Orthopedic Trauma

Femoral Neck Fractures

Brendan J Casey, DO

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- **Topic: Femoral Neck Fractures**
  - Review diagnosis and management
    - Identify common fracture patterns
    - Apply treatment principles based on fracture pattern
  - Discuss outcomes and complications

- **Goals:**
  - Familiarize with treatment options for fem neck fxs
  - Understand the relative indications for different surgical options
  - Review literature regarding treatment and outcomes

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Background:

Epidemiology

- >300 femoral neck fractures per year in US
  - Accounts for 30% of all hospitalizations
  - Will surpass 6 million by 2050
- Significant morbidity, mortality, expense
  - $10-15 billion/year in the US

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Background:

Epidemiology

- Bimodal distribution
  - Young adults: high energy mechanism
    - Often considered surgical emergency
    - Uncommon, Male > Female
  - Elderly: low energy mechanism
    - Osteoporotic bone
    - Female > Male, higher risk in Caucasians, EtOH, smokers
    - incidence doubles each decade beyond age 50

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Background:

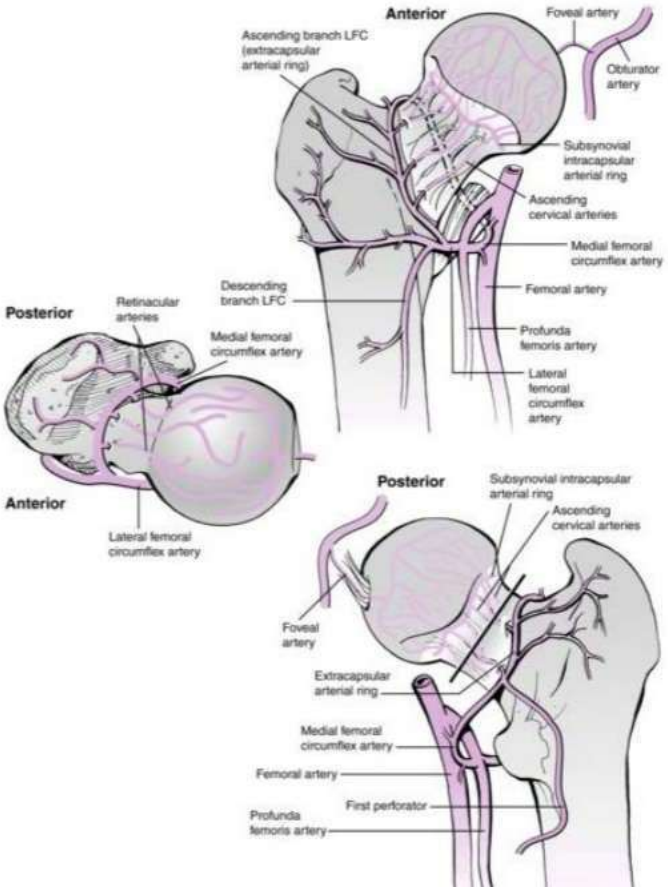
Epidemiology

- High morbidity and mortality
  - ~ 25% Mortality at 1 year in elderly
    - 30% in Males
    - 20% in Females
  - Significant functional impairment

Background:

Anatomy

- Femoral head has poor blood supply
  - **Lateral epiphysel artery**
    - terminal branch MFC artery
    - predominant blood supply to weight bearing dome of head
  - After fracture, blood supply depends on retinacular vessels
  - Greater fracture displacement = greater risk of retinacular vessel disruption



Background:

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Management

- Primary goal- return the pt. to his/her previous level of function
- Best accomplished by surgical intervention followed by early mobilization
- Historically- nonoperative management has resulted in an unacceptable rate of medical morbidity, mortality, malunion, and nonunion-Koval et al. (1994 JAAOS)
  - Extreme cases
    - High risk of mortality from anesthesia and surgery (recent MI, etc.)
    - Require ongoing anticoagulation that cannot be reversed for 72 hours during the perioperative period
    - Demented elderly pts. who were prior nonambulators, and experience minimal discomfort from the injury

Diagnosis:

