Vascular Emergencies in Athletics

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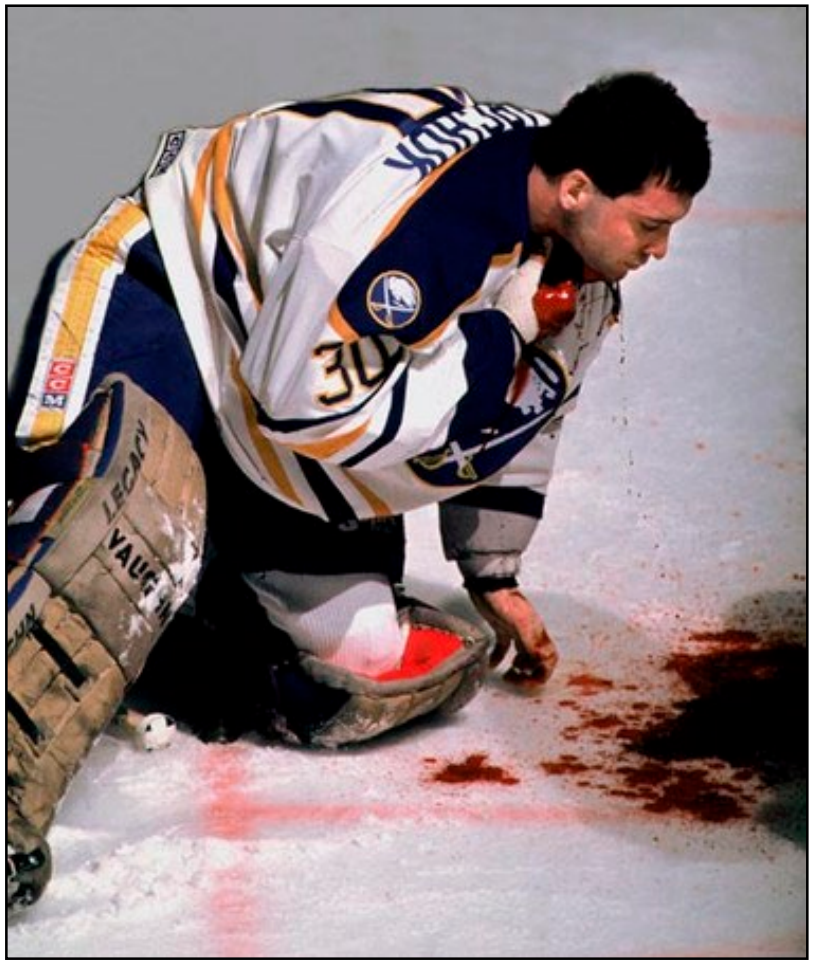
Types of Injuries



- Arterial
- Venous
- Lymphatic

Arterial Injuries

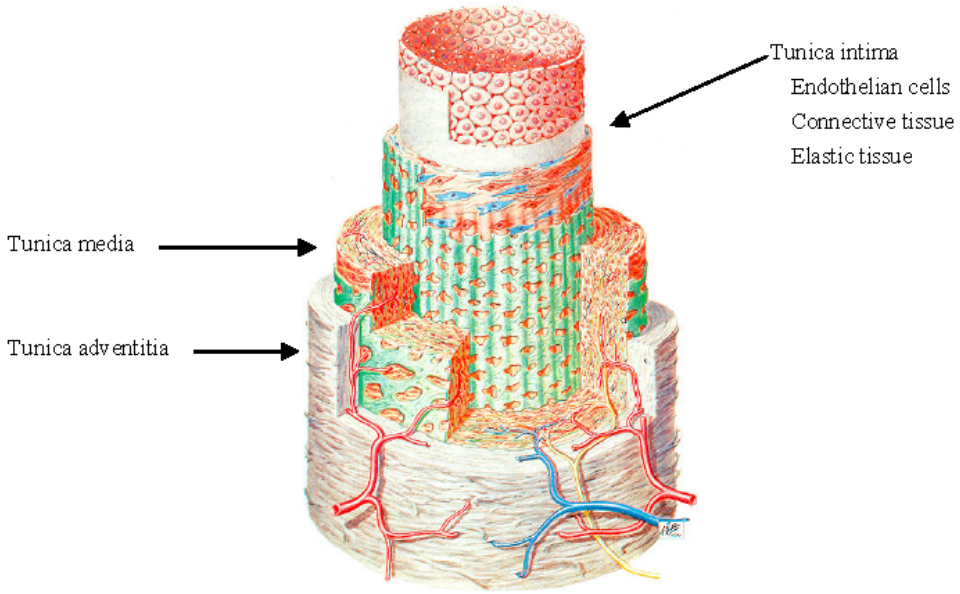
- Blunt
  - Dissection
  - Thrombosis
- Penetrating
  - Open Injury

Arterial Dissection

- Most Common Sites
  - Popliteal Artery
  - Carotid Artery
  - Vertebral Artery

Arterial Injury

- Blunt injury affects the three arterial wall layers
  - Intima
  - Media
  - Adventitia
- Dissection
  - Tearing of intima with flap closure of the lumen
  - Presentation: Acute Arterial Occlusion

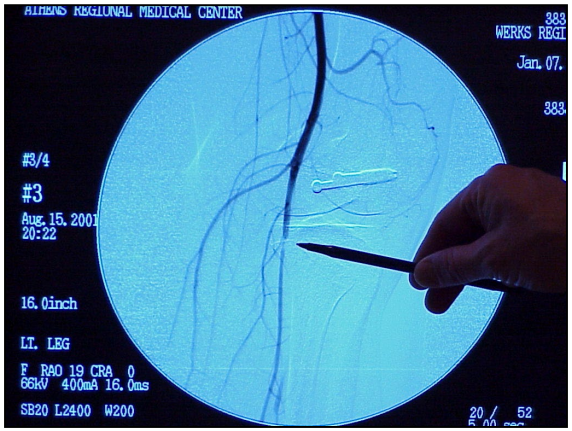


Acute Arterial Ischemia

- Clinical Signs
  - Pain
  - Pallor
  - Pulseless
  - Paresthesias
  - Paralysis
  - Poikilothermia

