Olecranon Fractures

Trauma 101
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Kyle J. Jeray
Professor
University of South Carolina
Greenville, South Carolina
I have no potential conflicts with this presentation

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Mechanism of Injury

- **Acute Tension overload**: Tension applied by the triceps with flexion of the elbow.
- **Direct Trauma**
- **Chronic overload**: stress fracture, osteopenia, pediatric injuries.
Evaluation

- Check integrity of skin
- Check extension of elbow
- Evaluate neurovascular status, especially ulnar nerve
- X-rays in three views (AP, Lateral, Oblique: shows radial head in profile)
Imaging

- AP View
- Lateral View
- Oblique View
  (sometimes helpful, good for Radial Head)
# Classification

## Numerous classifications:
- Colton
- Morrey
- Schatzker
- AO/ASIF
- OTA

## Criteria
- Displacement
- Direction of fracture
- Degree of comminution
- Percent involvement
- Associated injuries
Mayo Clinic Classification

• Type I: Nondisplaced 12%
• Type II: Displaced/ elbow stable 82%
• Type III: Elbow unstable 6%
• Both types II and III subdivided into:
  – A: noncomminuted
  – B: comminuted

Morrey BF, JBJS 77A: 718-21, 1995
Treatment Objectives

- Restoration of the articular surface.
- Restoration and preservation of the elbow extensor mechanism.
- Restoration of elbow motion and prevention of stiffness
  - Goal is to begin early ROM
- Prevention of complications.
Treatment Methods

- **Nonoperative**
  - Renewed interest (especially elderly)
  - Non-displaced with intact elbow extension

- **Operative**
  - Open reduction and internal fixation
    - Tension band wire with pins or intramedullary screws
    - Plate
  - Excision of olecranon and triceps repair
    - Comminuted, unreconstructable fractures
    - Elderly patients
Nonoperative Treatment

• Nondisplaced fractures (age dependent!)

• Long arm cast - complicated by stiffness

• Long-arm splint for 7-10 days followed by functional bracing for 4-6 weeks
  • complicated by loss of reduction
  • Goal to start motion! Less about displacement!
Indications for Surgery

- Disruption of extensor mechanism
  - Unable to actively extend elbow
- Articular incongruity
  - Any displaced fracture
Patient Positioning – Which One?

- Supine
- Prone
- Lateral
Supine With Imaging
Prone Position
Approaches to Elbow: Patient Position

Prone Positioning

Note flexion may be limited here versus lateral
Olecranon Excision

- Elderly patients
  - those with osteoporosis
  - involving <50% of joint
- Re-attach triceps anteriorly
  - At joint surface
- No difference in isometric strength but fewer complications in the excision group

Gartsman et al, JBJS 63A:718, 1981
ORIF: Surgical Technique

- Evaluate comminution of **dorsal cortex**
  - If intact: tension band wire appropriate
  - If comminuted, plate appropriate
- Evaluate **orientation of fracture line**
  - Transverse: tension band wire
  - Oblique, complex → plate
*Tension band: prerequisites for use:

Fractured bone must be eccentrically loaded

Implant must be on tension side

Bone must be able to withstand the compressive forces (comminution bad)

Far cortex must be intact
The tension band converts the distracting force into a compressive force.
Tension Band Wire

Reduce fracture
- hold with tenaculum

Place K-wires across fracture
- engage anterior cortex

Pass Tension wire deep to tendon with angiocath – two knots over dorsal cortex

From Hak and Golladay, JAAOS, 8:266-75, 2000
Olecranon fractures: pearls for tension band use

Pull and twist to properly coil and tension

Drill hole for tension band bicortical

Less likely to fracture out

Tension band as close to bone tendon interface as possible, under triceps
Simple Olecranon fractures

- Tension band applied around a large fragment screw

****Tension band wire as close to bone tendon interface as possible
Case Example - Transverse Fracture
Engage anterior cortex
Intramedullary Screw?

- Need to add tension band wire
- Long/large screw required
  - 6.5mm cancellous
  - 85-110 mm long

Beware of Mal-reduction!
Anatomy of the Proximal Ulna

- Beware of the bow of the proximal ulna, which may cause a medial shift of the tip of the olecranon if a long screw is used.

*From Hak and Golladay, JAAOS, 8:266-75, 2000*
Complex Olecranon fractures

Some examples and solutions....
Conversion of a complex pattern into a simple pattern – then tension band
Joint depression: elevate, graft, and mini fixation prior to tension band
Plate Fixation

- Use for comminuted fractures, fractures with shaft extension, or oblique fracture line:
  - DCP
  - Plates designed for proximal Ulna
  - Screw placement crucial for stability
Tension side comminuted: use of a plate to maintain reduction, resisting tension by restoring an intact tension side “cortex”
Complex Olecranon Fracture

As fracture becomes more distal and oblique - more amenable to plate fixation
Plate Fixation
Locking plate fixation may also be used
Olecranon Fractures

- Peri-plate locking?
- What is the problem with this fixation?
Summary of goals

- Restore articular congruity
- Achieve absolute stability
- Allow early motion
Summary of treatment

• Convert complex patterns to simple patterns whenever possible

• Excision and tendon repair for unreconstructable fragments

• Elderly low demand closed tx with early motion
Thank you