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Clinical Evaluation

- Unable to stand/walk following the injury
- Stress fx may be ambulatory
- Nondisplaced- possible absence of clinical deformity
- Displaced/comminuted- classically shortened and externally rotated extremity
- Pain with movement- log roll/straight leg raise
- Neurovascular injuries are rare

Diagnosis:

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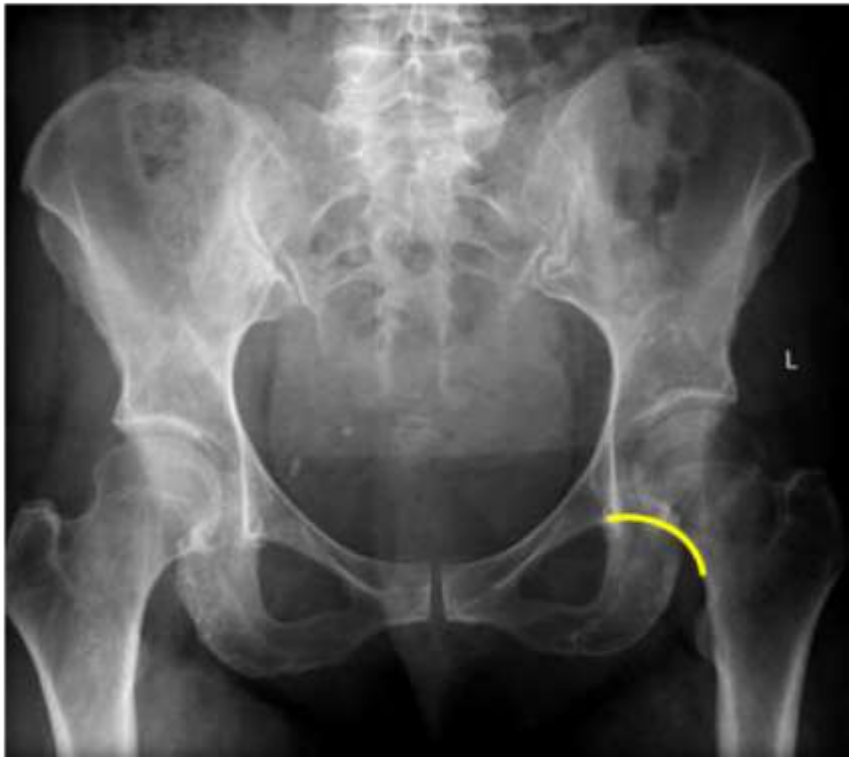
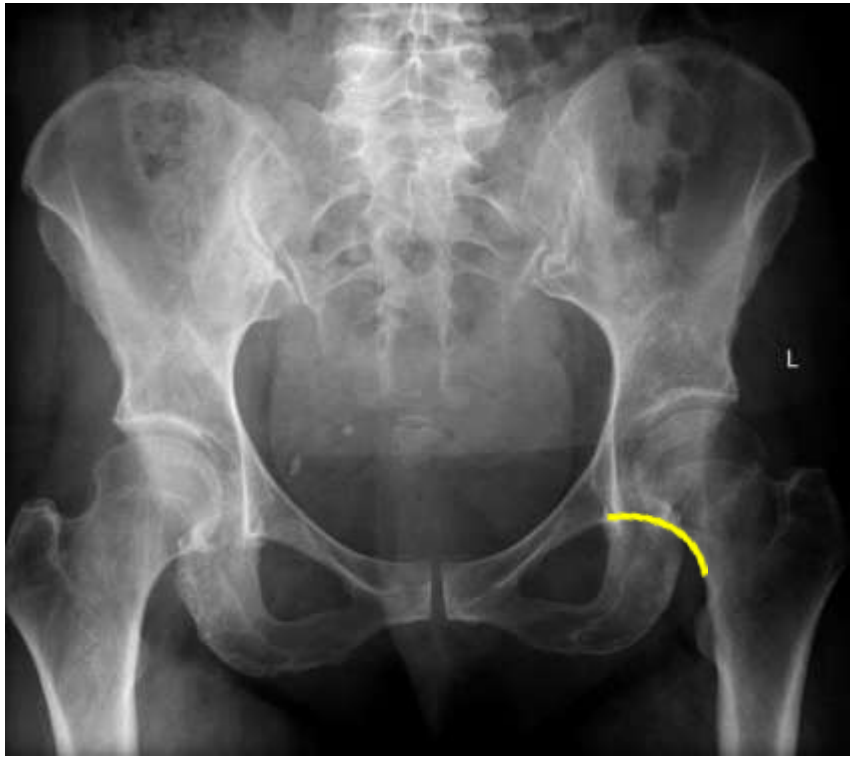
X-ray