Arterial Dissection

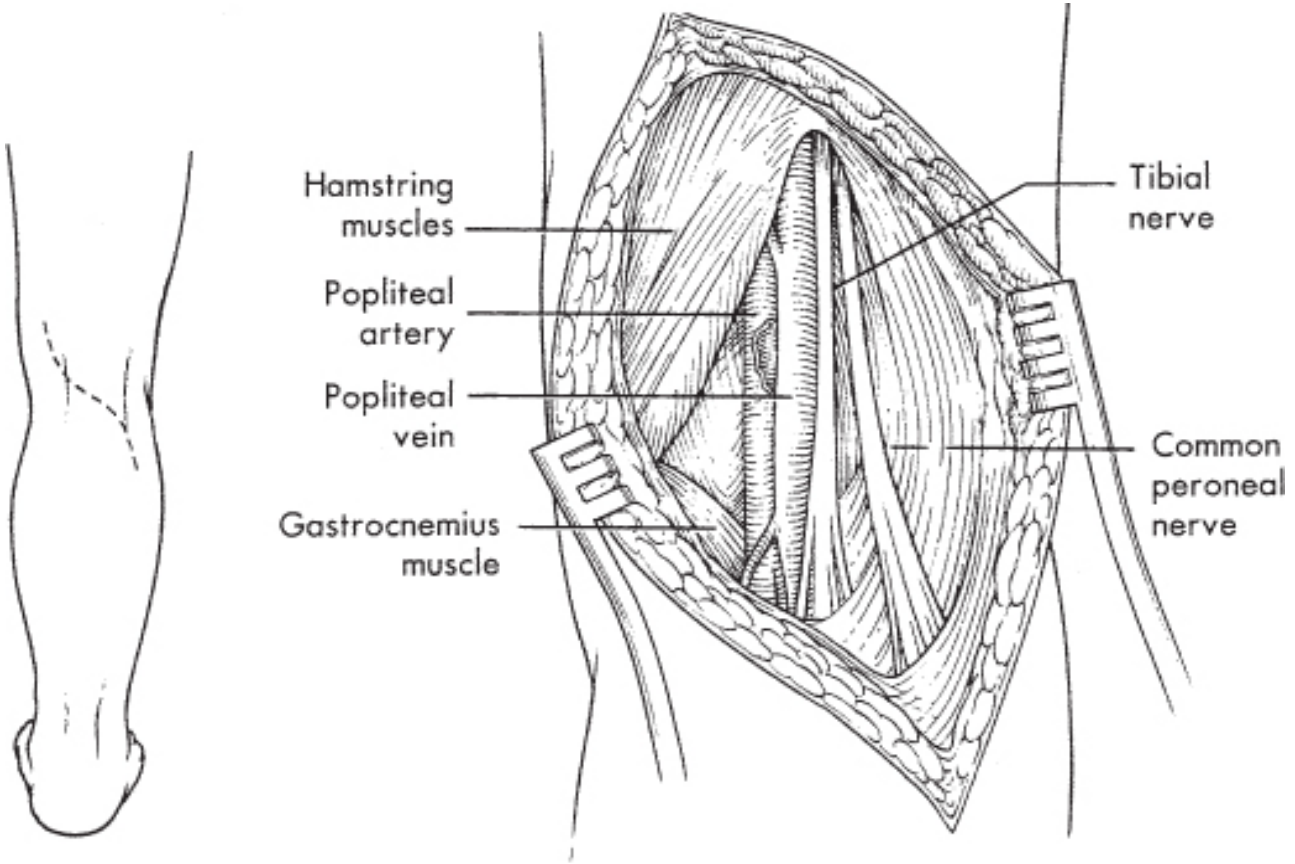
- Popliteal Artery
  - Mechanism : posterior knee dislocation
  - Presentation: Obvious knee deformity with femoral condyle overriding tibial plateau
  - Foot
    - +/- Cool
    - +/- Pulseless
    - +/- Paresthesias



Arterial Dissection

- Treatment
  - Reduce dislocation
    - If pulse returns – 40% still have arterial injury
    - If no pulse -> angio -> reconstruction

Popliteal Injury



Arterial Dissection

- Carotid

  Asymptomatic

  Symptomatic:

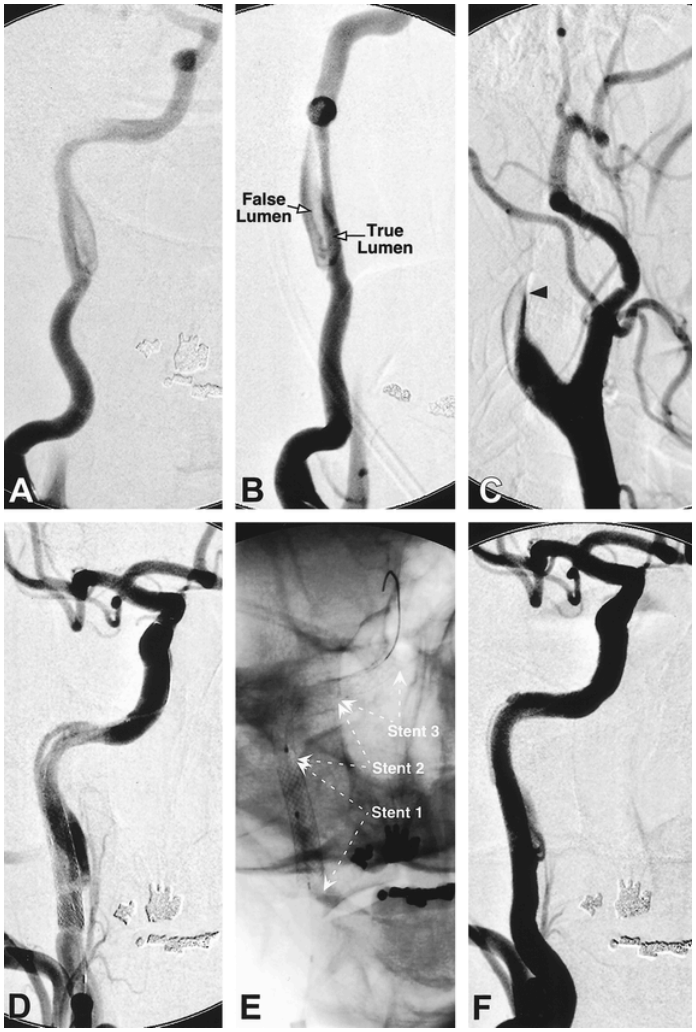
  ipsilateral neurologic Sxs i.e.. Stroke, TIA

