 15 mm
- 1 min after exercise , P > 30 mm
- 5 min after exercise, P > 20 mm

Which is not diagnostic of CECS?

- A. Preexercise , Pressure = 20 mm
- B. 5 min post exercise, P = 22 mm
- C. 1 min post exercise, P = 24 mm
- D. All are true

0 > 15mm
1 > 30
5 > 20m.

Treatment

- Rest
- Antiinflammatory drugs
- Physiotherapy- Stretching and strengthening of muscles

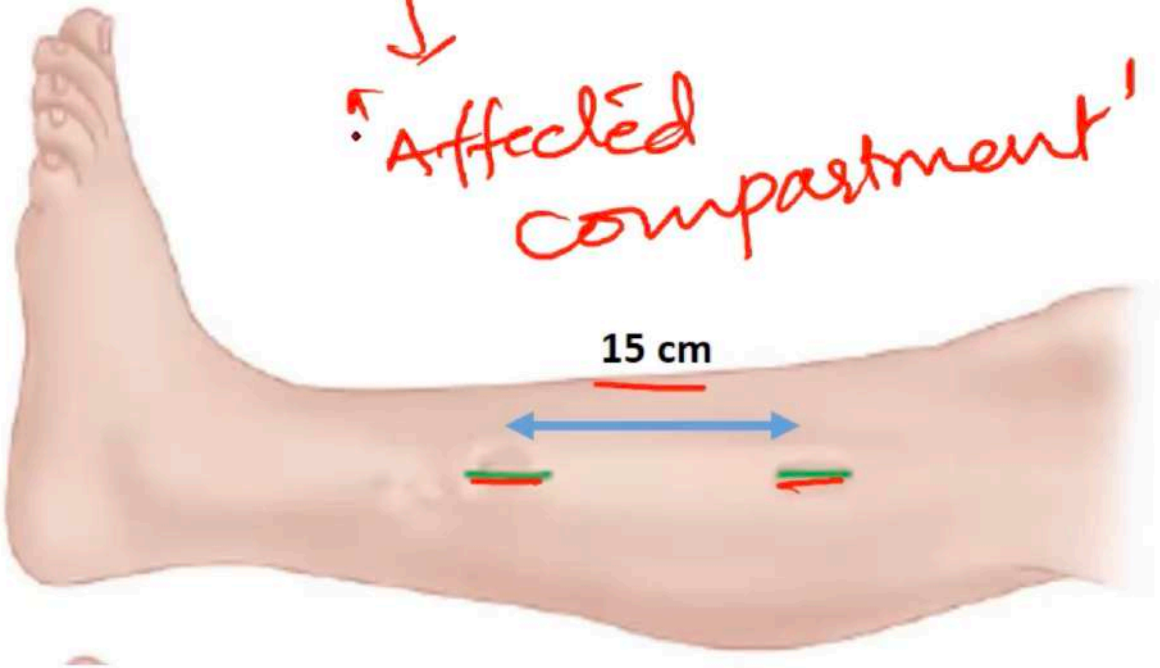
- Indications of Fasciotomy-
- If symptoms persists despite non operative treatment
- If Pressure persistently high

CECS

ACS → No role
mini incision

- Double mini incision fasciotomy

↓
'Affected compartment'



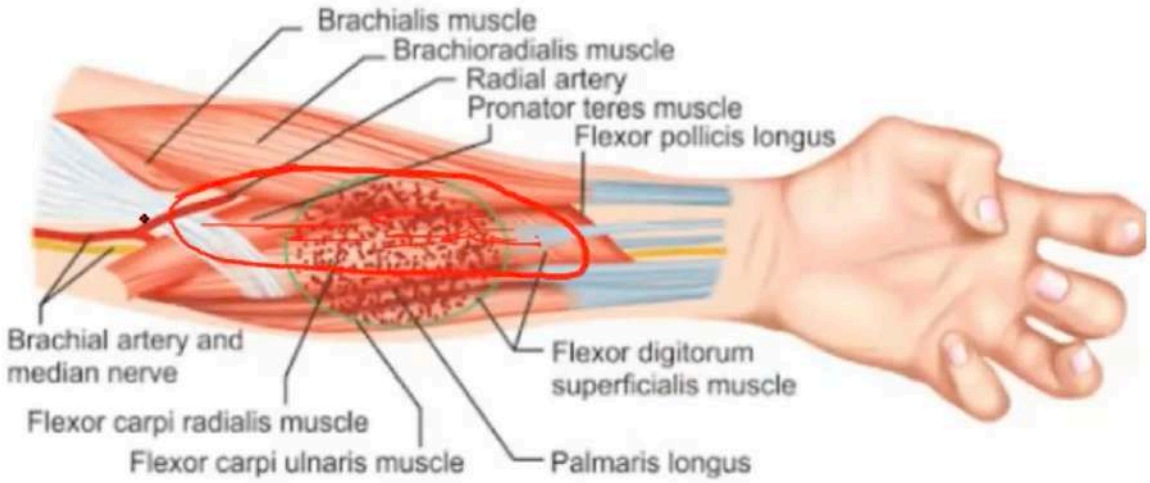
What if compartment syndrome is left untreated or partially treated?

- Amputation
- Volkmann Ischemic Contracture (VIC) → DNB

VIC

- End stage of compartment syndrome where irreversible ischemia causes ischemic necrosis and fibrosis of muscles.

Pathophysiology- Seddon ellipsoid

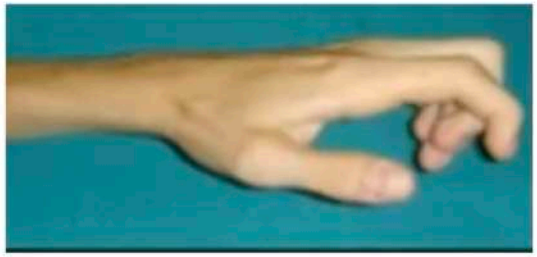


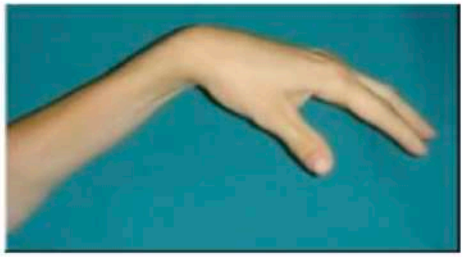
- Centre of muscle was most ischemic
- Most affected structures are- FDP and FPL, Median nerve

Clinical picture

- Volkmann sign- " Fixed Length phenomena"

- Passive extension of digits not possible with wrist extension





Classification

- Tsuge classification-
  - Mild- Partial FDP involvement
  - Moderate- Long flexors + Nerve involvement
  - Severe- Extensors involvement

Treatment

- Non Operative –

Splint – Turn Buckle splint

Physiotherapy

- Operative –

Lengthening of muscle tendon unit → 1 or 2 muscles.

Muscle sliding operation (MaxPage)

Maxpage Muscle sliding operation

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