- 2 views: AP pelvis and lateral
- Normal does not exclude- 8% pts with hip pain have occult fx

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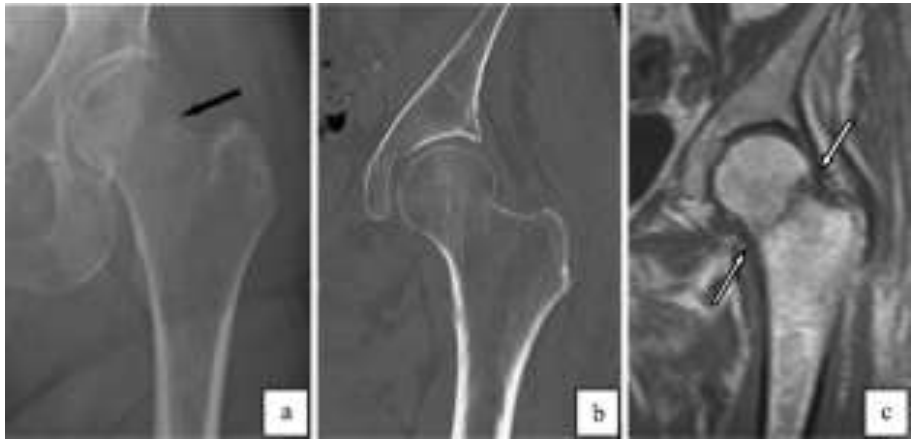
Diagnosis:

CT-scan

- Useful in assessing displacement
  - May determine type of fixation
- +/- for occult fractures

MRI

- **Gold Standard** For evaluation of occult femoral neck fx
  - Consider MRI in an elderly patient who is persistently unable to weight bear
- 100% sensitive and specific
  - May reduce cost by shortening time to diagnosis