  . Pain

  Headache

  Horner's Syndrome: ptosis, miosis, anhydrosis

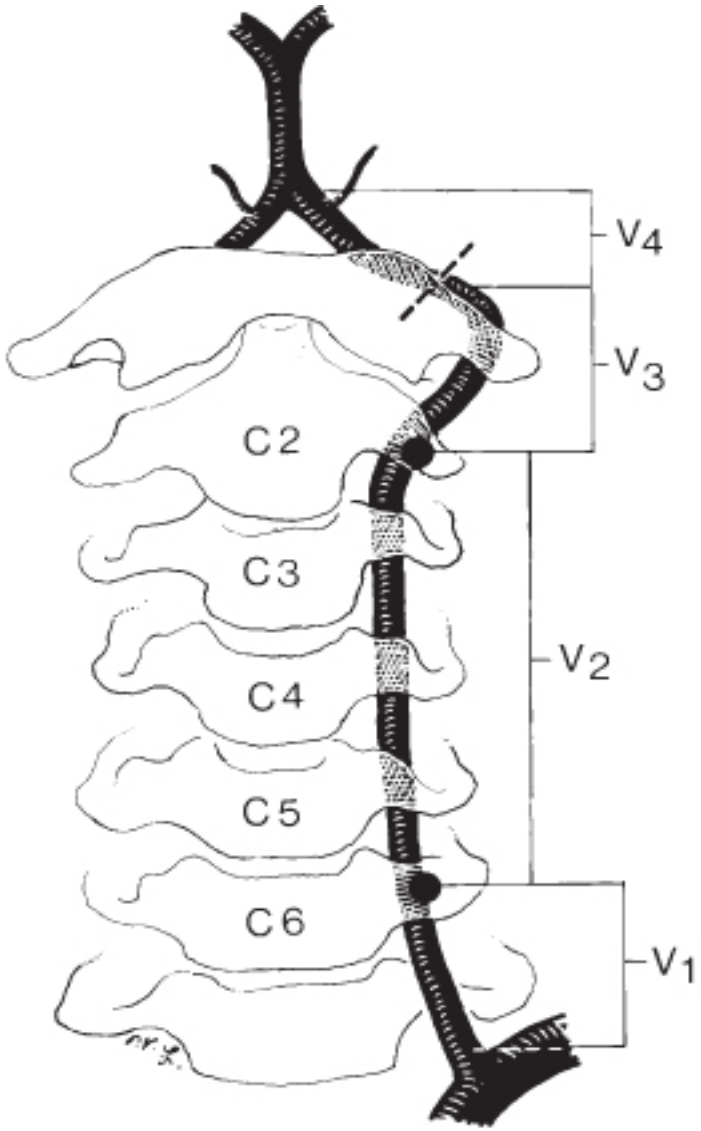
Carotid Dissection



Vertebral Dissection

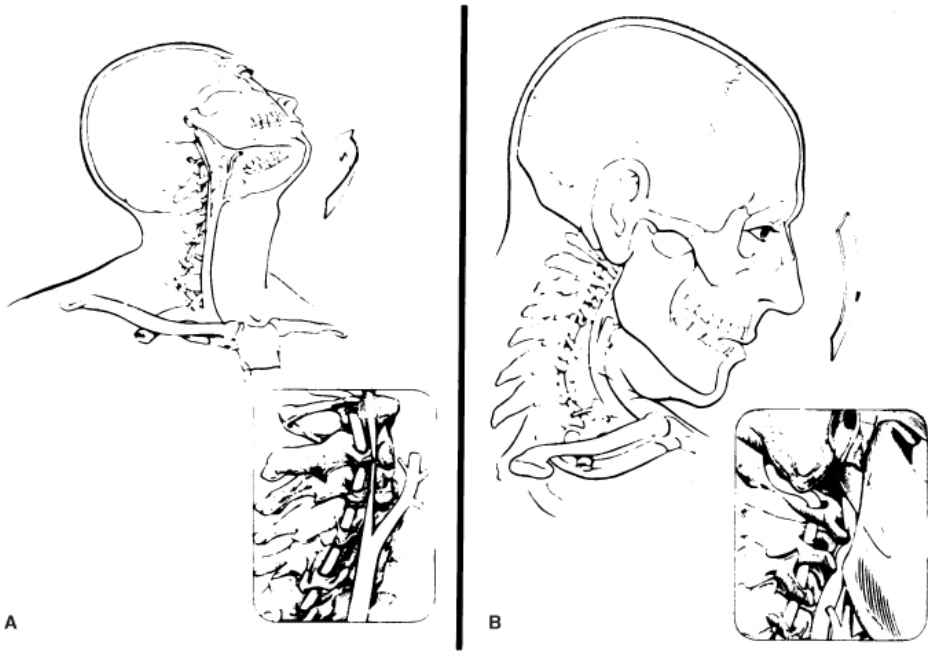
- Asymptomatic
- Symptomatic
  - Cerebellar Dysfunction
  - Ataxia
  - Cerebellar mutism – secondary pharyngeal dysfunction – thickened speech
  - Vision change – blindness
  - Coma
  - Death

