Elbow Trauma: What is the Evidence?

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1 (and/or my co-authors) have something to disclose.

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A multicenter, prospective, randomized, controlled trial of open reduction—internal fixation versus total elbow arthroplasty for displaced intra-articular distal humeral fractures in elderly patients

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Treatment Allocation

21 TEA → 21 ORIF
   1 death
     20 TEA → 20 ORIF
        5
          25 TEA → 15 ORIF

Results

**TEA Group**
- 25 patients
- 2 male, 23 female
- Mean age 78 years

**ORIF Group**
- 15 patients
- 3 male, 12 female
- Mean age 77 years

Baseline demographics the same (i.e. activity, mechanism, # type etc.)
**Mayo Elbow Performance Score**

![Graph showing Mayo Elbow Performance Score over time.](image)

**Long term outcomes @ 9 yrs**

- 21 TEA: 1 death, 20 TEA, 25 TEA
- 21 ORIF: 1 death, 20 ORIF, 15 ORIF

- 6 lost to long-term f/u (1 revised)
- 11 died No revisions
- 8 alive No revisions

**Conclusions**

- Non-operative treatment an option for some (demented, sick, low-demand)

- TEA significantly improved surgeon outcomes in one specific group (C3 #, female, age 78 yrs)

- TEA effective salvage in 25% of cases not amenable to ORIF

- Longevity of the TEA is good – 1 / 25 revised at mean f/u of 9 years
What to do with the ulnar nerve?

- Transpose?
- Leave in situ?

Simple Decompression vs Anterior Transposition of the Ulnar Nerve for Distal Humerus Fractures Treated with Plate Fixation: A Multi Centre Randomized Controlled Trial

Research Design

- Multi-centre randomized controlled trial
- 8 centres, 58 patients recruited

- Patients randomized to:
  1. Simple decompression
  2. Decompression + Anterior transposition
Results

- 31 Randomized to simple decompression
- 27 Randomized to decompression + anterior transposition
- Mean age 52 years (17-79 years), 60% female
- Pre-operative hand numbness in 25%
- No difference between the two groups with regards to age, gender, BMI, smoking, diabetes, injury characteristics, pre-operative neurologic dysfunction, time to operation, length of operation, or surgical approach.

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Gabel & Amadio Ulnar Nerve Neuropathy Scores

No difference

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DASH Scores

No difference
Nerve Conduction Studies

<table>
<thead>
<tr>
<th>Nerve conduction test results</th>
<th>All Patients N=45</th>
<th>Decompression N=22</th>
<th>Transposition N=23</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abnormal results</td>
<td>28 (62%)</td>
<td>12 (55%)</td>
<td>16 (70%)</td>
<td>0.30</td>
</tr>
<tr>
<td>Minor abnormality</td>
<td>15 (33%)</td>
<td>6 (27%)</td>
<td>9 (39%)</td>
<td>0.40</td>
</tr>
<tr>
<td>Severe abnormality</td>
<td>12 (27%)</td>
<td>6 (27%)</td>
<td>6 (26%)</td>
<td>0.59</td>
</tr>
<tr>
<td>Sensory only</td>
<td>10 (22%)</td>
<td>3 (14%)</td>
<td>7 (30%)</td>
<td>0.17</td>
</tr>
<tr>
<td>Sensory + Motor</td>
<td>16 (36%)</td>
<td>8 (36%)</td>
<td>8 (35%)</td>
<td>0.11</td>
</tr>
</tbody>
</table>

No difference

Conclusions

• Majority of patients develop ulnar nerve symptoms post-surgery
• Significant improvement by 1-year post-injury in neurologic symptoms and functional outcomes
• No difference with regards to ulnar nerve symptoms, functional outcomes or complications for patients treated with either simple decompression or anterior transposition
• Either strategy for managing the ulnar nerve is acceptable, and can be used at the discretion of the treating surgeon

Non-operative treatment of olecranon fractures in elderly: It is possible!