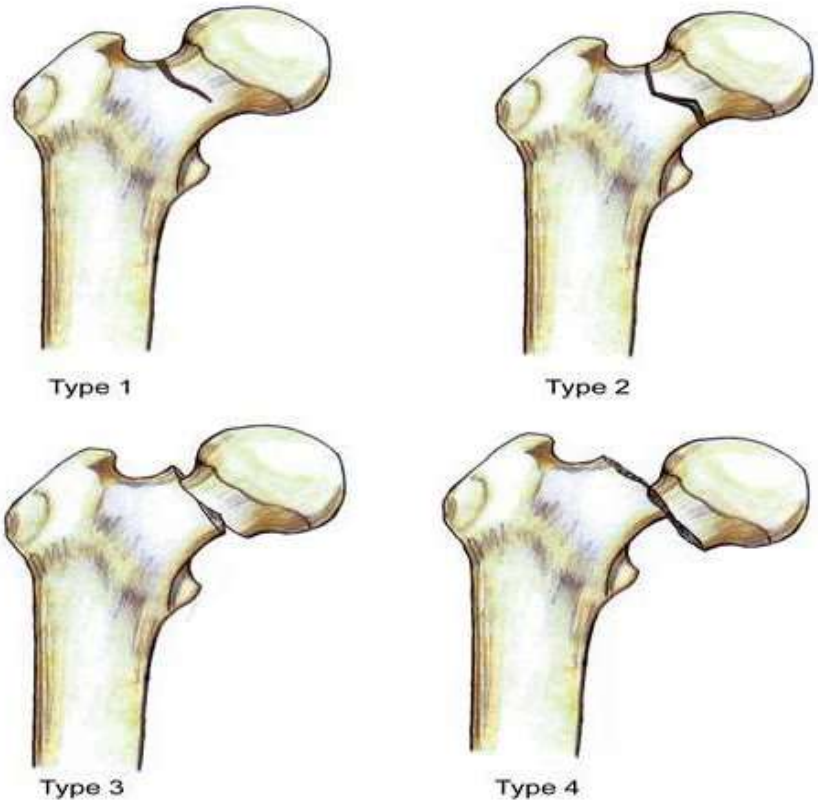


MRI

- Isolated GT Fractures?
  - "Isolated" GT fractures on XR and CT should be investigated further to identify occult IT extension
  - Kim et al (2010) performed MRI on 20 GT fx confirmed on XR
    - 8 complete extension of IT region, 11 >50% of IT involved
    - 100% showed IT extension, 95% stabilized with 2-hole Slinding hip screw

Classification

- Garden: degree of displacement of fx fragments
  - Grade I: incomplete or valgus impacted
  - Grade II: complete, nondisplaced
  - Grade III: complete, partially displaced
  - Grade IV: complete, completely displaced



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Treatment Goals: Geriatric Patients

- Mobilize
  - Weight bearing as tolerated
  - Minimize period of bedrest
- Minimize surgical morbidity
  - Safest operation
  - Decrease chance of reoperation

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Non-Operative

- Non-ambulatory
- Terminal stages of life (Hospice)
- Nondisplaced- but incidence of future displacement is 15-30%
- Compression-related stress fxs
- Close FU and restricted WB required

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Timing of Surgery

- As soon after injury as possible- 24 to 48 hours after admission
  - Essential all comorbid conditions evaluated & treated prior
- Surgical delay beyond 48-72 hours increases the risk of 1-year mortality
- Danford et al (JOT 2021)
  - 27,085 patients; surgery >48 hrs significantly increased risk for mortality, ARDS, MI, PNA, severe sepsis, ICU admission
- Sexson et al (JOT, 1988)
  - Surgery on medically unstable pts significantly increases mortality risk
  - Early surgery was detrimental to med. unstable elderly hip fx pts.

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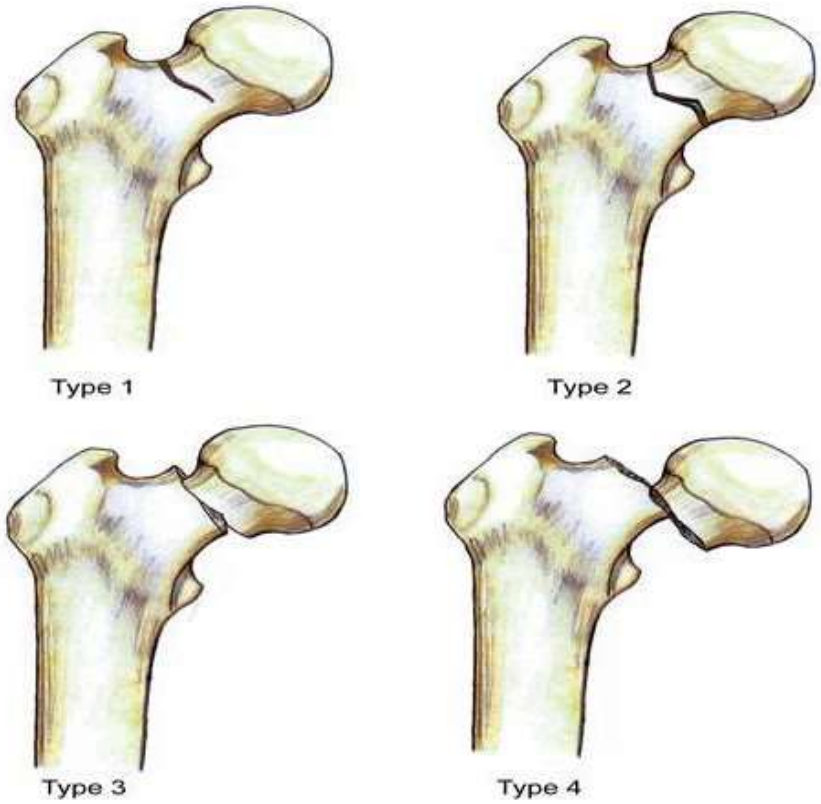
Surgical Treatment

