Topics

- epidemiology
- anatomy
- classification
- mechanism of injury
- patient assessment
- treatment
- rehabilitation
- complications
Epidemiology

- 341k people visited EDs with hip fractures
- 90% were > 60y
- trochanteric : cervical – 2:1
- approx 227k trochanteric fxs per year; ~200k in elderly patients

Hip Fractures in the United States: 2008 Nationwide Emergency Department Sample

SUNNY H. KIM,¹ JOHN P. MEEHAN,² THOMAS BLUMENFELD,¹ AND ROBERT M. SZABO¹
Arthritis Care & Research
Vol. 64, No. 5, May 2012, pp 751–757
Epidemiology

- 20% mortality within 1 year (most within 6 months)

- $8.6 billion spent on hip fxs in 1995 (of $13.7 billion spent on all osteoporotic fxs)

Medical Expenditures for the Treatment of Osteoporotic Fractures in the United States in 1995: Report from the National Osteoporosis Foundation

JOURNAL OF BONE AND MINERAL RESEARCH
Volume 12, Number 1, 1997

NANCY FOX RAY, JULIEN K. CHAN, MAE THAMER, and L. JOSEPH MELTON, III
Anatomy

- osseous anatomy is straightforward
- the soft tissue anatomy is more nuanced
Anatomy

- the deep branch of the medial femoral circumflex vessel
- generally fractures are lateral and inferior to the vessel and blood flow is not compromised
- basicervical fractures potentially are at risk

Avascular Necrosis and Related Complications Following Healed Osteoporotic Intertrochanteric Fractures

Yoav Mattan MD, Alice Dimant MD, Rami Mosheiff MD, Amos Peyser MD, Steven Mendelson MD and Meir Liebergall MD

Department of Orthopedic Surgery, Hadassah University Hospital, Jerusalem, Israel
Affiliated to Hebrew University Medical School, Jerusalem, Israel
Anatomy

- note neck-shaft angle
- note the ‘height’ of the greater trochanter relative to the center of the femoral head
- the reduction should aim to recreate the patient’s normal anatomy
Anatomy

- when the centers are higher the trochs = valgus
Anatomy

- when the centers are lower than the trochs = varus
Classification – AO/OTA

Fracture and Dislocation Classification Compendium - 2007
Orthopaedic Trauma Association
Classification, Database and Outcomes Committee

- 31-A – proximal femur, trochanteric segment

- the standard classification system
- not great for communication
- (too) many subtypes
Classification - Stability

- stability *may* drive choice of implant
- stable fractures *may be treated with a sliding hip screw
- unstable fractures *may do better with intramedullary fixation*
Classification - Stability

- features of instability
  - medial or posteromedial comminution
  - large lesser trochanter fragment
  - incompetent ‘lateral wall’
  - transverse fracture above the lesser
  - reverse obliquity
  - extension to the subtrochanteric region
Mechanism of Injury

• geriatric fractures most commonly occur from a ground level fall ➔ osteoporosis

• younger patients typically have a high energy mechanism
  – motorcycle
  – auto
  – fall from height
Assessing the Patient

• geriatric patient
  – in addition to full assessment for other injuries
  – prior functional level
  – living arrangements
  – comorbidities
  – prior treatment for osteoporosis?
• young patients
  – ATLS
Assessing the Patient

- shortened & externally rotated limb
- neuro exam
- vascular exam
- imaging
Assessing the Patient

• imaging
  – pelvis AP
  – hip 2v
  – femur 2v – deformities? other implants? (you need to assess the whole femur
Assessing the Patient

- imaging
  - ct – atypical patterns?
  - mri – searching for an occult fx
Assessing the Patient

- imaging
  - w/u hip pain after trauma

greater trochanter fx on CT – no fracture seen across

pt unable to mobilize - MRI was ordered - fluid consistent with occult fx
Assessing the Patient

• imaging
  – mri – searching for an occult fx
  – a negative ct does not rule out an occult fx in geriatric patients
Assessing the Patient

- imaging
  - ct
- not routinely used for geriatric fractures
- helps with understanding the fracture in atypical patterns
Associated Injuries

- geriatric patients
  - look for other osteoporotic fractures
    - shoulder
    - wrist
    - vertebral compression
  - beware of head injuries in patients on anticoagulants
- w/u & treat osteoporosis
Associated Injuries

- young patients – ATLS
  - like any other high energy trauma
  - full secondary surveys on initial evaluation and after surgical intervention – look for other injuries
Treatment

• closed

  – infrequently used – even in nonambulators

  – reduction and fixation is palliative for pain, hygiene
Treatment

- open
  - reduction and stabilization versus arthroplasty (primarily severe DJD)
  - anatomic reduction favored over displacement osteotomies (ie. dimon-hughston)
Treatment

- open (continued)
  - choice of implant is controversial
    - sliding hip screw (shs)
    - intramedullary nail (imn)
Treatment

whatever implant is chosen…

- anatomic reduction prior to fixation**
  - implant won’t reduce the fracture
- avoid devitalizing fragments – joystick with pins
- need ‘stable’ fixation to allow early mobilization
shs v. imn

- shs had been the standard device
- adoption of imn was made largely w/o evidence of improved results (initial results of imn had higher complication rates)
- as of 2005, candidates sitting for abos were using more imn than shs
shs v. imn

- evidence assessing for optimal implants is weak (low level, underpowered)
- early generations of imn (cephalomedullary) were prone to problems (ie., fracture at the tip) – which have improved with improved design
**shs v. imn**

- “No recommendation for device based on patient outcomes.”

