PERIPROSTHETIC FRACTURES FOLLOWING TOTAL HIP ARTHROPLASTY

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Intra-Op Incidence of Periprosthetic Hip Fractures

- Rare in primary THR
  - <1%
- More common in Revision THR
  - 4%

Etiology of Periprosthetic Hip Fractures

- Trauma
  - Usually trivial incident
  - Low energy type injury
- Osteoporosis
- Stress risers in bone
Bone Stress Risers Associated With Periprosthetic Fractures

- Osteolysis/corticolysis
- Previous bone window
- Prior Perforation(s)/screw holes
- Congenital bowing
- Prior osteotomy or fractures

Classification System for Periprosthetic Hip Fractures

- Efficient & simple
- Ease of application
- Addresses fracture patterns
- System incorporates prosthesis

Periprosthetic Fracture Classification Systems

VANCOUVER system

Garbuz DS, Masri BA, Duncan CP: Fractures of the femur following total joint arthroplasty, in Steinberg ME, Garino JP, eds: Revision Total Hip Arthroplasty. Philadelphia, PA, Lippincott Williams & Wilkins, 1999, p 497.)
Proximal femoral fractures following total hip arthroplasty.

J S Bethea, J R DeAndrade, L L Fleming, S D Lindenbaum, R B Welch

### Bethea System


Type A fractures at stem tip. Type B fracture spiral around stem. Type C: fracture comminuted.

#### Type A
- Tip and below

#### Type B
- Around Component
  - Spiral
  - Oblique
Type C
• Proximal to tip
• Commination around stem

Radiographic Evaluation of The Periprosthetic Fracture
• Quality radiographs required
• Apply FX classification
• Expect COMMINUTION
• Type of Implant
  – Cemented vs. cementless
• Stem well fixed or loose
• Dorr Bone type: A, B, C
• Osteolysis/Corticolysis

Treatment Options for Periprosthetic Hip Fractures
• Closed reduction & casting
• Traction
• ORIF
• Revision
• Combinations
ORIF for Periprosthetic Hip Fractures

- Consider for all FX variants
- Best option in well fixed implants
- Immediate ambulation post-op
- Insures stable bone envelope for:
  - Later staged revision
  - May preclude further hip surgeries

ORIF Options for Periprosthetic Hip Fractures

- Cerclage Wire
- Cables
- Cable / plate
- Cables/plate/bone combinations
  - Cancellous slurry
  - Bulk allograft struts

Revision THA for Periprosthetic Hip Fractures

- Potential for added complexities
- Suitable for loose THA
- Associated w/ increased blood loss, OR time & co-morbidities
- **AVOID** removal of well fixed implant
**Revision** for Periprosthetic Hip Fractures

- Remove loose cement &/or lytic debris
- Revise to Revision stem or Megaprosthesis
- Bypass FX site (2.5 cortical diameters)
- Obtain stable fixation
- Cable cerclage required

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**Recommendations for Treatment of Periprosthetic Hip Fractures**

- ORIF can be the best option of treatment
- Best treatment in community setting
- More suitable in emergent/urgent setting
- Best option for limited O.R. resources

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**Advantages of ORIF for Periprosthetic Hip Fractures**

- ORIF restores femoral envelope
- Allows for later elective rev THR
- ORIF more predictable result
- Decreased cost outlay vs. revision
Surgical Technique for Periprosthetic Hip Fractures

- Lateral position for surgery
- Hardinge approach for exposure
- Lift up vastus lateralis from linea aspera
- Exposure from distal to proximal

Avoid circumferential stripping

Remove osteolytic debris

Reduce FX:
  - Direct or indirect reduction

Apply selected FX fixation construct

Selection of FX Treatment:

**Cable Only Fixation**

- Calcar type FX
- Type B Bethea (?)
- Highly Stable Fracture w/ long stem component
- Non-osteoporotic/Non-osteolytic bone
- Avoid in nonunion/malunion
Selection of FX Treatment: Cable/Plate Fixation

- Unstable Bethea B & C FXs
- Required construct for:
  - Osteolytic bone
  - Nonunion/malunion
  - Unstable fractures
  - Osteoporotic bone

Selection of FX Treatment: 90/90 (Cable, Plate, Bone Strut) Fixation

- Type A & C fractures
- Fracture Plate on lateral femoral surface
- Strut on anterior femoral surface
  - Strut contoured to fit femoral shaft
- Avoid 360 degree bone striping

Selection of FX Treatment: 90/90 Fixation

- Bethea Type A
  - Narrow cortical diameter
  - Increased stress/loading at FX site
  - Requires compression of fracture
  - Unstable FX type
Selection of FX Treatment:
90/90 Fixation

- Bethea Type C
  - Complex comminution
  - Unstable FX
- Nonunion/Malunion
  - Eliminate infection as etiology

Bone Graft in Fracture Treatment

- Effective for: *Comminuted/Osteolytic Bone*
- *Allograft bone struts*
  - Tibial struts
  - Alternative graft
    - DBM
    - Autograft

Case Example: Type C (Comminuted ) Periprosthetic Fracture
Periprosthetic hip fracture

Case Example: Extensile Approach to Femur

Proximal femur
Distal femur
Vastus lateralis
Case # 2

- 57 year old male from LA
- Lower Alabama
- Hx of long standing left hip pain
- Patient presents with acute pain and deformity to ER

- Added Hx: Disabled, toothless and tongue tied
If you're a Revision surgeon... That's what you do!
Clinical Case

Keys to surgery:
- Preserve host bone
- Secure the cup
- Acetabular cage & cemented
- Extended liner for limb length
Conclusions and Recommendations

- Increasing incidence in the aging population
- Requires consideration for the patients poor health, physiology and ambulatory status

Conclusions and Recommendations

- ORIF best may be best choice!!!
- Utilize longer vs. shorter plates
- Distribute fixation over the length of the plate
- The Synthes Hook Plate is your friend
- You can always bale to a Megaprosthesis

Now go out there and kick some ASS!