Periprosthetic fractures

- Increasing incidence due to increasing number of joint replacements
  - Below THA (reported incidence 0.1%-18%)
    - 1.5% for primary THA
    - 4% for revision THA
  - Above TKA
    - 0.3-2.5%

Risk factors -- MECHANICAL
- Implant loosening
- Osteolysis
- Femoral notching (above TKA)

Risk factors -- PATIENT
- Rheumatoid arthritis
- Chronic steroid use
- Neurological diseases/disorders
- Osteoporosis/osteopenia
- Female gender
- Increasing age

Classifications

- Below THA
  - Vancouver Classification
- Above TKA
  - Rorabeck Classification

Vancouver Classification

- A, B or C
- Based on:
  - location of fracture relative to prosthesis
  - stability of prosthesis

Vancouver Classification

- A Around greater or lesser trochanter (A_o or A_l)
Vancouver Classification

• B
  - Around or just distal to prosthesis
    1: Prosthesis stable
      • Most common
    2: Prosthesis unstable
    3: Inadequate bone stock

B1 B2 B3

• C
  - Below prosthesis

Rorabeck Classification

• Fracture displacement
• Implant stability
  – Type I
    • Fx nondisplaced, prosthesis intact
  – Type II
    • Fx displaced, prosthesis intact

Treatment principles

• Treatment goals
  – Prosthesis stability and fracture union
• Treatment depends on
  – Fracture location
  – Prosthetic stability
  – Bone stock
  – Patient age and medical condition

• Principles
  – Revision of loose components
  – Accurate fracture reduction
  – Stable fixation
Treatment of periprosthetic fractures: THA

• Options
  – Nonoperative
    • Limited weightbearing
  – Brace
  – Operative
    • ORIF (plate and screws, cables &/or strut allograft)
    • Revision THA + ORIF

Type A

• Around greater or lesser trochanter

• Prosthesis is stable
  – Nonop if fx nondisplaced
  – Cable grip/cable plate for GT
  – Cerclage wires

Type B1

• Around or just below the stem tip
  – Prosthesis well-fixed

• Options
  – Wires or cables
  – Plate and screws &/or cables
  – Cortical onlay allograft
  – Combination

Type B1

• Options
  – Plates alone
    • This is a fracture...treat it like a fracture!
    • Plates alone equivalent to
      – struts with cerclage wire alone
      – struts, cerclage wire and plates

Type B1

• Technique
  – Adequate bicortical distal fixation
  – Cerclage wires /screws proximally
  – Longer plates

Type B2

Prosthesis unstable/loose

• Revision arthroplasty + ORIF
• Choice of implant
  – Uncemented prosthesis:
    • Extensive coated long stem curved prosthesis
    • Fluted long stem prosthesis
    • Proximal fit
    – Cemented prosthesis
Type B3

- **Prosthesis loose/poor bone stock**
- Options:
  - Proximal femoral reconstruction
  - Composite allograft
  - Proximal femoral replacement
  - Age of patient
  - Severity of bone defect
  - Functional class of patient

Vancouver C

- Treat the fracture

Treatment of periprosthetic fractures: TKA

- Options
  - Nonoperative
    - Limited weightbearing
    - Brace, cast
  - Operative
    - Retrograde intramedullary nail
    - ORIF with fixed angled device
    - Blade plate
    - DCS
    - Locking plates
    - Revision TKA – Rorabeck Type III

Retrograde nail

- May not get adequate distal purchase if:
  - Very short distal segment
  - Significant distal comminution

Retrograde nail

- Disadvantages
  - Requires open box
  - Nail diameter limited by type of prosthesis
  - Nail trajectory limited by prosthesis
  - Nail length limited if THA also present
Plate and screws

- ORIF
  - Fixed angled device
    - Blade plate
    - DCS
    - Locking plates

Plate and screws

- Locking plates vs. retrograde nail
  - Similar biomechanical properties with simple fracture patterns
  - Locking plate
    - Decreased torsional stability
    - Decreased stability to varus loading
    - Increased stability to valgus loading

Locking plates

- More suitable for very short distal segments
- Attempt to obtain adequate reduction prior to plate placement/fixation
- Supplements to screws
  - Bone graft substitutes (calcium sulfate/phosphate)
  - PMMA

Rorabeck Type III

- Options
  - Revision TKA
  - DFR

“Periprosthetic”

- Does not just have to mean joint replacement
- Does not have to refer only to femur

Equivalent to Vancouver B1
Conclusion

- Treatment goals after periprosthetic fracture
  - Prosthesis stability and fracture union
- Treatment depends on
  - Fracture location
  - Prosthetic stability
  - Bone stock
  - Patient age and medical condition

Thank You