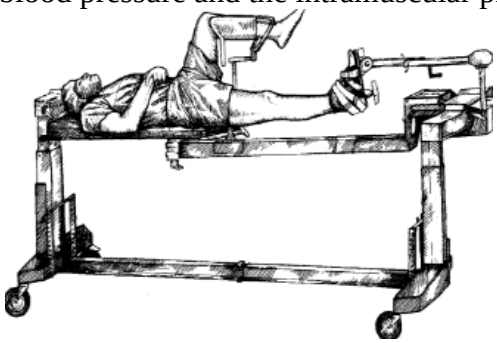
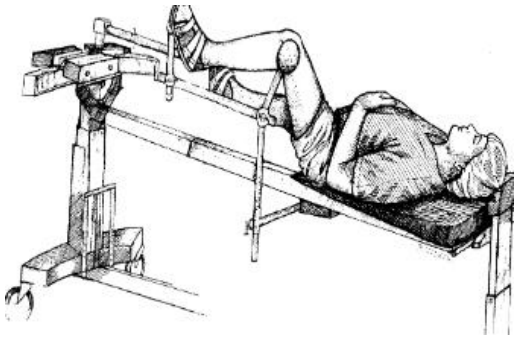
Unit I – Problem 5 – Clinical: Compartment Syndrome

- **Definition:** it is a condition in which increased pressure within a limited space compromises the (circulation- elevated tissue pressure) and (function) of the tissues within that space. This will result in reduced tissue perfusion (ischemia) and (necrosis).
- **Etiology (causes):**
  - **Reduced compartment size:**
    - ✓ Tight dressing: a cast.
    - ✓ External pressure: lying on a limb.
  - **Increased compartment content:**
    - ✓ Bleeding and IV injections.
    - ✓ Capillary permeability.
  - **So main causes for this syndrome include:**
    - ✓ Fractures (closed fractures: don't penetrate the skin; open fractures: penetrate the skin):
      - ❖ The most common cause (incidence of 9.1%).
      - ❖ The syndrome will be directly proportional to the degree of injury to soft tissues and bone.
    - ✓ Blunt trauma (no external bleeding, just from the inside):
      - ❖ The second most common cause (especially among football players).
      - ❖ 25% due to direct blow.
    - ✓ Vascular occlusion or arterial injury.
    - ✓ IV fluids.
- **Patient positioning:**
  - Leaving the calf free when the leg is placed in the hemilithotomy position instead of using a standard well-leg holder. This will increase the difference between diastolic blood pressure and the intramuscular pressure.





