Proximal Humeral Fractures
ORIF with Locking Plates

Trauma 101
2016
John D Wyrick MD
University of Cincinnati

Disclosures
- Consultant with Stryker
- Educational stipend Smith Nephew

Indications
- Younger patients
- Good bone stock
- Healthy rotator cuff
- Multiple trauma
- Caution in pts >70, studies tending to recommend RTSA better than hemi
Classification

- Codman originally described the 4 parts in 1934

Classification

- Codman originally described the 4 parts in 1934

Classification

- Neer 1970 JBJS
  - Widely used standard
  - Provides treatment guidelines
  - 4 parts
  - >1cm or 45 deg
Classification

- Varus angulation
  - Original angulation or reduction
  - Associated with higher risk of failure in recent literature on ORIF
  - Not accounted for in Neer classification

Fracture Patterns

- 3 and 4 part fxs
- Fx - dislocations
  - Tuberosity fxs
  - Proximal fx with shaft extension

3-Part Fractures

- Usually fracture through surgical neck and greater tuberosity
- CT useful for surgical planning
3 and 4-Part Fractures

- Historical treatment recommendations
  - ORIF in young
  - Elderly, hemiarthroplasty
  - We need to learn to fix in the young population

Valgus Impacted 3 & 4-Part

- Not to be confused with valgus impacted surgical neck
- Reduced AVN rate
  - 4 part 21 to 75%
  - Valgus impacted 8 to 26%
- More common than previously recognized

Valgus Impacted 3 & 4-Part

- Treatment
  - Court-Brown JBJS 02 most managed nonop
  - Most can be anatomically reduced and fixed
  - Some amenable to min invasive techniques
  - CT useful
Valgus Impacted 3 & 4-Part

- Treatment
  - Court-Brown JBJS B 02 most managed nonop
  - Most can be anatomically reduced and fixed
  - Some amenable to minimally invasive techniques
  - CT useful

Valgus Impacted 4 part

Plating Technique

- Beach chair position
  - Mini C-arm
Plating Technique
- Beach chair position
  - Mini C-arm
  - Deltopectoral approach
- Tag the tuberosities
- Provisional fixation
Plating Technique
- Beach chair position
- Deltopectoral approach
- Tag the tuberosities
- Provisional fixation
- Definitive fixation

Recent Studies on ORIF with Locking Proximal Humerus Plate
- Thenasus et al, JSES 2009
  - Review of 12 studies, no comparisons
  - Included 2.3 & 4 part fxs
  - Constant score avg 74.3
  - AVN 7.9% overall, 14.5% in 4 part fxs
  - Reoperation 14%
  - Screw cutout 12%
  - Nonunion 1.6%

Recent Studies on ORIF with Locking Proximal Humerus Plate
- Solberg et al, JBJS 2009, Compared 3 and 4 part fxs treated with ORIF vs hemiarthroplasty
  - Nonrandomized, pts > 55y/o
  - ORIF 38 pts, Hemi 48 pts
  - Constant scores
    - ORIF 69, 3 part=72, 4 part=65
    - Hemi 61, 3 part=60, 4 part=60
  - ORIF outcomes dependent on initial fx displacement, poorer for varus fxs
Recent Studies

- PROFHER study, JAMA 2015
- PRS, PH fxs to nonop vs op (ORIF or hemi)
- 270 pts, no diff in outcomes
- Much higher costs in op
- Higher complication rate
- No diff in revision rate

3 & 4 Part Fx - Dislocations

- Very challenging
- Some of the most difficult surgeries
- CTs on most all
- Not middle of the night cases
Segmental Neck-Shaft Fractures

Segmental Humeral Fractures

Segmental Humeral Fractures
Segmental Humeral Fractures

Locking Proximal Humeral Plate Complications
- Primary screw penetration 15%
- Secondary 8%
- Screw loosening
- Check screw position fluoroscopically in OR

Locking Proximal Humeral Plate Complications
- Loss of fixation up to 13%
- Associated with
  - Initial varus angulation > 60°
  - Varus malreduction > 20°
  - Lack of screws in inferior head
Locking Proximal Humeral Plate Complications

- AVN
- Much lower than originally stated
- Overall around 8%
- 3 & 4 part fxs 15-18%

Summary

- High energy, fx-dislocations common in young
- Appropriate imaging
- Stable fixation with locking implants
- Be aware of complications, failed fixation, screw penetration
- Good luck!

Bibliography

4. Sudkamp, N et al, Open reduction and internal fixation of proximal humeral fractures with use of the locking proximal humerus plate. JBJS 2009, 91:1320
Bibliography

7. Solberg, B et al, Locked plating of 3- and 4-part proximal humerus fractures in older patients: The effect of initial fracture pattern on outcome. JOT 2009, 23:113