Epidemiology, Biomechanics, Mechanism of Injury, Diagnosis, workup, and physical examination

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Introduction

- **Lower extremity injuries:** common cause of hospital emergencies

- **Etiologies:**
  1. Fractures
  2. Ischemia
  3. Infection
  4. long-term functional deficits

Biomechanics and Mechanisms

- Associated with the physics of an injuria' event
- Fractures occur when the applied load to the bone exceeds its load-bearing capacity.
- The density of the Haversian system directly affects bone strength.
- There are four basic forces that lead to fracture: compression, tension, torsion, and bending.

Epidemiology and Injury Pattern

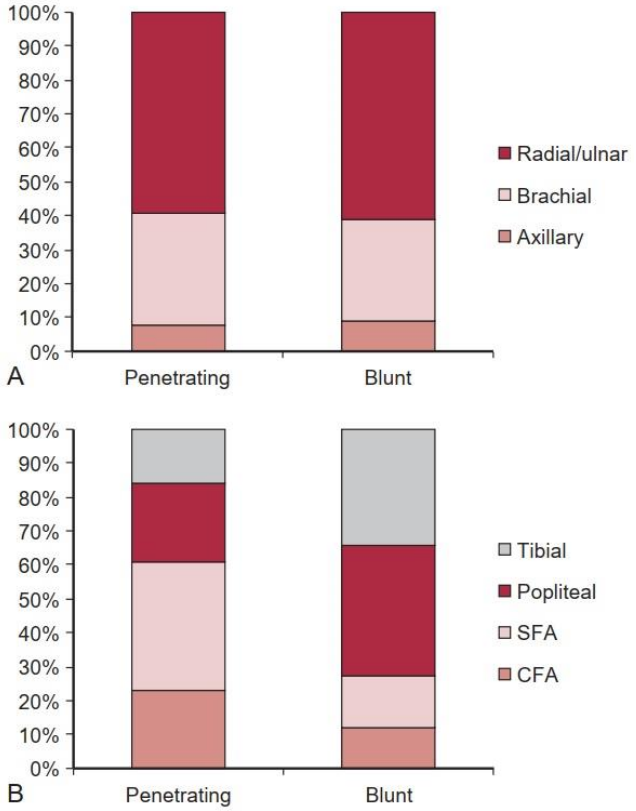
- The overall incidence of trauma and vascular injuries is increasing.
- Vascular injuries are present in only 1% to 2% of injured patients.
- In modern series, vascular injuries to the extremities occur in 0.5% to 1% of injured patients but account for 20% to 50% of all vascular injuries.
- Extremity vascular injuries tend to be young, with average ages in the 30s, and predominantly (70% to 90%) male

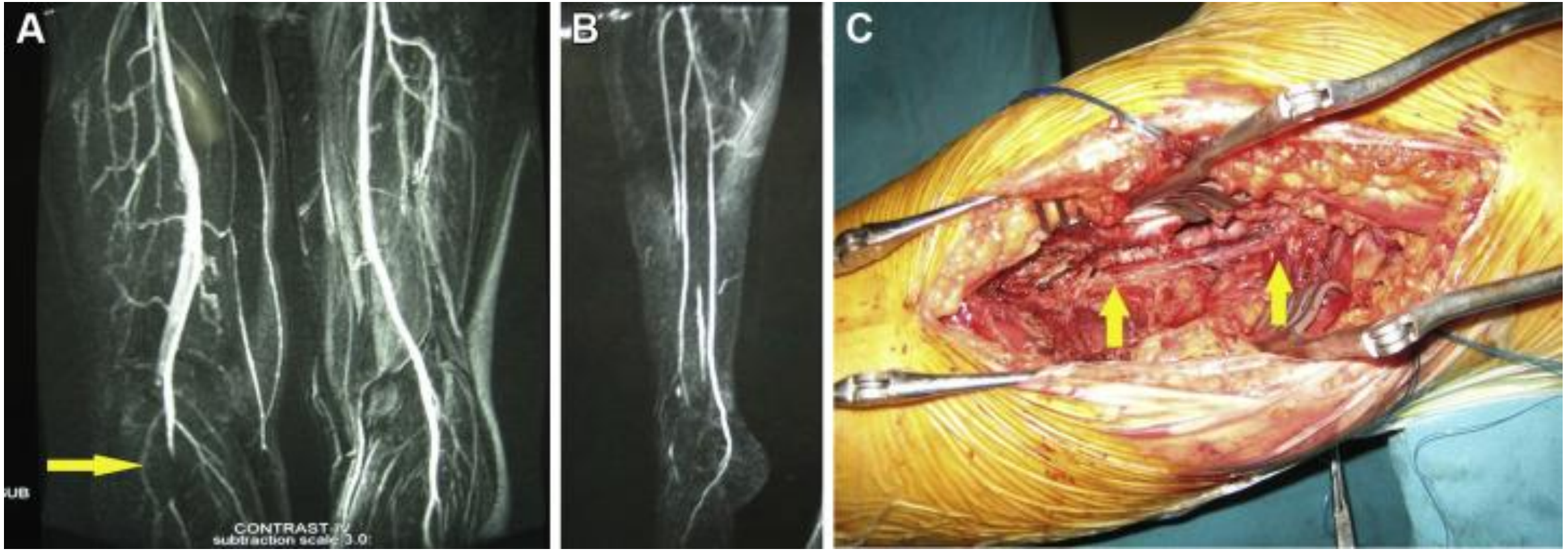
Epidemiology and Injury Pattern (Cont'd)

- These injuries result from blunt and penetrating mechanisms.
- Blunt injuries experience mortality rates between 2% and 5%.
- Penetrating injuries generally result in fewer deaths.
- The discrepancy is predominantly due to a greater incidence of concomitant nonvascular injuries in blunt trauma patients.
- Amputation rates in patients with extremity vascular injury range from 7% to 30%, with most amputations performed in patients with blunt mechanisms

Epidemiology and Injury Pattern (Cont'd)

- Mechanism influences the arterial injury pattern, with the popliteal artery most frequently injured in blunt trauma and the superficial femoral artery (SFA) most frequently injured in penetrating trauma.