Vertebral Anatomy



Cervical Dissection

- Mechanism
  - Hyperextension/rotation
  - Flexion – angle of the mandible into transverse process of C2 or C3



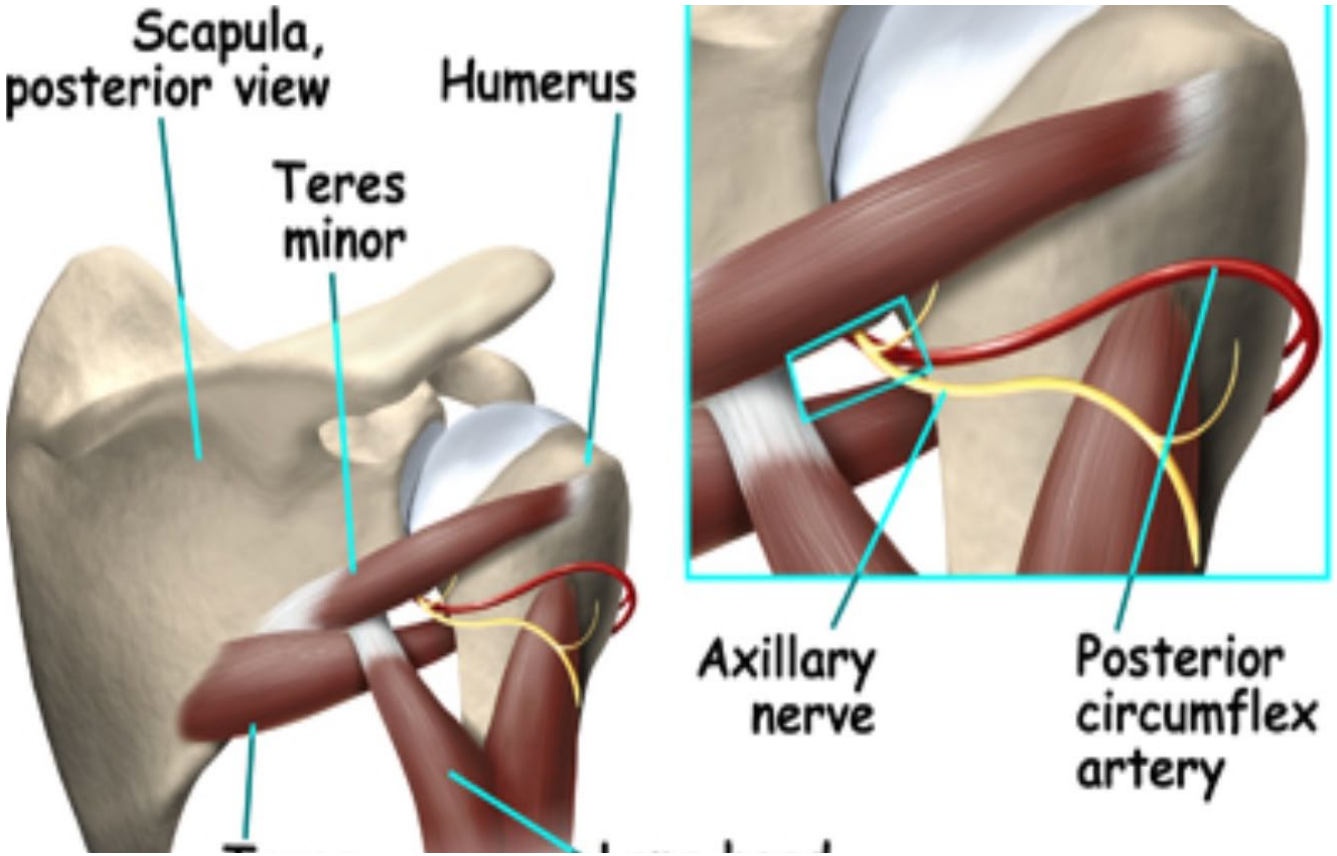
Arterial Ischemia

- Mesenteric Ischemia -Celiac Compression
- GI Complaints 20- 50% High Intensity Competitors
- To accommodate exercise demands blood diverted Gut (GI Blood Flow may reduce by as much as 80%
- Sxs - Abdominal Cramping, Bloating, Nausea, emesis
- Tx – cessation activity

Arterial Injury

- Brachial Artery
  - Supracondylar Humeral Fracture
    - More common in children
  - Acute dissection / thrombosis
  - Acutely Ischemic Hand
- Subclavian Artery
  - Clavicle Fracture / Dislocation
  - Posterior Displacement
    - Drives clavicle into subclavian vessels

Quadralateral Space Syndrome



Quadralateral Space Syndrome

- Anatomy
- Superior Border Teres Minor
- Inferior Border Teres Major
- Lateral Border Long Head Triceps
- Medial Border Humerus

Quadralateral SpaceSyndrome

Causes

- Repetetive stress or overuse as seen in overhead sports ie Swimming ,Tennis ,Throwers

Symptoms

- Numbness or tingling in Arm
- Tender to pressure over space
- Dull ache worsen with overhead repetitve movement

QSS

Treatment

- Rest and Therapy
- NSAID's
- Occassionally Surgery
- Release trapped axillary nerve and posterior humeral circumflex artery

Venous Injury

- Deep Venous Thrombosis
  - Virchow's Triad
    - Venous Stasis
    - Hypercoagulopathy
    - Trauma

Venous Injury

- Trauma
  - Post-reconstruction edema- usually lymphatic Consider DVT if limb has been immobilized
  - Screen prior to starting Rehab with Duplex ultrasound