- Depends on Fracture pattern
  - Garden I + II – fixation
  - Garden III + IV – Arthroplasty



Surgical Treatment

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- Non-displaced fractures: Garden I + II
  - Percutaneous fixation

Surgical Treatment

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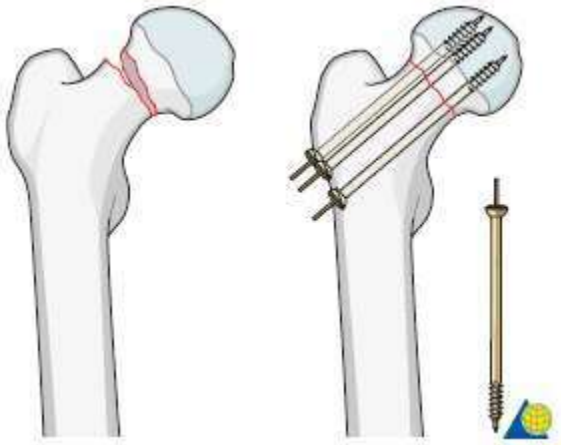
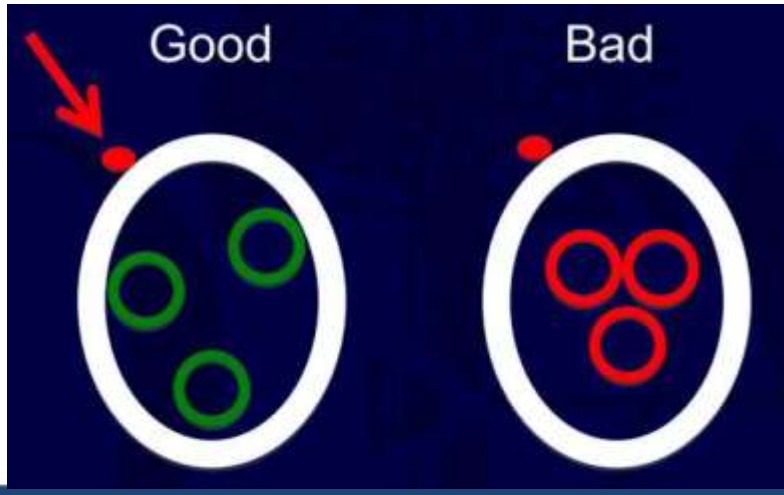
- Percutaneous Fixation (CRPP)
  - 3 partially threaded compression screws
  - Start at/above level of LT on lateral cortex
    - Minimize risk of stress riser-ST fx
  - Place screws in periphery of femoral neck to gain support of residual cortical bone
  - Aim for subchondral bone-within 5mm of the articular surface





Surgical Treatment

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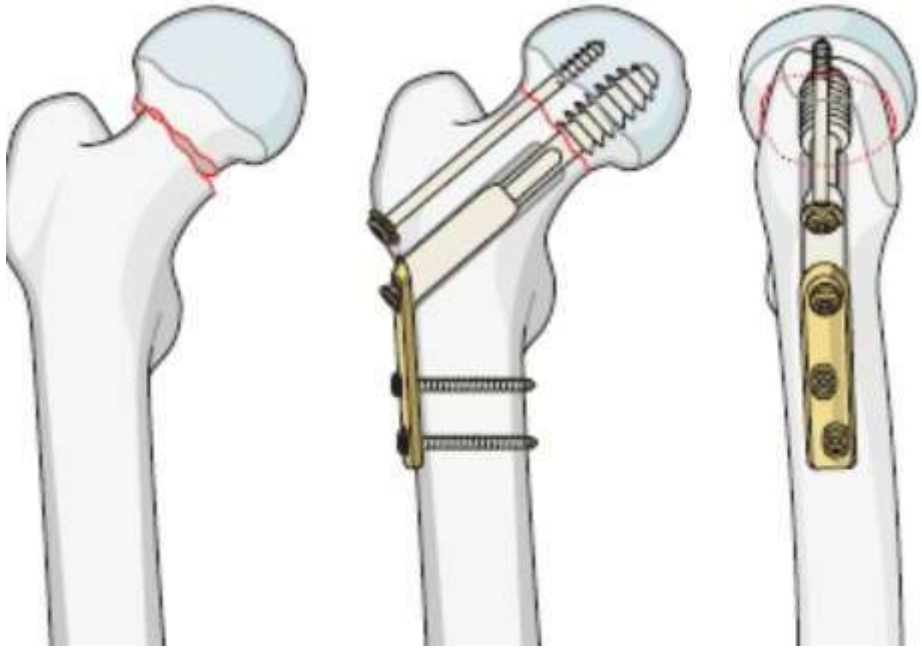
- Sliding hip screw
  - May help with comminution
  - Basicervical fracture patterns
  - Accessory screw for de- rotation



