Femoral Shaft Fracture

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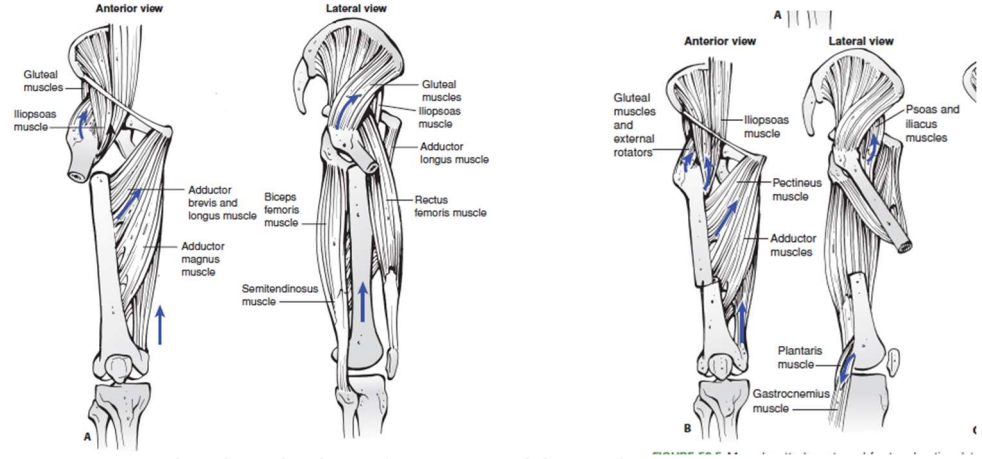
Introduction

Femoral shaft fracture has a bimodal distribution which peaks at 25 and 65 years of age with an incidence of 10 per 100000 population. It usually associated with other injuries such as ipsilateral femoral neck fracture, intertrochanteric fracture and distal femoral intraarticular fracture.

Anatomy

The Femur is the largest and longest long bone in the body and is surrounded by large muscle mass in three individual compartments. It has an anterior bow and the normal neck-shaft angle is 120-135 degrees. The narrowest portion in the intramedullary canal of the femur is called isthmus. The surrounding large muscle mass in the femur causes a distinct deformity in the femur. In proximal femur fracture, the gluteus medius and minimus causes the proximal fragment in abduction, and the iliopsoas flexes and externally rotates it. The adductor muscle group pulls the distal fragment medially. In distal femur fracture, the same deforming forces is noted on the proximal fragment with the addition of the adductor group, while the distal fragment is flexed by the origin of the gastrocnemius.

Proximal femur fracture deforming forces. Distal femoral fracture deforming forces



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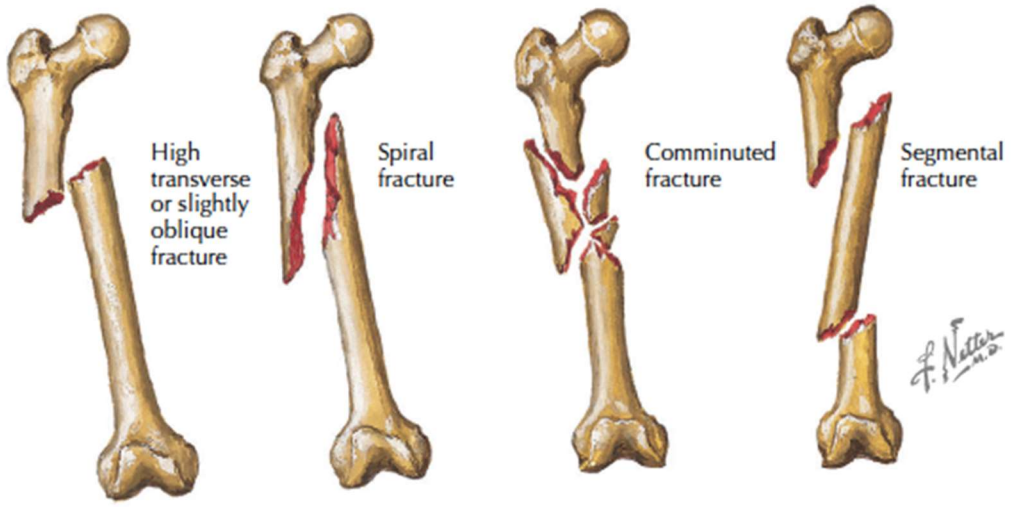
Mechanism of injury

In adults, femoral shaft fracture is usually caused by high energy trauma such as motor vehicle accident, gunshot shot wound, and fall from a height. In contrast, in the elderly, is generally caused by low energy injury such as fall on level ground.

