Periarticular Osteotomies for Fracture Malunion

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Distal Femoral Osteotomy
Proximal Tibial Osteotomy

Indications
- Post traumatic deformity with compartment overload and pain
- Diaphyseal malunion
  - Shaft osteotomy and IM fixation
- Periarticular malunion
  - DFO or HTO close to the joint

Complications
- Late
  - Infection
  - Nonunion
  - Malunion
    - Knee stiffness
    - Posttraumatic Osteoarthritis

Complications of Fractures

Early
- Infection (<1% in closed, approaches 20% in open)
- Malreduction
- Fixation failure
  - Poor bone stock
  - Lack of patient compliance post-operatively
  - Poor surgical plan or poor execution of surgical plan

Diaphyseal
- Malunion
  - Delayed union
  - Revision with IM rod
Malalignment: malunion

- Correct alignment is the most important component of lower extremity reconstruction
- Stiff / arthrofibrotic knee will compromise outcome

Approach to Malunion

- “There is nothing that can’t be made worse by surgery”
  - Hughston

36 yo M, medial condyle defect, post fracture, varus alignment, ROM 20-40 deg, thigh atrophy

Need to align the knee

But need motion

Plan:
- Open medial condyle allograft
- HTO
- Distraction arthroplasty with hinged fixator

36 yo M, distal fem #, quadricepsplasty, hardware removed
• Fixator allows motion
• Relaxes soft tissues, improves motion
Malunion: approach

1. **Need a quiet knee if possible**
   - May need to wait despite stiffness

2. **ROM**
   - Need adequate motion
   - If knee is stiff need to obtain motion first

3. **Need stable fixation to allow early rehab**

Pre operative evaluation

**Routine X-rays**
- Long leg views
- Standing AP
- Standing tunnel
- Lateral
- Infrapatellar

Distal Femoral Osteotomy

- **Pre operative Planning**
  - Standing tunnel view for diagnosis
  - Standing radiographs hips to ankles for alignment

  **Aim**: shift mechanical axis to medial tibial spine

Technique

Distal Femoral Osteotomy

- **Primary choice**: Medial closing wedge

  **Indications:**
  - Large corrections
  - Moderate to severe OA
  - Smokers, obese, large corrections
Medial closing DFO

Medial CW DFO: Technique

14 yo M  
distal femoral physeal plate injury

Medial closing wedge AO plate

Lateral opening wedge
26 yo m lat condyle #; lateral meniscectomy

Meniscal transplant+ hto Tibial osteotomy for small corrections

Mr SM 4 yr FU post hardware removal

30 yo M, distal fem #

Femoral corrective osteotomy

- Post operative care
  - In hospital pain control; CPM
  - Hinged post op brace
  - ROM 0-90 degrees
  - Touch weight bearing (<25%) for 10-12 weeks
Tibial osteotomy

- For varus deformity
- Uniaxial, mild to moderate correction
  - Acute correction and plating
- Multiaxial deformity, large correction
  - External fixation, slow correction

**Case 1:** 18 f growth plate injury, hyperextension varus

**Case 1:** Flexion osteotomy to correct slope, anterior opening wedge tibial tubercle osteotomy

**Case 2:** 50 yo malunited HTO

**Case 2:** 50 yo malunited HTO revision OWO to correct slope and valgus; TTO

**Case 3** severe deformity
Case 4 severe deformity
Spatial frame to allow multiaxial correction

Summary
- Need to assess alignment in coronal, sagittal and rotational plane
- Need a good knee with good ROM for success post osteotomy
- Acute correction for mild to moderate deformity
- Ex fix (spatial frame) for severe deformity

Thank you