

Case Report: Anterior Compartment Syndrome (ACS) of the Thigh

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HPI

- ▶ 31YOM with no pertinent medical history presents to the ED by POV with pain and swelling of the right thigh of a 1 hr duration.
- ▶ Employed as a professional jockey
 - ▶ 3wks prior, a racehorse rolled over him with resultant ecchymosis and swelling of his pelvis and right thigh, this had healed.
- ▶ 4hrs prior to ED presentation, dismounted from a racehorse, no initial pain, but several minutes later noted his thigh was “tight”
 - ▶ Followed by pain shortly after, difficulty walking
- ▶ Being transferred to St. Vincent’s for orthopedic evaluation with concern for ACS.

What is acute compartment syndrome?

- ▶ increased pressure within a closed osteofascial compartment, resulting in impaired local circulation
- ▶ Pressure can increase one of two ways
 - ▶ Restrict intracompartmental space
 - ▶ Increase compartmental fluid volume
- ▶ Impairs Hemodynamics
 - ▶ \uparrow pressure = \downarrow venous outflow
 - ▶ Leads to \uparrow venous capillary pressure
 - ▶ If compartmental pressure greater than arterial pressure, decreased arterial inflow can occur
- ▶ ischemia

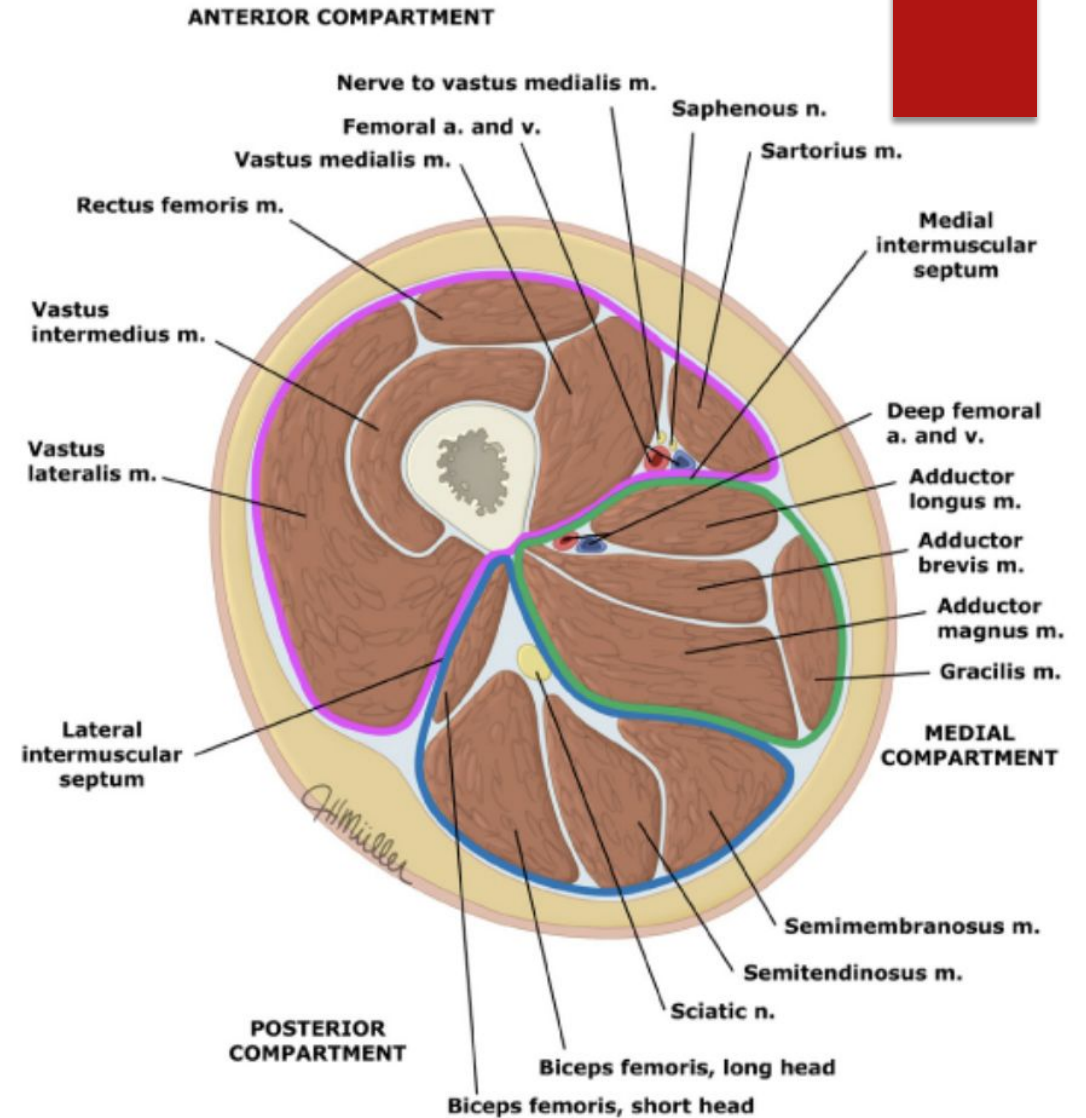


Figure 1. Muscle Compartments of the Thigh. Adapted from "Acute Compartment Syndrome of the Extremities" UpTo Date, 2023. Retrieved from https://www.uptodate-com.offcampus.lib.washington.edu/contents/acute-compartment-syndrome-of-the-extremities?search=acute%20compartment%20syndrome&source=search_result&selectedTitle=1~150&usage_type=default&display_rank=1

What can cause Acute Compartment Syndrome?