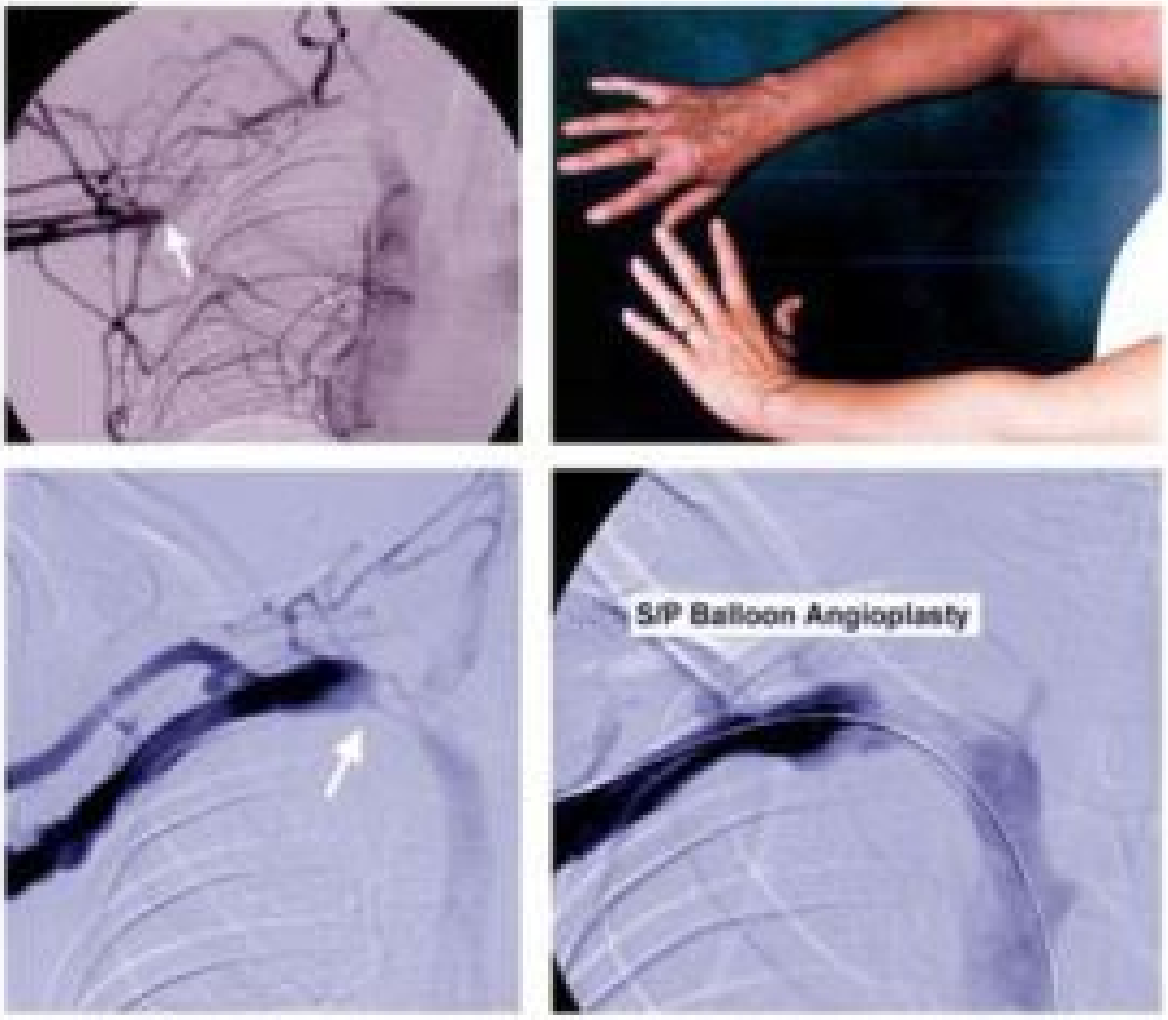
DVT SYMPTOMS

- Pain Extremity
- Swelling
- Cyanotic Limb
- Limb may feel cool to touch
- Limb Fatigue
- Asymptomatic

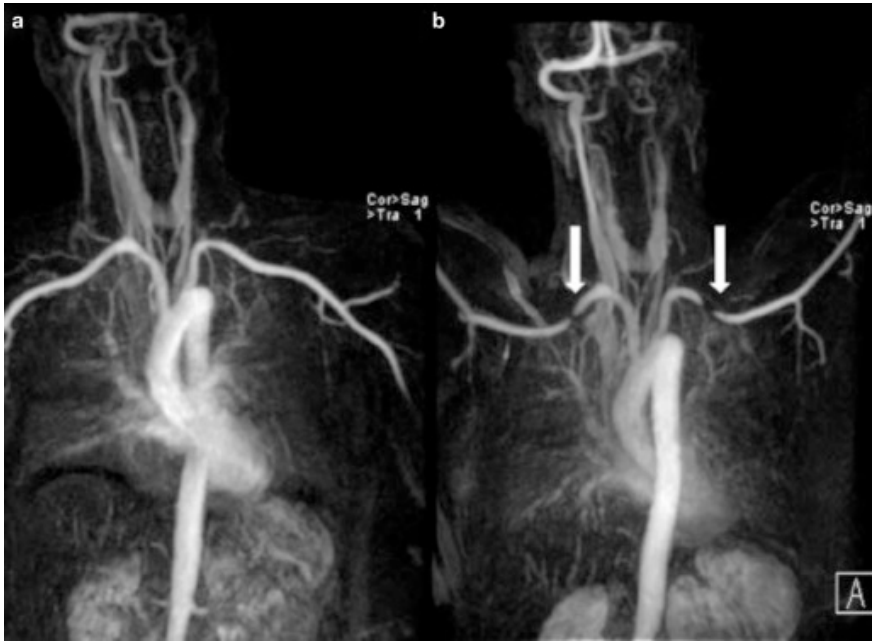
Venous Thrombosis

- Upper Extremity
  - Paget-Schroetter Syndrome / Venous TOS
  - Acute Limb Edema-
    - Athletes at risk- usually throwers, weight lifters
    - Volleyball ,Tennis, Football
    - Seen after exertion
  - Axillo-Subclavian DVT
    - Incidence .25-1% of all DVT disease
    - Male: female 2:1
    - 60-80% of cases occur in the dominant arm
    - Presentation: Swelling, Pain, Cyanosis
    - Diagnosis: Venous Duplex or Venography
    - Treatment: Venography-> Thrombolysis -> Angioplasty vs. Surgical intervention: Venous repair or first rib resection
    - Anticoagulation usually 3 months