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Surgical Treatment

- Displaced fractures: Garden III + IV
  - Hemiarthroplasty – low demand
  - Total Hip Arthroplasty – high demand

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Surgical Treatment

- Hemiarthroplasty
  - Advantages over ORIF
    - Faster FWB
    - Eliminates risk of nonunion, AVN, and fixation failure
  - Disadvantages
    - More extensive procedure
    - Risk of acetabular erosion
    - Risk of dislocation

Surgical Treatment

- Hemiarthroplasty – Cement?
  - Cemented (PMMA)
    - Improved mobility, function, walking aids
    - Most studies show no difference in morbidity / mortality
      - Sudden Intra-op cardiac death risk slightly increased
  - Non-cemented (Press fit)
    - Pain / Loosening higher
    - Intra-op or periop fracture risk higher
    - Slightly shorter operative time

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Surgical Treatment

- Total Hip Arthroplasty
  - Indications
    - Arthritic, symptomatic joint
    - Active elderly individual with Garden III & IV
  - Eliminates risk for acetabular erosion but more extensive procedure, inc. cost and higher risk of dislocation

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ORIGINAL ARTICLE

Tranexamic Acid Safely Reduced Blood Loss in Hemi- and Total Hip Arthroplasty for Acute Femoral Neck Fracture: A Randomized Clinical Trial

Watts, Chad D. MD; Houdek, Matthew T. MD; Sems, S. Andrew MD; Cross, William W. MD; Pagnano, Mark W. MD

Author Information

Journal of Orthopaedic Trauma 31(7):p 345-351, July 2017. | **DOI:** 10.1097/BOT.0000000000000837

- TXA in Arthroplasty for FNF surgery
  - Decreased calculated blood loss, overall amount of transfusion and rate of transfusion
  - No increase in adverse clotting events at 30 and 90-days

ORIGINAL ARTICLE

Comparison Between the Direct Anterior and Posterior Approaches for Total Hip Arthroplasty Performed for Femoral Neck Fracture

Cichos, Kyle H. BS[a]; Mabry, Scott E. MD[a]; Spitler, Clay A. MD[a]; McGwin, Gerald Jr PhD[b]; Quade, Jonathan H. MD[a]; Ghanem, Elie S. MD[a]

Author Information

Journal of Orthopaedic Trauma 35(1):p 41-48, January 2021. | *DOI:* 10.1097/BOT.0000000000001883

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- Surgical approach for THA in FNFs
  - 143 THAs performed at Leve 1 trauma center, 70% Posterior and 30% DAA
  - No significant difference in-hospital, 90-day follow up in regards to dislocation, PJI, fracture, mechanical complications or revisions
  - At 1 year mortality was significantly lower (0% vs 11.1%, *P=0.018*)

