Femoral Neck Fractures

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Agenda

- Epidemiology
- Normal anatomy of the femur
- Garden classifications
- Patients
- Summary
Epidemiology 1

- 250,000 yearly hip fractures in the US
- This is expected to double by 2040
- 90% occur to those over the age of fifty
- 25% mortality at one year
- Of patients who survive to six months, 60% will regain their pre-fracture walking ability and 50% will regain their pre-fracture activities of daily living
Epidemiology 2

• Falls account for 90% hip fractures for those over fifty years of age
• 15% of falls result in hip fracture
• The most common cause in young patients is high energy trauma
• Pathologic fracture may occur at any age ex. metastasis, hyperparathyroidism, osteogenesis imperfecta, steroids, Pagets disease, infection
Epidemiology 3

- Risk doubles every decade after fifty
- Risk factors include osteoporosis, female gender, age, excessive caffeine or alcohol consumption, smoking, dementia, visual impairment, physical inactivity, arthritis, certain psychotropic medications, low BMI, and residence in an institution
Femoral Anatomy 1

• An imaginary line can be drawn between the Greater and Lesser Trochanter called the Intertrochanteric Line

• This is important for classification of fractures
Femoral Anatomy 2

- Lines correlating torque and mathematical expressions to endure loads follow closely to the trabecular matrix

http://www.bartleby.com/107/illus248.html
Femoral Anatomy 3

- Trabeculae are arranged in a matrix that allows maximal dissipation of vertical and horizontal forces.
- This network is compromised in the elderly due to osteoporosis.

http://www.bartleby.com/107/illus247.html
Femoral Anatomy 4

- A fracture proximal to the Intertrochanteric line is considered intraarticular and distal is extraarticular
- Important with respect to vascular complications
Types of hip fractures

1. Subcapital fracture
2. Intertrochanteric Fracture
3. Subtrochanteric fracture

Acetabulum
Greater Trochanter
Head
1. Subcapital fracture
2. Intertrochanteric Fracture
3. Subtrochanteric fracture
Lesser Trochanter
Images from BIDMC Hospital
Femoral Vessels

- Three vessels feed the femoral head
- The Medial is considered the most important
- Individual variation and/or anastomosis still exists between them all
  - 1. Medial femoral circumflex artery
  - 2. Lateral femoral circumflex artery
  - 3. Artery of Ligamentum Teres
Femoral Angiogram

1. Medial Femoral Circumflex Artery
2. Ascending LFCA
3. Transverse LFCA
4. Descending LFCA

http://classes.kumc.edu/som/radanatomy/image.asp?Image=7601-001.jpg&Film=7601&Features=1
Role of imaging

- Evaluation for chronic or sub acute hip pain based on physical exam, history
- Trochanteric bursitis, OA, Lumbar radiculopathy, Meralgia paresthesia, Osteonecrosis, hip fracture
- Plain radiograph (AP, AP with internal rotation of about 15 degrees, Lateral)
- MRI, Bone scan, CT
- Prognosis, planning of medical and surgical intervention
Garden Classifications

- Studies indicate that Radiologist agree in diagnosing garden types only 22% of the time
- The important distinction is I/II versus II/IV because risk of avascular necrosis jumps from 7% to 37% respectively
- This distinction is clear
Garden Type I/II

- **Type I**
  - Incomplete fracture
  - No displacement

- **Type II**
  - Complete fracture
  - No displacement

- Internal rotation causes hip pain
- Sometimes able bear weight
- Ecchymoses
- Stinchfield test
Garden Type 1 Fracture

**Incomplete femoral neck fracture**

**Uptake in femoral neck on bone scan**

Images from BIDMC Hospital
Garden Type II Fracture

T1 MRI complete femoral neck fracture
Garden Type III/IV

- Garden III
  - Complete
  - Partial displacement

- Garden IV
  - Complete
  - Total displacement

- Unable to bear weight
- Groin pain
- External rotation
- Short limb
Garden Type III Fracture

T1 MRI complete femoral neck fracture with partial displacement
Patient 1

- 79 year old female with history of CVA in 2002, aphasia, dementia, and COPD
- Admitted for a fall in her kitchen
- Unable to acquire a verbal history due to her aphasia
- Found by her son who was visiting
P1 Hip Radiograph 1

Type IV
P1 Hip Radiograph 2

Femoral head replacement
Patient 2

- 35 year old male s/p motorcycle accident
- High energy mechanism of trauma
- Multiple soft tissue injuries and fractures
P2 Radiograph 1

Type IV fracture s/p external reduction

Sacroiliac fracture and widened pubic symphysis
Femoral neck fracture

Superomedial pubic ramus fracture
P2 CT 2

Sacroiliac joint fracture

Images from BIDMC Hospital
P2 CT 3

Kidney laceration
P2 CT 4

Subcutaneous emphysema

Inferior pubic ramus fracture
P2 Radiograph 2

Internal fixation with screw
Summary

- Femoral neck fractures have a high associated mortality and morbidity
- Falls are the major cause in elderly and high energy trauma in younger patients
- Radiological assessment is critical for prompt surgical and medical intervention
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