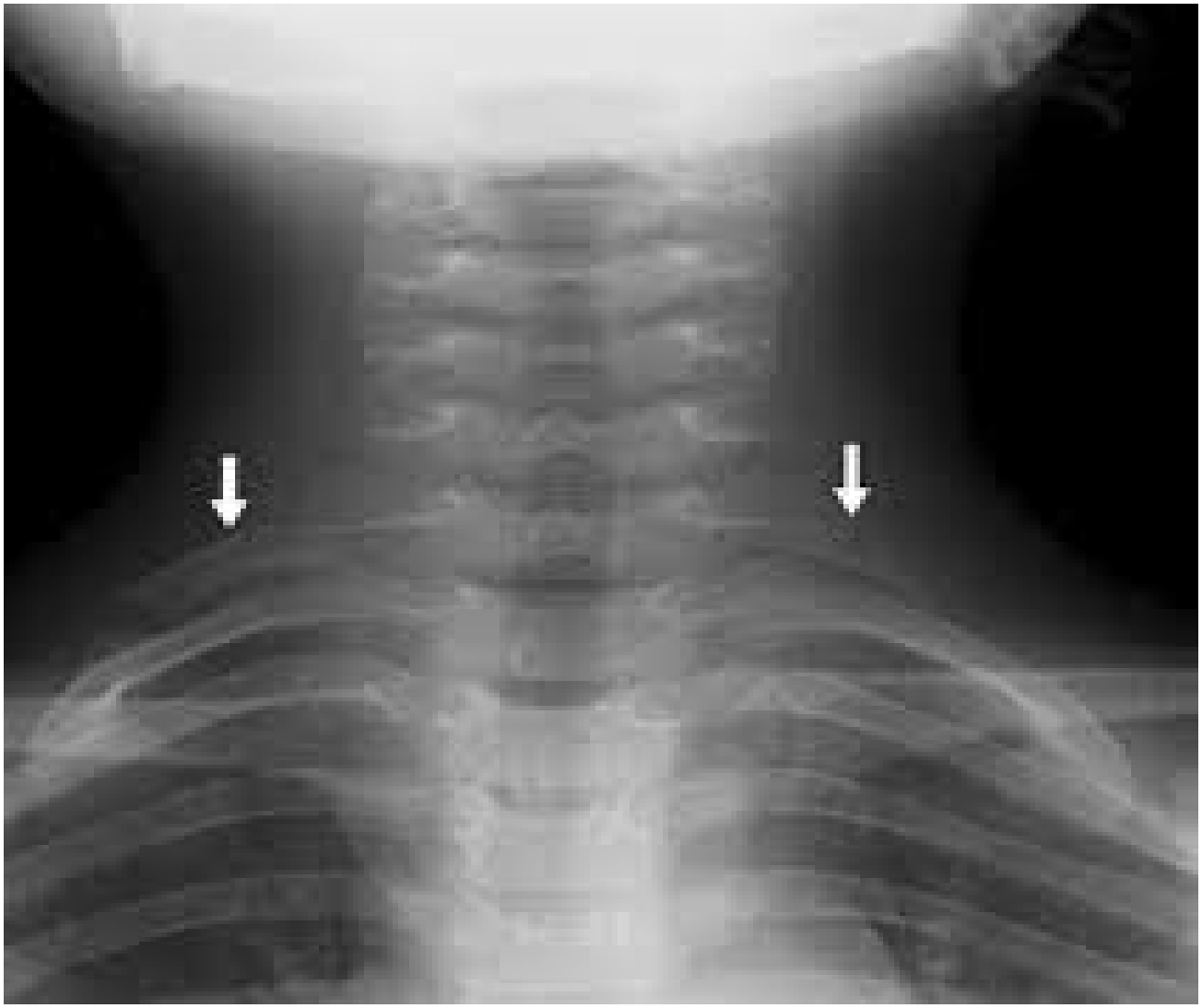
Venous TOS



Arterial TOS



TOS

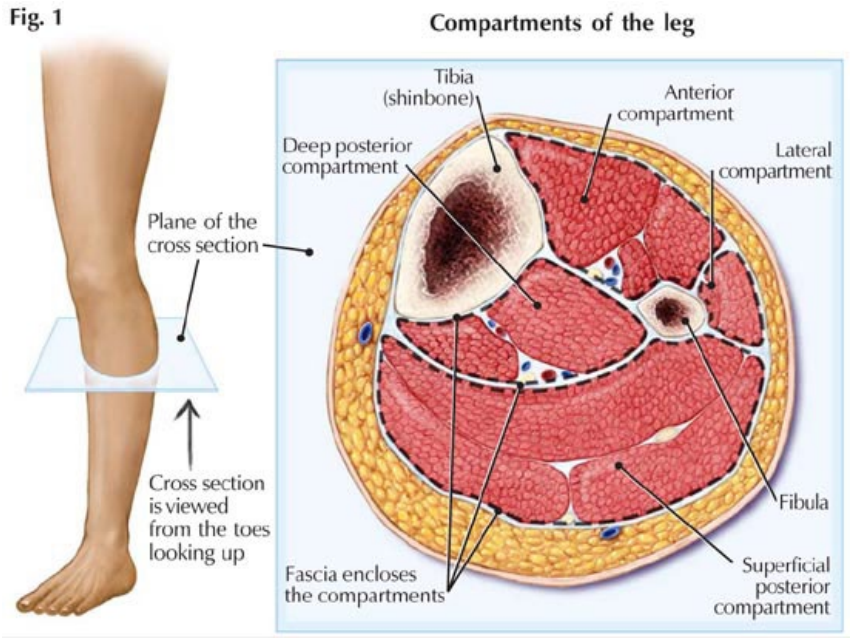


Lymphatic

- Post Injury Edema
- Lymphatic Circulation
  - Unidirectional vascular system
  - Transports surplus tissue fluid back into blood stream
  - Lymphatics return extracellular fluid into vascular system
  - Disruption caused by trauma i.e.. Surgical or Direct Injury
  - Treatment
