Hand to Shoulder Center

Shoulder/ Humerus Fractures
Let’s recall anatomy!
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PHF: Epidemiology

- Majority of patients older
  - Osteoporotic fracture
  - Low energy
  - Younger patient is high energy
- 2:1 female to male
- 4% of all fractures in adults
  - 85% of Fx’s one-part (non-displaced)
Neer classification

<table>
<thead>
<tr>
<th>Articular segment</th>
<th>Two part</th>
<th>Three part</th>
<th>Four part</th>
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</thead>
<tbody>
<tr>
<td>(anatomic neck)</td>
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<tr>
<td>Shaft segment</td>
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<tr>
<td>(surgical neck)</td>
<td></td>
<td>Unimpacted</td>
<td>Comminuted</td>
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<tr>
<td>Greater tuberosity segment</td>
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<tr>
<td>Lesser tuberosity segment</td>
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<tr>
<td>Fracture-dislocation</td>
<td>Anterior</td>
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<td></td>
<td>Posterior</td>
<td>Articular surface</td>
<td></td>
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</tbody>
</table>

"Impression"

"Head splitting"
• Codman: 4 distinct epiphyseal fragments
Codman EA. The shoulder; 1934.
Greater Tuberosity Fx

Posterior-superior displacement causes impingement
• Associated with RCT

*Traditional criteria for ORIF- 1 cm (Neer)*

• Deltoid split for small fragments
  – Limit to 5 cm distal
  – Axillary nerve

• Large fragments use deltopectoral approach

• Suture fixation reduces recurrence, better fixation, and avoids fragmentation

• Screws, Plating techniques may be needed
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Surgical Neck Fracture

Stable reduction impossible
Requires fixation

• Medial comminution
  – Varus malalignment
Prominent tuberosities
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3-Part Fractures

• Issues:
  – Malrotation
    • Version
  – Head-height relationship
    Varus or valgus
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3-part fracture
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Classic 4-Part Fx

ORIF?
• Young
• AVN
• Often Hemi
• ? Reverse
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Assessment: CT
Predicting humeral head ischemia

Hertel et al. *JSES*. 13. 2004

• Combination of 3: 97% predictive AVN
  — Length of medial calcar segment (< 8mm)
  — Loss of integrity of medial hinge

Anatomic neck fracture
Nerve Injury

- Frequency (electromyogram)
  - 67% (96/143) all comers
  - 82% (41/50) displaced fxs
  - 59% (55/93) non-displaced fxs

- All nerves recovered
- Nondisplaced fxs
  - Recovery of shoulder fxn took 2 mos longer

- Displaced fxs
  Difficult to know
• Displaced Fx’s
  – Distorted Anatomy
    • Not a “healing issue”
• Options:
  – ORIF
    • Perc Pinning
    • Locking Plate
  – Hemiarthroplasty
  – ? Reverse
  – Rod
Current Indications for Locking Plate

Fx Pattern
Displaced 2, 3 and 4-parts

- Varus Fx’s
- Valgus Impacted
  - Too late for pinning
- Osteoporotic Fxs
- Comminution
  Failed Nonop Tx
Beware of the Varus Fracture

- Calcar comminution
  - Deforming forces
  - Pinning not a good option
  - Higher Failure Rate!!
- Varus Collapse
- Screw Cutout

Requires Locking Plate
Fractures of the clavicle

**Mechanism of injury:**

Most (94%) clavicular injuries result from a direct blow on the point of the shoulder, generally from a fall on the side (A). Less commonly, force may be transmitted up the arm from a fall on the outstretched hand (B). Under the age of 30 road traffic and sporting injuries are the commonest causes.
Fractures of the clavicle (in children)

Greenstick fractures are common, particularly at the junction between the middle and outer thirds. Fractures may not be particularly obvious on the radiographs and it is often helpful in children to have both shoulders included for comparison.
Fractures of the clavicle

In the adult, undisplaced fractures are also common, and are comparatively stable injuries. Late slipping is rare. Symptoms settle rapidly and minimal treatment is required.
Fractures of the clavicle

With greater violence, there is separation of the bone ends. The proximal end, under the pull of sternomastoid, often becomes elevated (1). The shoulder loses the prop-like effect of the clavicle, so that it tends to sag downwards and forwards (2). Note (3) the glenoid, (4) the coracoid, (5) the acromion.
Fractures of the clavicle

**Figure-of-eight bandage:**

Pads of gamgee or cotton wool alone are carefully positioned round both shoulders (1). The patient, who should be sitting on a stool, is asked to brace back the shoulders; a wool roll bandage is then applied in a figure-of-eight fashion (2). For added security the layers may be lightly stitched together at the crossover (3).
Fractures of the clavicle

Operative treatment

Internal fixation of fractures of the clavicle in the acute situation may be considered in cases of so-called 'floating shoulder', where there is a fracture of the clavicle associated with a fracture of the proximal humerus or of the glenoid. Good fixation reduces pain, improves patient mobility, and may facilitate union at each site. New evidence suggests faster return to function but higher risk of nonunion.
Scapular fractures

- Fractures of the *scapular neck* lead to much bruising and swelling. Comminution is common. In spite of frequently daunting radiographs, a good outcome usually follows conservative management with early mobilisation.

- Fractures of the *scapular spine or coracoid* may usually be treated conservatively.
Fractures of the humeral shaft

- Consider internal fixation if there is a segmental fracture, two fractures in the same limb; multiple injuries, fractures of both arms, a significant head injury, pathological fracture, a radial nerve palsy in an open and otherwise suitable fracture, or after failed manipulation.

- The most reliable method is to use a plate (1) applied to the posterior surface with an interfragmental screw (2).

- Alternatively, an intramedullary nail with interlocking screws may be used.
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Better Education, Better care, Better Outcomes