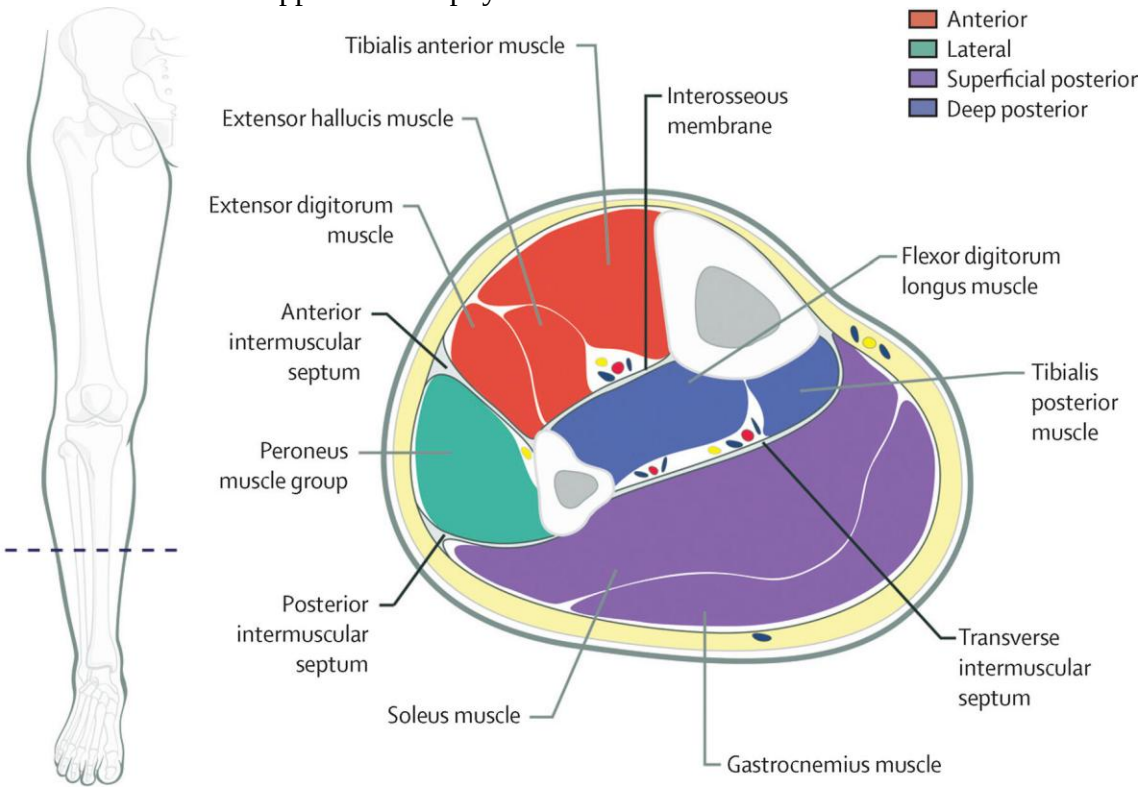
- **Pathophysiology:**
  - The normal tissue pressure 0-4 mmHg, and 8-10 mmHg with exertion, while the pressure will rise to 30 mmHg or more if CS is present.
- **Tissue survival:**
  - **Muscle:**
    - ✓ 4 hours: reversible changes.
    - ✓ 8 hours: irreversible changes.
  - **Nerve:**
    - ✓ 4 hours: neuropraxia (loss of sensation and blockade of nerve conduction).
    - ✓ 8 hours: irreversible changes.
- **Diagnosis:**
  - **Noticed in an earlier stage:**
    - ✓ Pain out of proportion (extreme pain).
    - ✓ Palpably tense compartment.
    - ✓ Pain with passive stretch.

- **Noticed in late stage (compartment is dead):**
  - ✓ Paresthesia/ hyposthesia.
  - ✓ Paralysis.
  - ✓ Pulselessness/ pallor.

- **Differential diagnosis (these might be present but this doesn't mean that the patient has CS):**
  - Arterial occlusion.
  - Nerve injury.
  - Muscle rupture.

- **Pressure measurement:**
  - **This is an unreliable exam represented by an infusion of a needle to all of the compartments with a manometer. The compartments are:**
    - ✓ Anterior compartment.
    - ✓ Lateral compartment.
    - ✓ Superficial posterior compartment.
    - ✓ Deep posterior compartment.

  The results must be supported with physical examination.



- **Medical management:**
  - **Emergent treatment:**
    - ✓ You must insure the patient is normotensive. Circumferential casts must be removed –total of 85-90% reduction in compartment pressure will occur by just taking off the cast- and the limb must be maintained at the level of the heart because elevation reduces the arterial inflow. In addition, there must be a supplemental oxygen administration.
  - **Surgical treatment:**
    - ✓ This is done by prophylactic fasciotomy – fascia is cut to relieve tension- of all compartments. This procedure will be done when:
      - ❖ There are unequivocal clinical findings.
      - ❖ Rising tissue pressure (30 mmHg).
    - ✓ More than 6 hours of total limb ischemia

- ✓ Fasciotomy principles are:
  - ❖ Long extensile incisions (average of 16 cm).
  - ❖ Release all fascial compartments.
  - ❖ To look after neurovascular structures (peroneal nerve).
  - ❖ Coverage within 7-10 days.
- ✓ Delayed fasciotomy:
- ✓ After 12 hours there is a risk of infection or amputation.
- ✓ Wound management (closure):
  - ❖ A bulky compression dressing and a splint are applied.
  - ❖ Usually a skin graft is required.
  - ❖ Interim (temporal) coverage techniques include:
    - ➢ Simple absorbent dressing.
    - ➢ Semipermeable skin like membrane.
    - ➢ Vacuum assisted closure (VAC).