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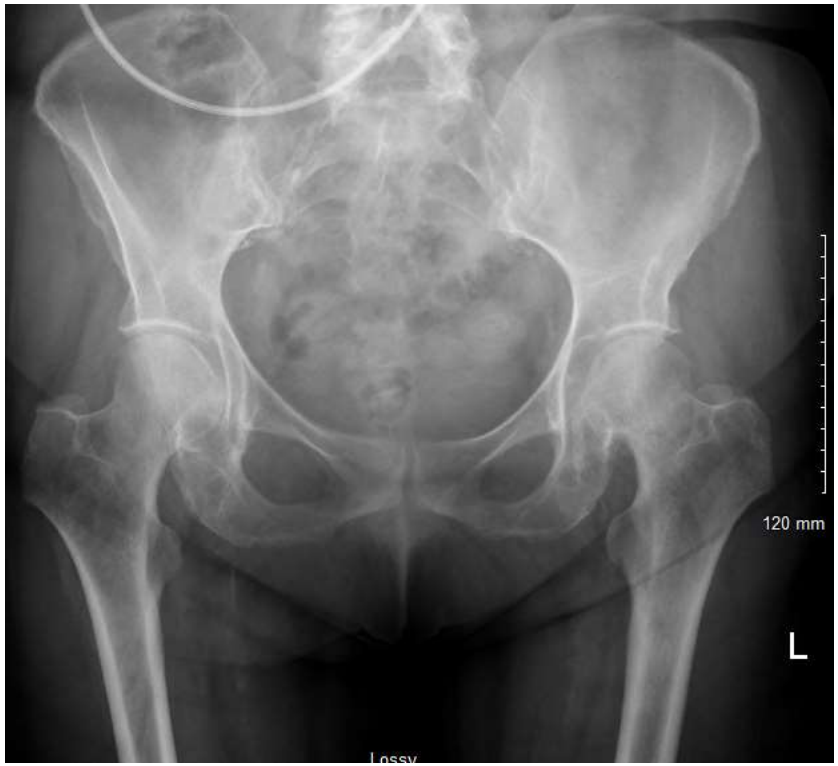
- 74 yo F active fall at work (waitress), denies sig PMH. Ambulates w/o assistive device. NVI. +tobacco use, 0.5 PPD x ~40 years



- 74 yo F active fall at work (waitress), denies sig PMH. Ambulates w/o assistive device. NVI. +tobacco use, 0.5 PPD x ~40 years
- Treatment Options:
  - Non-op
  - CRPP
  - Hemiarthroplasty
  - THA

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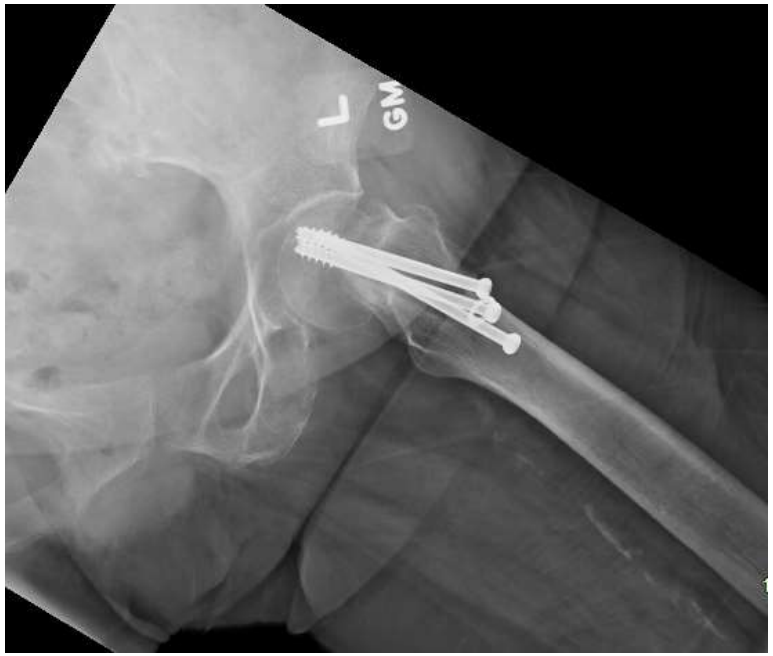
- 74 yo F active fall at work (waitress), denies sig PMH. Ambulates w/o assistive device. NVI. +tobacco use, 0.5 PPD x ~40 years

  -2 weeks post op

- 74 yo F active fall at work (waitress), denies sig PMH. Ambulates w/o assistive device. NVI. +tobacco use, 0.5 PPD x ~40 years

  -1 year post op

  -ongoing pain, shoe lift, unable to return to work, quit smoking 6 weeks prior to my consultation