    - Exercise – Simple ROM-muscle contraction stimulates lymph flow
    - Compression Therapy

Compartment Syndrome

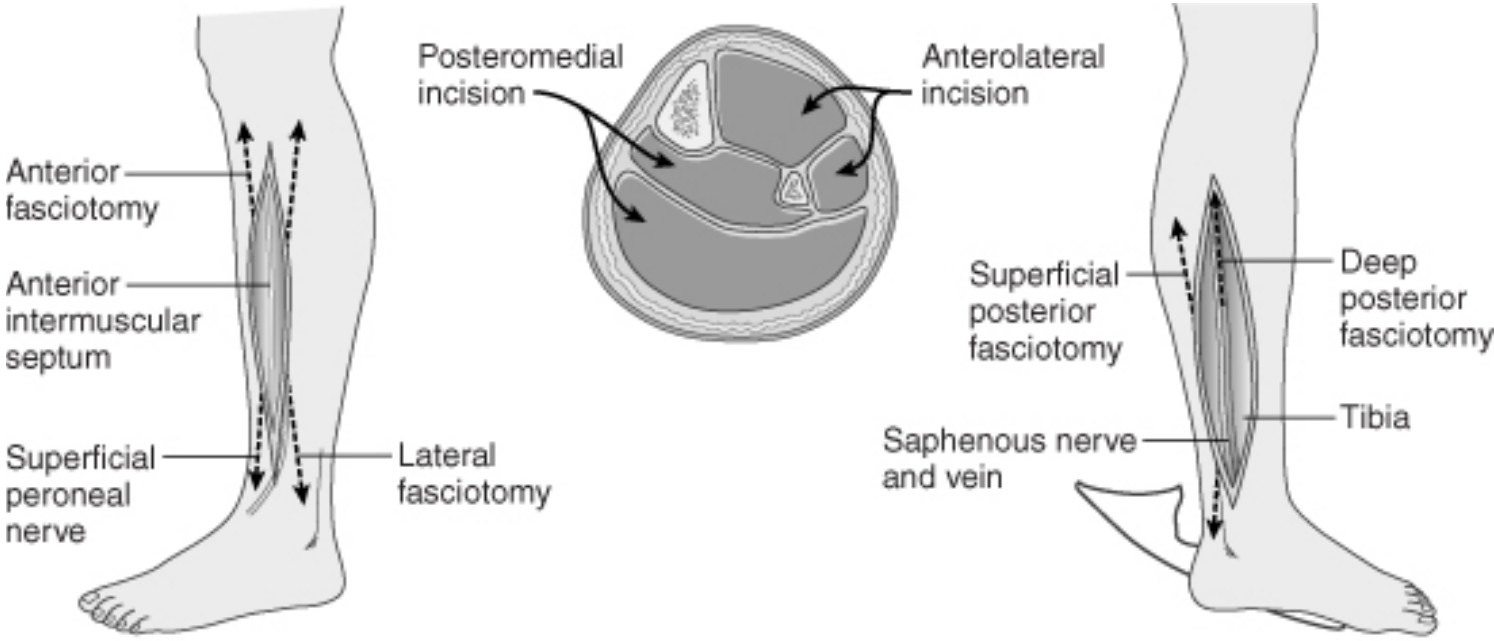
- Increased tissue pressure in a nonexpansile space
- Most common after acute injury or ischemia of an extremity
- Presentation:
  - High index of clinical suspicion
  - Severe pain
  - Tense muscle compartments
  - Pain with passive flexion of ankle (lower extremity)



