Hip Fractures: Continuum of Care

Anthony J. Ferretti, D.O., MHSA
Primary Care 2015
LECOM Summer CME

Background

- Hip fractures very common in today's medical community
- 1.5 million osteoporotic fractures annually in US
  - 300,000 of these hip fractures
- Incidence of hip fracture significantly increases with age
  - Age 50 - M:F 22.5:23.9 per 100K
  - Age 80 - M:F 630:1289 per 100K

Background

- Mortality secondary to hip fracture in a study of 2660 patients was found to be:
  - 9% at thirty days
  - 19% at ninety days
  - 30% at twelve months
- Pts with medical comorbidities that subsequently caused a delay in surgery
  - 2.5x greater risk of dying within 30 days following surgery when compared to pts not delayed

Background

- Incidence of intertrochanteric hip fracture roughly the same as femoral neck fractures
- Demographics of female: male ratio
  - Between 2:1 and 8:1
- Proximal humerus fractures increase risk of hip fracture for 1 year

Background

- A retrospective study analyzed 341 hip fracture patients from 2005-2009 for patient characteristics
- Average admission cost: $24,770
- Average length of stay: 6.4 days
- Average age of patient: 83yo

The Hip Fracture Admission

Patient Characteristics	Mean ± SD
Gender (%)	
Female	69.5
Male	30.5
Age (years)	83.3 ± 8.8
Hospital Charges (US dollars)	24770 ± 11723
Length of Stay (days)	6.4 ± 3.8
Hip Fracture Site (%)	
Femoral Neck	46.0
Intertrochanteric	49.0
Subtrochanteric	5.0
Hip Procedure Performed (%)	
Open/Closed Reduction-Internal Fixation	61.0
Hemiarthroplaty	36.4
Total Hip Arthroplasty	2.6
Discharge Disposition (%)	
Home	3.2
Rehab	22.6
Skilled Nursing Facility	31.4
Transitional Care Unit	39.6
Hospital Transfer	0.3
Deceased	2.9

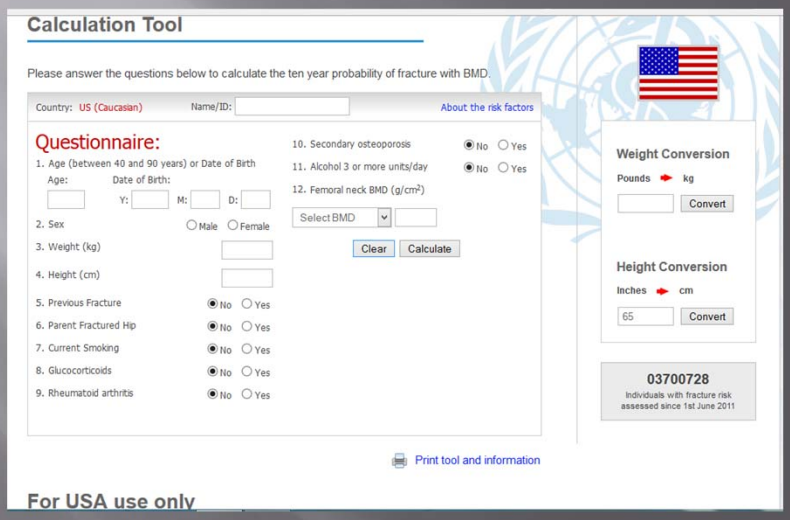
Osteoporosis

- 10 million Americans have osteoporosis
- 1.5 million osteoporotic fractures occur each year
  - Location of fractures
    - Vertebral body > hip > wrist fractures
  - 300,000 hip fracture each year in US