Classification:

Descriptive:

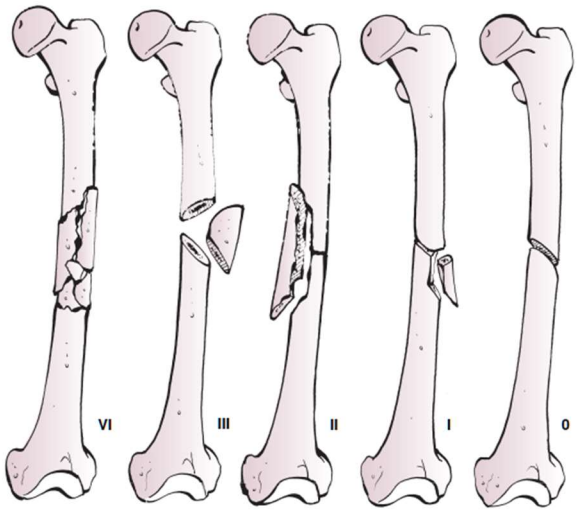
Open vs closed
Anatomic Location: Proximal, Middle or distal third
Configuration: Transverse, oblique, segmental, comminuted



Winquist and Hansen Classification:

TABLE 52-1 Winquist and Hansen Classification of Fracture Comminution[33,34]

Grade	Degree of Comminution
0	No comminution
I	Small butterfly fragment (<25%) or minimally comminuted segment with at least 75% cortical contact remaining between the diaphyseal segments
II	Butterfly fragment or comminuted segment with (approximately 25–50%) with at least 50% cortical contact between the diaphyseal segments
III	Large butterfly fragment or comminuted segment (approximately 50–75%) with minimal cortical contact between the diaphyseal segments
IV	Complete cortical comminution such that there is no predicted cortical contact between the diaphyseal segments. Segmentally comminuted



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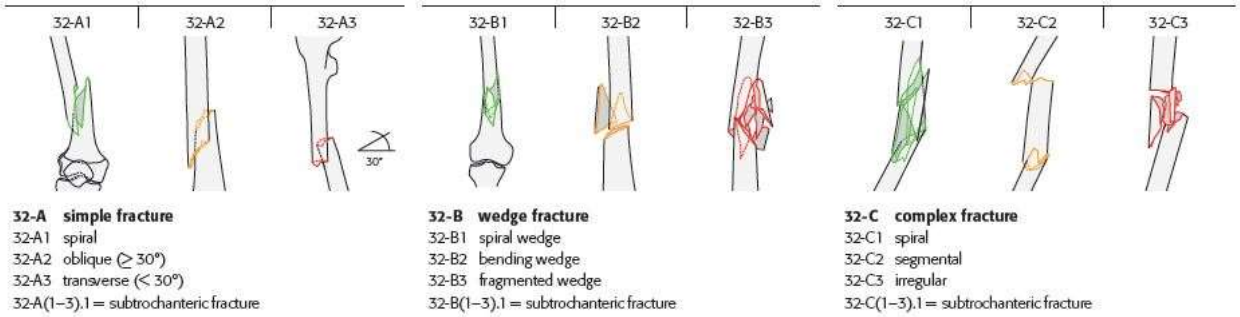
AO Classification



https://cms.aot-start.org/index.php/lower-extremity/femur-shaft/

Presentation

At the ER, the mechanism of injury, time of injury and place of injury should be reviewed.

On examination, ABCD of trauma should always be must be examined. Usual symptoms are pain, inability to ambulate/bear weight and gross deformity.