Fractures (75% of cases)

- Most commonly tibial fractures

Trauma without Fracture

- Forceful direct trauma,
- Burns
- Penetrating trauma
- Vascular injury
- Constrictive bandages/splints/casts

Nontraumatic Causes

- Envenomation
- Revascularization
- Coagulopathies

How do we
identify
compartment
syndrome?

- ▶ 5P's
 - ▶ Pain
 - ▶ Pallor
 - ▶ Paresthesia
 - ▶ Pulselessness
 - ▶ Paralysis

Bring this back to our case

- ▶ At this point, the patient has been transferred from Miles City to Billings.



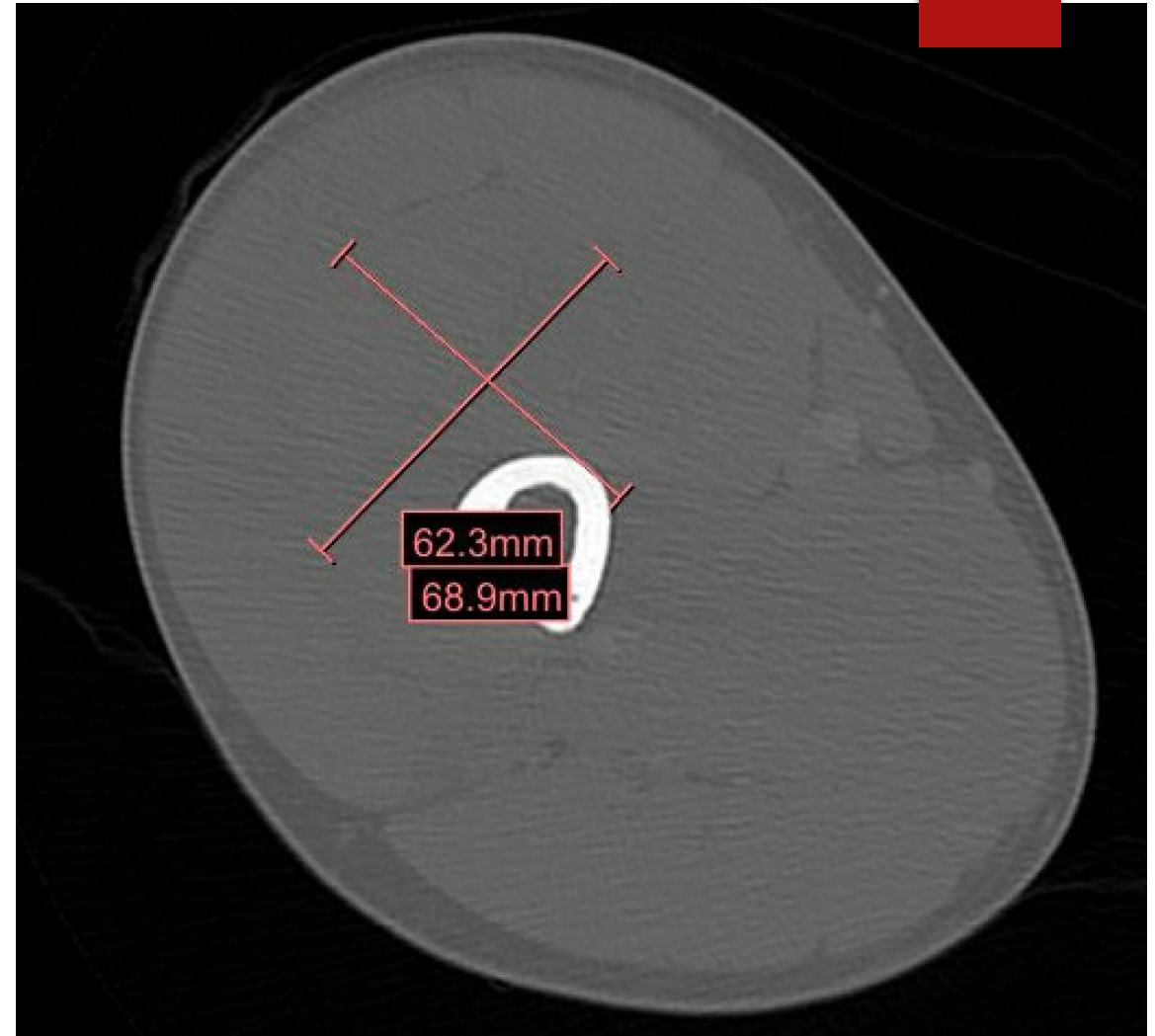
Physical Exam

- ▶ General: Young male, no apparent distress, laying comfortably in a hospital bed, pleasant and conversant.
- ▶ Extremities
 - ▶ Unremarkable with exception for right thigh
 - ▶ Ecchymosis visible on distal anterior thigh, from 3wks ago.
 - ▶ Anterior swelling appreciated from hip to knee
 - ▶ Anterior thigh tense and painful to palpation
 - ▶ Performs straight leg raise with discomfort
 - ▶ Excruciating pain with passive movement
 - ▶ Knee examination limited by pain
 - ▶ Reasonable femoral, popliteal, dorsalis pedis, and posterior tibialis pulses