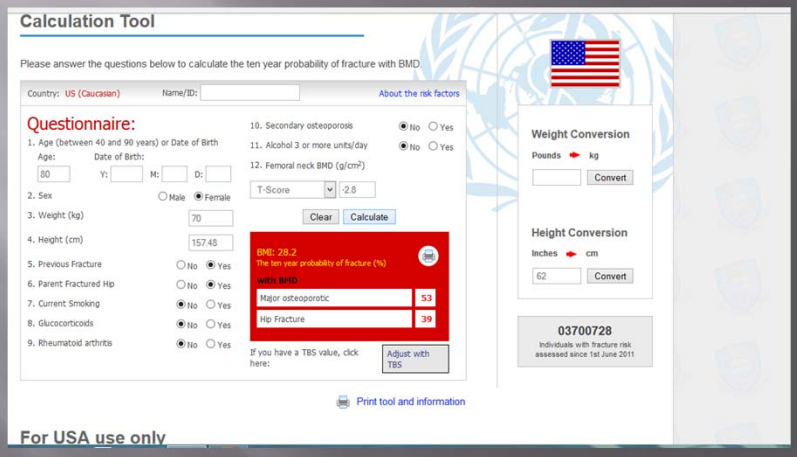
FRAX SCORE

- WHO **f**racture **r**isk **a**ssessment **t**ool that calculates
  - 10-year risk of hip fracture
  - 10-year risk of major osteoporotic-related fracture
- Factors include
  - Age, sex, personal history of fracture
  - Low BMI
  - Oral steroid use
  - Secondary osteoporosis
  - Parental history of hip fracture
  - Smoking status
  - Alcohol intake

FRAX SCORE



FRAX SCORE



Osteoporosis

- Diagnosis confirmed by DEXA scan
  - Dual Energy X-ray Absorptiometry
  - T-score < -2.5 (osteoporosis)
- 2008 National Osteoporosis Foundation Guidelines for Pharmacologic Treatment of Osteoporosis
  - Suggests pharmacologic treatment be considered for postmenopausal women and men >= 50yo with:
    - Hip/vertebral fracture
    - T score between -1.0 and -2.5 and 10-year risk of hip fracture >= 3%
    - 10-year risk of major osteoporosis-related fracture >= 20% by FRAX calculation
    - T score <= -2.5

Pathophysiology

- Elderly
  - Low energy falls in osteoporotic patients
  - Osteoporotic hip fractures most commonly 70-80 years of age
  - Trabecular thinning of bone
- Young
  - High energy trauma
    - Motor vehicle accident

Presentation

- Physical Exam
  - Hip and thigh painful
  - Lower extremity shortened and externally rotated
  - Inability to weight bear

Radiographs

- Recommended views
  - AP pelvis
  - AP of hip, cross table lateral
  - full length femur radiographs

Radiographs

- CT or MRI
  - useful if radiographs are negative but physical exam consistent with fracture
  - MRI has highest sensitivity with an ability to show bony edema representing fracture

Diagnosis

- 3 main hip fracture patterns
  - Femoral neck fracture
  - Intertrochanteric fracture
  - Subtrochanteric fracture

The Hip Fracture Patient

- Beginning appropriate volume replacement in the ED with IV fluids is critical
- Elderly patients may have blunted compensatory response to hypovolemia
  - Beta blockers will prevent tachycardia
- 1–1.5 liters of blood can be lost into the thigh
  - Anticoagulant medications can result in persistent bleeding into thigh compartments
- Many elderly patients are volume contracted at baseline

Femoral Neck Fracture

- Associated injuries
  - Femoral shaft fractures 6-9% associated with femoral neck fractures
  - Distal radius fractures
  - Thoracic and lumbar compression fractures
  - Closed head injuries
  - Rib fractures

Femoral Neck Fracture

- Anatomy
  - Blood supply to femoral head
    - Major contributor is medial femoral circumflex artery
    - Minor contributor is lateral femoral circumflex artery
    - Insignificant supply from artery of ligamentum teres
  - Displacement of femoral neck fracture will disrupt the blood supply to the femoral head

Femoral Neck Fracture

Garden Classification (based on AP radiographs and does not consider lateral plane alignment)	
Type I	Incomplete, valgus impacted
Type II	Complete fracture. nondisplaced
Type III	Complete, displaced < 50%
Type IV	Complete, displaced

Nonoperative Treatment

- **Nonweightbearing with early out of bed to chair**
  - Indications
    - Nonambulatory patients
    - Patients at high risk for perioperative mortality
  - Outcomes
    - high rates of pneumonia, urinary tract infections, decubiti, and DVT

Operative Treatment

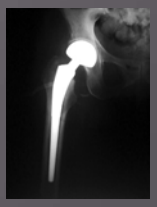
- Cannulated **screw fixation**
  - Indications
    - Garden I and II fracture patterns in elderly
    - Displaced transcervical fracture in young patient
      - Considered a surgical emergency
      - Achieve reduction to limit vascular insult