**Evidence Report/Technology Assessment**

*Number 184*  
AHRQ Publication No. 09-E013  
August 2009

**Treatment of Common Hip Fractures**

- future research recommendations
  - ‘better research’ (paraphrased) (consistent use of outcome measures, assess and quantify surgical technique, data pooling)
Treatment

• open (continued)
  – arthroplasty
  – insufficient data to determine advantage of arthroplasty over internal fixation

Replacement arthroplasty versus internal fixation for extracapsular hip fractures in adults (Review)


Parker MJ, Handoll HHG

• improved clinical outcome with imn, no difference with function
  • ↑ blood loss
  • ↑ mortality
Treatment - Timing

• ‘expedient’
  – don’t rush to surgery ‘emergently’
  – get ‘judicious’ w/u (avoid the $1M w/u – usually just delays surgery
  – don’t treat as purely elective – ‘book it for 2 days from now’
  – literature is observational – selection bias for the patients who go to surgery quickest (healthier patients)
Treatment - Timing

- surgery w/in 48h associated with decreased mortality

**Postoperative Complications and Mortality Associated with Operative Delay in Older Patients Who Have a Fracture of the Hip**

*THE JOURNAL OF BONE AND JOINT SURGERY VOL. 77-A, NO. 10, OCTOBER 1995*

*BY JOSEPH D. ZUCKERMAN, M.D., MARY LOUISE SKOVRON, DR.P.H., KENNETH J. KOVAL, M.D., GINA AHARONOFF, M.P.H., AND VICTOR H. FRANKEL, M.D., PH.D., NEW YORK, N.Y.*

- no difference in mortality – increase complications

**The Effects of Time-to-Surgery on Mortality and Morbidity in Patients following Hip Fracture**

*June 15, 2002 THE AMERICAN JOURNAL OF MEDICINE® Volume 112*

Julia P. Grimes, DO, MPH, Patrice M. Gregory, PhD, MPH, Helaine Noveck, MPH, Mark S. Butler, MD, Jeffrey L. Carson, MD
Treatment - Timing

- pts are less likely to return to independent living if delayed 36-48h
- 80% of pts w/o dementia returned to indep living w/in 4 mos (<36h)
- 31% of demented pts returned to indep living
- fewer pressure sores if <24h

Early Operation on Patients with a Hip Fracture Improved the Ability to Return to Independent Living

A Prospective Study of 850 Patients


By Amer N. Al-Ani, MD, Bodil Samuelsson, RN, Jan Tidermark, MD, PhD, Åsa Norling, RN, Wilhelmina Ekström, MD, Tommy Cederholm, MD, PhD, and Margareta Hedström, MD, PhD
Treatment

• position - fx table with well limb
treatment • position - fx table with well limb extended

ASIS

ANTERIOR & POSTERIOR GREATER TROCHANTER

incision

LATERAL PF JOINT
Treatment

- I make a stab incision so if I’m fighting soft tissue (adipose) I can adjust without making a huge incision (another stab)
- reduce fracture on the table
Treatment

- pick a starting point that keeps the reamer from falling into the fx

medial starting point avoids more lateral fx

lateral starting point avoids more medial fx
Treatment

- lateral view
  - the pin should be at the jxn of the anterior & middle 1/3’s of the greater troch
  - not centered!
  - if it’s centered it won’t align with the neck and the shaft
Treatment

- if it’s too posterior – distal end of nail can abut the anterior cortex
Treatment

• guide the reamer down to avoid reaming into the neck or out laterally
Treatment

• prior to proximal fixation add traction to eliminate varus (as needed)
Treatment

• ‘perfect’ lateral – the nail is centered over the femoral neck and head – then rotate the nail until the jig to direct the pin trajectory to the center of the head
Treatment

- screw should be deep in the head, centered or lower on the AP, centered on the lateral
- lock distally if axial or rotational instability
Treatment

• the sum of the distances on the 2 views should be at least <25mm (maybe less)
Treatment

- high energy reverse oblique in 32y man
- option for IMN (risk to displace the coronal split at lateral cortex) or plate - ? maintain alignment – concern for varus
Treatment

• reduce and get proximal fixation
• articulated tensioner
  – helps eliminate varus
  – tensions the construct
  – compresses the fracture
Treatment

- healed and remodeled at 9 months
Treatment

- implants removed due to pain (prominent implant)
Rehabilitation

• early mobilization
• what immediately or within 1-2 weeks of surgery
  – non-demented patients – ‘voluntarily limit weight-bearing on the basis of the degree of discomfort or apprehension that such weight-bearing causes’ (self protected weight bearing)
  – demented patients (they do what they want)?

Postoperative Weight-Bearing after a Fracture of the Femoral Neck or an Intertrochanteric Fracture*

THE JOURNAL OF BONE AND JOINT SURGERY
BY KENNETH J. KOVAL, M.D.†, DEBRA A. SALA, M.S., P.T.†,
FREDERICK J. KUMMER, PH.D.†, AND JOSEPH D. ZUCKERMAN, M.D.†, NEW YORK, N.Y.
VOL. 80-A, NO. 3, MARCH 1998
Investigation performed at the Department of Orthopaedic Surgery, Hospital for Joint Diseases, New York City
Complications

• (aside from mortality, ulcers, poor function)
• malalignment – varus – line through center of femoral heads should be at the top of the greater trochanter
Complications

• basicervical fracture
Complications

- avn / collapse
Summary

• 20% mortality in geriatric fx at 1 year
• no definitive evidence to guide implant choice
• if surgery within...
  – 48h - ↓ mortality
  – 36-48h – ↑ return to independent living
  – 24h – ↓ complications (decubitus ulcers)
• surgical goal – anatomic reduction with stable fixation to allow mobilization
• counsel patients and family about outcomes
References

References