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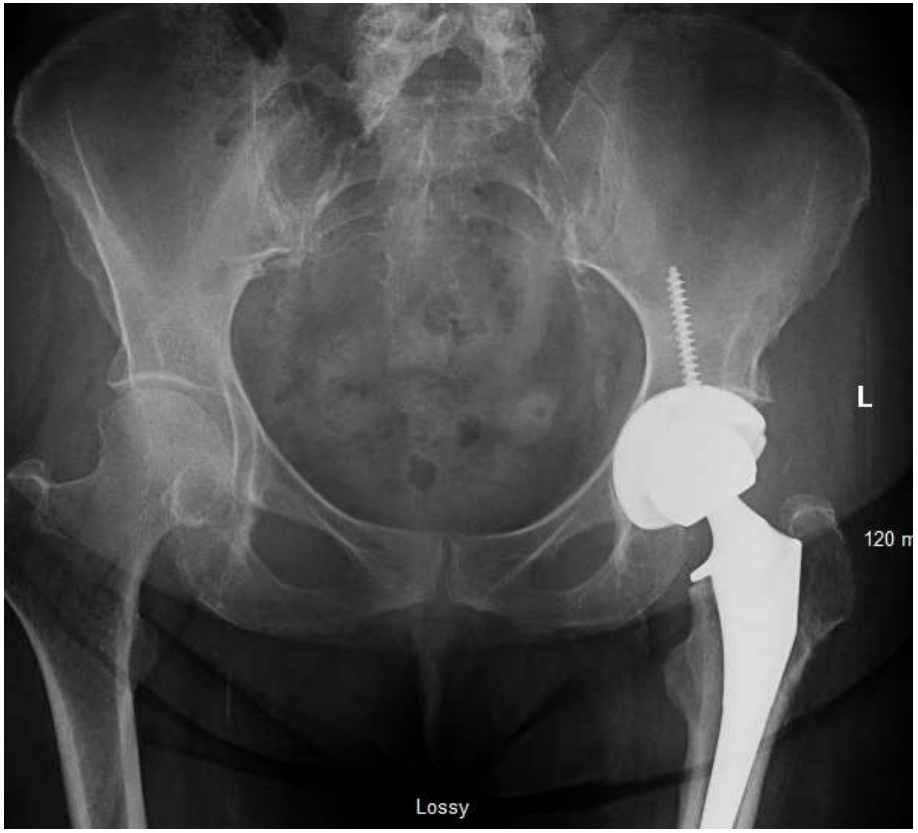
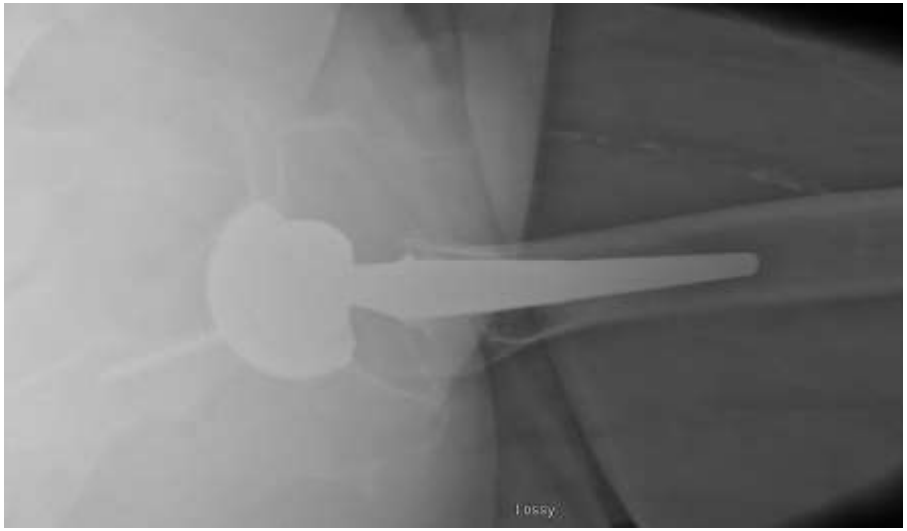
- 74 yo F active fall at work (waitress), denies sig PMH. Ambulates w/o assistive device. NVI. +tobacco use, 0.5 PPD x ~40 years, 1 yr post op AVN, Fem Neck Nonunion

  -DA THA, ROH from small lateral accessory incision





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Questions?