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CONTRAST IV
subtraction scale 3.0

Epidemiology and Injury Pattern (Cont'd)

- Fractures are seen with high frequency in blunt limb trauma, with rates as high as 80% to 100% in some series.
- In penetrating trauma, fractures are seen in only 15% to 40% of limbs with an arterial injury.
- The incidence of named venous injury concomitant with extremity arterial trauma ranges between 15% and 35%.

Epidemiology and Injury Pattern (Cont'd)

- Concomitant venous or nerve injury is associated **do not predispose** the patient to amputation.
- The presence of a significant soft tissue deficit does appear to **correlate with amputation** in lower extremity arterial trauma

Diagnosis

BOX 184.1 Clinical Signs of Extremity Arterial Injury

Hard Signs

- Absent distal pulse
- Palpable thrill or audible bruit
- Actively expanding hematoma
- Active pulsatile bleeding

Soft Signs

- Diminished distal pulse
- History of significant hemorrhage
- Neurologic deficit
- Proximity of wound to named vessel

TABLE 44-1: Signs of Vascular Injury

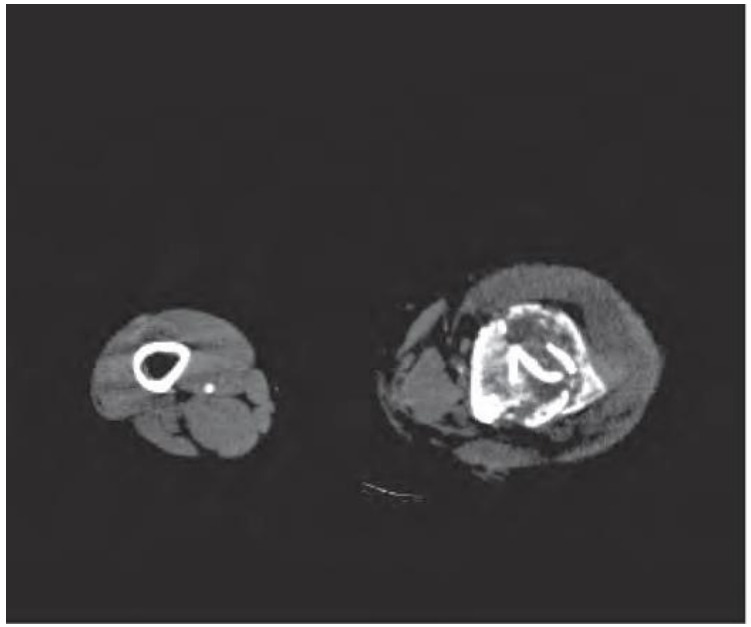
Hard signs	Soft signs
Active or pulsatile hemorrhage	Asymmetric extremity blood pressure
Pulsatile or expanding hematoma	Stable and nonpulsatile hematoma
Clinical signs of limb ischemia	Proximity of wound to major vessel
Diminished or absent pulses	Peripheral neurologic deficit
Bruit or thrill, suggesting arteriovenous fistula	Presence of shock/hypotension

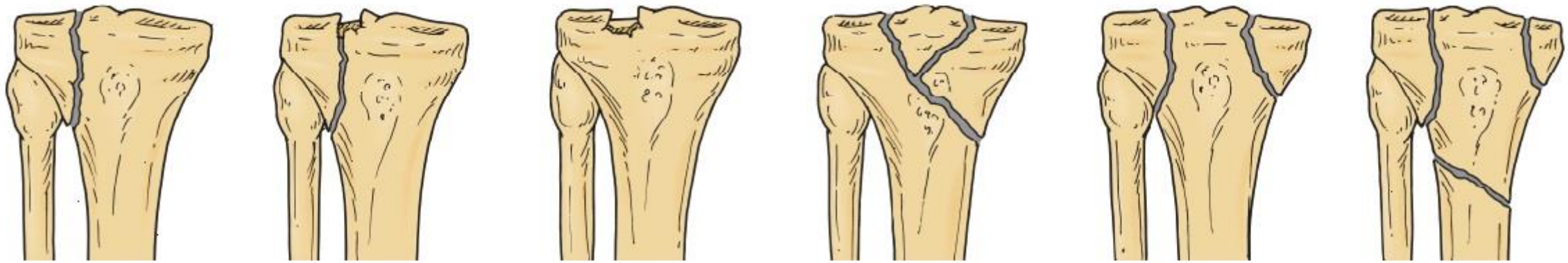
Workup

- Computed tomographic angiography
- Duplex ultrasonography
- On-table angiography

B

C





Type I
Split

Type II
Split-depression

Type III
Central
depression

Type IV
Split fracture,
medial plateau

Type V
Bicondylar
fracture

Type VI
Dissociation of
metaphysis
and diaphysis


THANK YOU
FOR YOUR
ATTENTION