Operative Treatment

- **Sliding hip screw** or **cephalomedullary nail**
  - Indications
    - Basicervical fracture pattern in a young patient
      - Biomechanically superior to cannulated screws
    - Consider placement of additional cannulated screw above sliding hip screw to prevent rotation

Operative Treatment

- **Hemiarthroplasty**
  - Replacement of the femoral head
  - Indications
    - Garden III and IV Classification
  - Unipolar vs Bipolar components



- **Total hip arthroplasty**
  - Replacement of the femoral head and acetabulum
  - Indications
    - Garden III and IV Classification
  - Older active patients
  - Patients with preexisting hip osteoarthritis
    - Recent studies show more predictable pain relief and better functional outcome than hemiarthroplasty

Femoral Neck Fracture

Complications

- Osteonecrosis incidence of 10-45%
- Recent studies fail to demonstrate association between time to fracture reduction and subsequent AVN
- Increased risk with
  - Increase initial displacement
    - AVN can still develop in nondisplaced injuries
  - Nonanatomical reduction

Femoral Neck Fracture

Complications

- Nonunion incidence of 5 to 30%
  - Increased incidence in displaced fractures
- Varus malreduction most closely correlates with failure of fixation after reduction and cannulated screw fixation

Hip Fracture

- Operative technique often based on hip fracture pattern:
  - Femoral neck
  - **Intertrochanteric**
  - Subtrochanteric

Intertrochanteric Hip Fracture

- **Sliding hip compression screw**
  - Indications
    - stable intertrochanteric fractures
  - Outcomes
    - equal outcomes when compared to intramedullary hip screws for stable fracture patterns

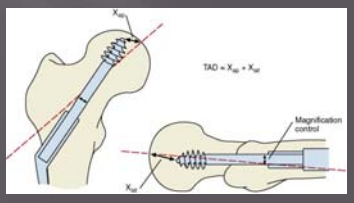
Intertrochanteric Hip Fracture

- **Intramedullary (cephalomedullary) nail**
  - Indications
    - Stable/unstable fracture patterns
    - Reverse obliquity fractures
      - 56% failure when treated with sliding hip screw
    - Subtrochanteric extension
    - Lack of integrity of lateral femoral wall
      - Associated with increased displacement and collapse when treated with sliding hip screw
  - Nearly replaced the sliding hip screws in the last decade

Intertrochanteric Hip Fracture

Complications

- Implant failure and cutout
  - Most common complication
  - Usually occurs within first 3 months
  - Tip-apex distance >45mm associated with 60% failure rate
    - Optimal tip-apex distance <25mm



Intertrochanteric Hip Fracture

Complications

- Anterior perforation of the distal femur
  - Mismatch of the radius of curvature of the femur (shorter) and implant (longer)
- Nonunion
  - Incidence <2%
- Malunion
  - Varus and rotational deformities are common

Intertrochanteric Hip Fracture

Complications

- Nonunion
  - Incidence <2%
- Malunion
  - Varus and rotational deformities are common

Hip Fractures

- 3 main hip fracture patterns
  - Femoral neck fracture
  - Intertrochanteric fracture
  - **Subtrochanteric fracture**

Subtrochanteric Hip Fracture

- Subtrochanteric is defined as level of lesser trochanter to 5cm distal fractures
- Associated intertrochanteric component may be termed:
  - Intertrochanteric fracture with subtrochanteric extension
  - Peritrochanteric fracture

Subtrochanteric Hip Fracture

Intramedullary(cephalomedullary) nailing

- Indications
  - Subtrochanteric fractures
- Long cephalomedullary nail components with distal locking screws

Subtrochanteric Hip Fracture

- May represent an atypical femur fracture
  - Associated with bisphosphonate use
  - Bisphosphonate fractures
    - Increased risk of iatrogenic fracture and nonunion

Subtrochanteric Hip Fracture

- Radiographic findings associated with bisphosphonate hip fractures
  - Lateral cortical thickening
  - Transverse fracture orientation
  - Medial spike
  - Lack of comminution

Postoperative Management

- DVT has been reported as high as 80% of patients with hip fractures
- Mechanical and chemical prophylaxis should be used to prevent DVT
- Exact type of prophylaxis and duration remain controversial