CT results

- ▶ Large intramuscular hematoma in the anterior compartment of the thigh.
 - ▶ 6.9x 6.3cm
 - ▶ 33cm craniocaudal extension





Lab results

- ▶ CBC and CMP WNL
- ▶ Creatine Kinase
 - ▶ 191 U/L on presentation in MC
 - ▶ 154 U/L 6hrs later



Diagnostic testing

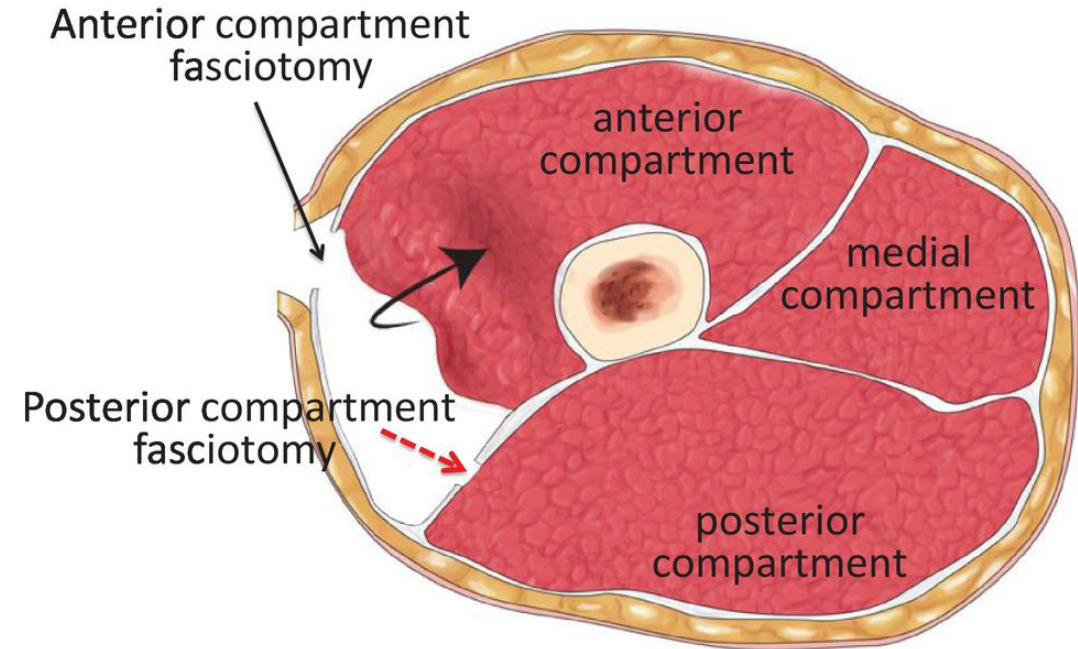
COMPARTMENT PRESSURES

How do we interpret compartment pressures

- ▶ 30mmHg
- ▶ Needs to be taken in context
- ▶ This number is applied to all compartments
- ▶ A more precise modifier is used.
 - ▶ Difference between diastolic pressure and compartment pressure (ΔP)
 - ▶ If ΔP is less than 20 mmHg, compartment syndrome is likely

What do we do if we confirm ACS

- ▶ Relieve all external pressure
- ▶ Limb should be kept level with torso
- ▶ Analgesics
- ▶ Hypotension reduces perfusion, maintain with saline boluses
- ▶ Fasciotomy



Back to our patient

- ▶ At this point we have a compartment pressure
 - ▶ It is ~30mmHg
 - ▶ Fasciotomy?
 - ▶ Well let's look at the clinical context
 - ▶ We have vitals
 - ▶ Hr: 96
 - ▶ BP: 131/89
 - ▶ Temp 97.3
 - ▶ Resp 18
 - ▶ So our ΔP is...
 - ▶ 59

Does our patient have ACS?

- ▶ Hard to make a judgement on an EARLY compartmental pressure
 - ▶ Fortunately, our reading was 9hrs after the fact
- ▶ Patient is laying comfortably in bed
- ▶ No pallor, no paresthesia, palpable pedal pulses
- ▶ CK within normal limits, stable on 2 temporally spaced studies.
- ▶ ΔP is much greater than 20mmHg
- ▶ Should he go to the OR?

Follow-up



Questions?

- ▶ Should absolute pressure thresholds be used to confirm the diagnosis of ACS?
- ▶ What is the most sensitive physical exam finding for ACS?
- ▶ What are potential problems with using the five classic signs of arterial insufficiency (5p's) with respect for ACS