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University of Edinburgh
Nonoperative Management of Displaced Olecranon Fractures in Low-Demand Elderly Patients

Background

The aim of this study was to document both the short and long-term outcomes following primary nonoperative management of displaced fractures of the olecranon.

Methods

Nonoperative treatment was performed in 132 patients, all of whom had been managed nonoperatively for a displaced olecranon fracture over a threemonth period. Inclusion criteria included isolated fractures of the olecranon with - Normal displacement of the anterior surface. The primary short-term outcome measure was the Disabilities of the Arm, Shoulder and Hand (DASH) score.

Results

There were 103 patients with a mean age of 7.5 years (range: 2 to 3 years) in our study cohort. A successful outcome was defined as having no loss of reduction at the last follow-up visit. The mean follow-up time was 36 months (range: 1 to 24 months). Failure was defined as loss of reduction with subsequent arthroplasty (n = 8), secondary arthroplasty (n = 1), or certified death (n = 1). The DASH score was 4.7 points (range: 2 to 48) in patients with successful outcomes and 4.7 points (range: 2 to 48) in patients with treatment failure. A total of 42 patients (42%) achieved a DASH score that was 4.7 (range: 2 to 48) at the last follow-up visit.

Conclusions

Nonoperative management is a satisfactory alternative and long-term outcomes following the nonoperative management of isolated displaced olecranon fractures in elderly low-demand patients.

Level of Evidence: Therapeutic Level IV; Few instructions for further a comprehensive description of levels of evidence.

Outcome of Olecranon Surgery in the Elderly

- Risks factors for a poor outcome following operative treatment:
  - Increasing age
  - Fracture morphology

- Complications
  - Loss of reduction up to 50%

Methods – Criteria

<table>
<thead>
<tr>
<th>Inclusion criteria</th>
<th>Exclusion criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Age ≥75 years</td>
<td>1. Patients unable to give informed consent</td>
</tr>
<tr>
<td>2. Displaced fracture of the olecranon</td>
<td>2. Associated fractures to the coronoid, radial head and/or distal humerus</td>
</tr>
<tr>
<td>3. Minimal, moderate or severe fragmentation of the olecranon</td>
<td>3. Associated ligamentous injury, dislocation or subluxation</td>
</tr>
<tr>
<td>4. Within two weeks of olecranon fracture</td>
<td>4. Open fractures</td>
</tr>
<tr>
<td></td>
<td>5. Patients unable to comply with follow-up</td>
</tr>
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</table>
Randomization

Results – Primary Outcome Measure

No significant difference at any time point
Results - Complications

- 13 complications in 10 patients
- Significantly higher rate in the operative arm

<table>
<thead>
<tr>
<th></th>
<th>Non-operation (n=7)</th>
<th>Operation (n=11)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total complications</td>
<td>1</td>
<td>9</td>
<td>0.013</td>
</tr>
<tr>
<td>Infection</td>
<td>1</td>
<td>1 (plate)</td>
<td>1.000</td>
</tr>
<tr>
<td>Loss of reduction</td>
<td>1</td>
<td>6 (all TBW)</td>
<td>0.151</td>
</tr>
<tr>
<td>Subsequent surgery</td>
<td>1</td>
<td>3</td>
<td>0.265</td>
</tr>
<tr>
<td>ROM</td>
<td>1</td>
<td>3 (2 plates, 1 TBAC)</td>
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<tr>
<td>Revision</td>
<td>4</td>
<td>0</td>
<td></td>
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</tbody>
</table>

Results - Radiographic

- 9 patients radiological union – (all operative group)
- 9 functional non-union – (7/7 non-op, 2/11 op)

Conclusions

- Non-operative management of isolated displaced olecranon fractures in lower demand elderly patients
  - Growing body of evidence
  - Lower cost and complication rate
  - Caveat is the subtle unstable injury

- Future studies: alternative fixation methods?