Prognosis

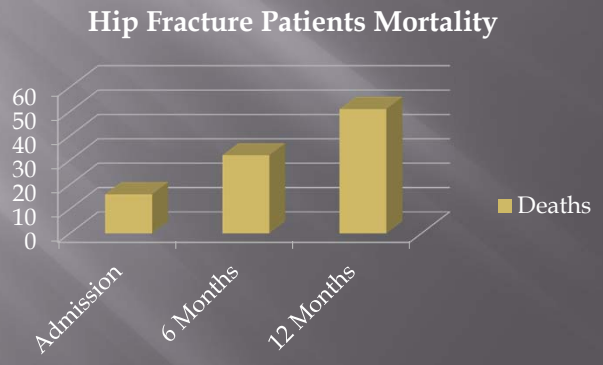
- **20-30% mortality risk** in the 1st year following hip fracture
- Factors that increase mortality
  - male gender (25-30% mortality) vs female (20% mortality)
  - higher in intertrochanteric fracture (vs femoral neck fracture)
  - operative delay of >2 days
  - age >85 years
  - 2 or more pre-existing medical conditions
  - ASA classification (ASA III and IV increases mortality)

Prognosis

- Zuckerman et al. reviewed mortality associated with operative delay in older patients with hip fractures
- They found that operative delay of 3 or more calendar days results in greater 1 year mortality

Prognosis

- This same study documented the mortality of 367 hip fracture patients at 3 intervals:



Prognosis

- This study showed that an operative delays greater than 3 calendar days double the risk of the patient dying before reaching the 1 year follow up visit

Prognosis

- Switzer et al. reviewed perioperative considerations in the geriatric patient.
- They showed that hip fracture repair after 2 days results in decreased independent living, increased pressure sores, and longer hospital stays
- They found with early surgery, pain, length of hospital stay and 1-month mortality was reduced

Prognosis

- Holt et al is a prospective review of 1000 hip fractures and reported that pre-injury mobility to be the most significant determinant for post-operative survival

Prognosis

- This was a prospective study of 1000 femoral neck fractures (476 intertrochanteric and 524 subcapital)
- Other findings of the study included the following information
- The in-hospital mortality of the 975 surgically treated fractures was 11%

Prognosis

- Non-operatively treated fractures had a mortality of 60 percent
- Internal fixation produced a lower mortality than uncemented hemiarthroplasty
- The use of acrylic cement was associated with an increased morbidity and mortality rate in hemiarthroplasties

THE END

References

- Riggs B, Melton L. The world wide problem of osteoporosis: insights afforded by epidemiology. Bone 17: 5055-5155, 1995.
- Beaupre LA, Jones A, Saunderes LD, Johnston DWC, Buckinngham J, Majumdar SR. Best Practices for Elderly Hip Fracture Patients – A Systematic Overview of the Evidence. J Gen Intern Med 20:1019-1025, 2005.
- Roger,R., Tranovich, M., Habusta, S. (2011). The Effect of Hyperglycemia on Perioperative Outcomes in the Geriatric Hip Fracture Patient. Millcreek Community Hospital, Department of Orthopedic Surgery
- US Department of Health and Human Services, *2004*. Riggs and Melton. Bone, 1995. Beaupre et al. J Gen Int Med, 2005
- **Moran** CG, Wenn RT, Sikand M, Taylor AM (2005). Early mortality after hip fracture: is delay before surgery important? **J Bone Joint Surg Am**. **2005** Mar;87(3):483-9

References

- Zuckerman JD, Skovron ML, Koval KJ, Aharonoff G, Frankel VH. Postoperative complications and mortality associated with operative delay in older patients who have a fracture of the hip. J Bone Joint Surg Am. 1995 Oct;77(10):1551-6.
- Switzer JA, Layman MD, Bogoch ER. Perioperative and postoperative considerations in the geriatric patient. In: Schmidt AH, Teague DC, eds. Orthopaedic Knowledge Update: Trauma 4. Rosemont, IL: American Academy of Orthopaedic Surgeons; 2010:535-544
- Holt EM, Evans RA, Hindley CJ, Metcalfe JW. 1000 femoral neck fractures: the effect of pre-injury mobility and surgical experience on outcome. Injury. 1994 Mar;25(2):91-5.
- Morgan, S. (2014). AAOS Comprehensive Orthopaedic Review. Fractures of the Hip. Chpt 38.
- Moore, D. (2015). Adult Reconstruction. www.orthobullets.com. 2015. 8 May.