On physical examination, we should inspect for deformity/angulation/rotation. Soft-tissue injury must be evaluated. We should note that a skin injury may not positioned directly over the fracture site and may lie at a distant site. It may connect with the fractured bone under degloved skin. Hence any fracture associated with a wound in the same area must be deemed open until proven otherwise by surgical exploration.

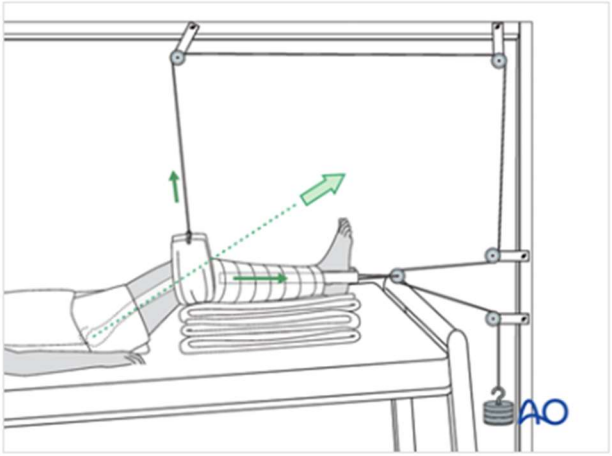
Neurologic and specially vascular examination should be thorough, specially that with femoral shaft fracture can cause major blood (up to 1200cc) and the major blood supply of the leg originates from the femoral artery at the hunter's canal. Compartment syndrome is rare in the thigh.

Treatment:

Non-operative Treatment

Skeletal Traction

Indications: Reserve for patients who cannot tolerated surgical management or for temporary immobilization.

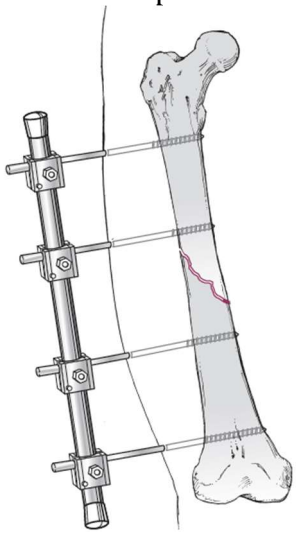


https://surgeryreference.aofoundation.org/orthopedic-trauma/adult-trauma/femoral-shaft/wedge-intact-middle-1-3-fractures/nonoperative-treatment-with-limited-resources#general-considerations

Operative Treatment:

External Fixation

Generally reserved for temporary fixation of open fractures and for damaged control orthopedics.



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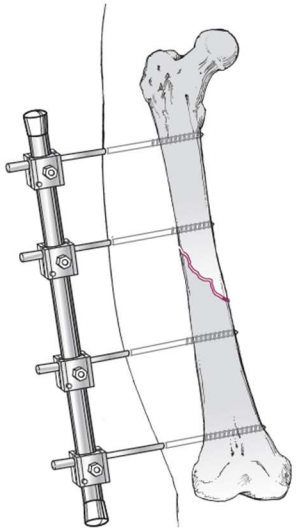
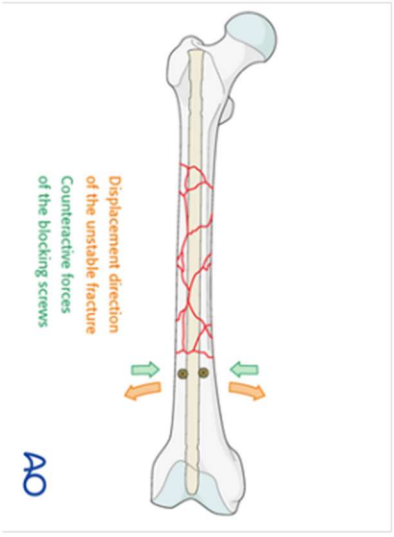
Intramedullary Nailing and Plate Fixation

These methods offers more stable fixation compared to external fixation but there is a risk for infection. IM nailing has the advantage of preserving the soft tissue and the periosteal blood supply. Biomechanically, it also has an advantage in controlling the rotation, translation and alignment. For plates fixation, it is usually used on fracture with metaphyseal or epiphyseal extension.





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Complications:

Malunion
Non-union
Infection (from open fracture)
Neurovascular injury

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