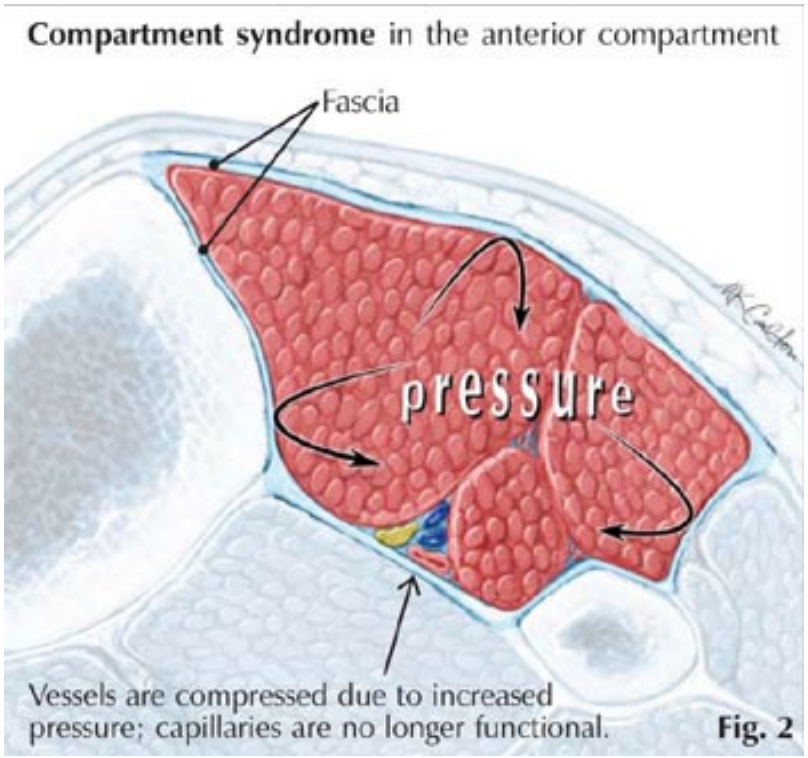
Compartment Syndrome

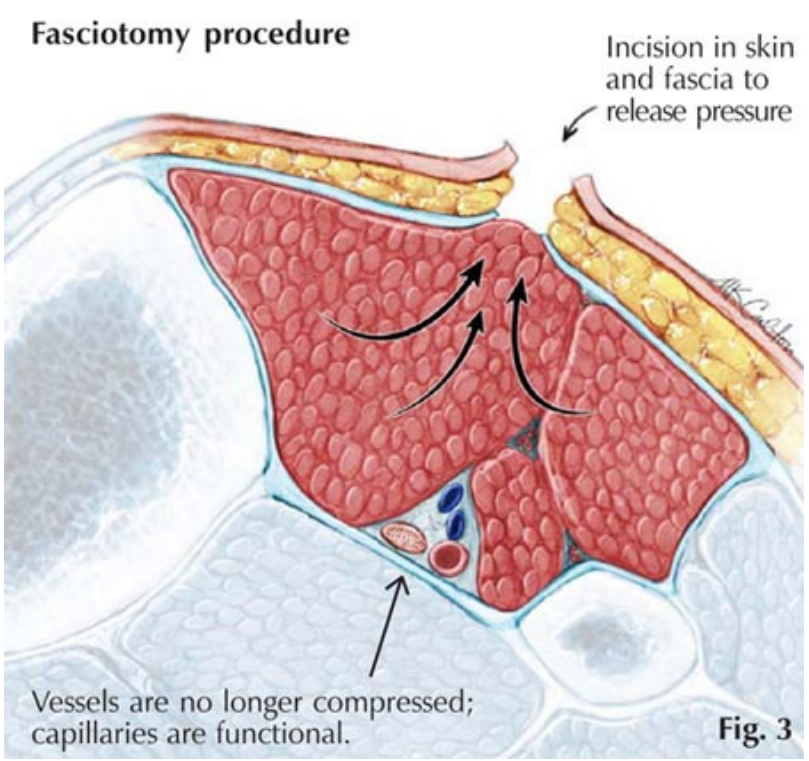
- Objective Tests
  - Compartment Pressures
    - 20-30 mmHg of diastolic pressure
    - Isolated measure not accurate
  - Venous Doppler
    - If there is normal phasic venous flow then no compartment syndrome
  - Treatment: fasciotomy

Fasciotomy



Anterior Compartment Before and After Fasciotomy





Compartment Syndrome

- Chronic
  - Repetitive pain, numbness & weakness with vigorous exercise
  - Elevated pressures with exercise
  - Doppler evaluation of tibial venous flow looking for loss of spontaneous and phasic venous signal

Summary

- Review Literature

  Arko, Vascular Complications In Athletes

  JVS 2001 May;33(5) 935-942

  June 1994-June 2000 26 pts 14 arterial injuries, 12 Venous Injuries

  8 Baseball, 7 FB, 2 Cyclists, 2 rock climbers, 2 wind surfers, 1 each swimmer, kayaker, weight llifter, VB player, Marksman

- Survey via CATS
- Survey was Check Box
- Requesting form filled out on vascular Injuries over 10 years

Summary

- 131 Responses
- 126 Data containing responses
- 5 Responses lacked data
- 123 Schools

96 DI	2 NAIA
11 DII	3 JUCO
11 DIII	

1485 yrs experience by respondants

Summary

- 200 Male
- 115 Female
- 111 Not Designated

- **426 Total Vascular Injuries Reported**

Summary

- **Sports Specific**
- **Football** 133 (27.4%)
- Compartment syndrome, LEDVT
- **Soccer** 60 (14.1%)
- Compartment Syndrome
- **Unspecified** 45 (10.6%)
- Limb Swelling, LE DVT
- **Baseball** 33 (7.7%)

  Venous TOS, Arterial TOS, DVT

Summary

Basketball 27 (6%)

UE DVT, LEDVT

Softball 19 (4.5%)

Venous TOS, Arterial TOS

T&F 19 (4.5%)

Compartment Syndrome

Swim & Dive 15

Venous TOS, Arterial TOS

Summary

- **VB** 14 (3.3%)

Venous TOS, Arterial TOS, UE DVT

- **Rowing** 13 (3%)

Venous TOS, Arterial TOS, UE DVT

- **Cross Country** 9 (2.1%)

Compartment Syndrome

- **Lacrosse** 7 (1.6%)
- Compartment Syndrome, SC Dislocation

Summary

Golf 8 (1.9%)

Venous TOS

Gymnastics 5 (1.2%)

UE DVT,PE

Field Hockey 5 (1.2%)

Compartment Syndrome, Pop Art

Wrestling

Venous TOS, UE DVT

Summary

- **VTE (Venous TOS, UE DVT, LE DVT, PE)**

  145 Cases (34.1%)
- **Compartment Syndrome**
- 94 cases (22.1%)
- **Limb Swelling/Lymphedema**

  78 cases (18.3%)
- **Arterial Injuries**

  59 cases (13.8%)
- **ATC** **1 Vascular event/ 3.5 yrs**

Vascular Injurys in Athletics

- Thank You