Re-Fracture Following Operative vs. Non-Operative Management of Adolescent Diaphyseal Clavicle Fractures

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Background

- **Peds/adolescent clavicle treatment:**
  - Pediatric orthopaedic surgeons follow adult orthopaedic surgery trends
  - Overall trend towards increasing fixation
  - Sparse evidence regarding outcomes, complications for younger population

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**A Survey of Physician Opinion**

*Adolescent Midshaft Clavicle Fracture Treatment Preferences Among POSNA Members*

*Patrick M. Carry, BA,* Ryan Koonce, MD,† Zhaoxing Pan, PhD,‡ and John D. Polousky, MD§*
Background

- Little information regarding refracture of clavicles, including in adult literature
  - Especially lacking in comparative assessments

![Table II Complications](image)

<table>
<thead>
<tr>
<th>Adverse Event</th>
<th>Operative Group (N = 62)</th>
<th>Nonoperative Group (N = 45)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nonunion</td>
<td>2*</td>
<td>7</td>
<td>0.042</td>
</tr>
<tr>
<td>Malunion requiring further treatment</td>
<td>0</td>
<td>9</td>
<td>0.001</td>
</tr>
<tr>
<td>Wound infection and/or dehiscence</td>
<td>3</td>
<td>0</td>
<td>0.253</td>
</tr>
<tr>
<td>Hardware irritation requiring removal</td>
<td>5</td>
<td>0</td>
<td>0.085</td>
</tr>
<tr>
<td>Complex regional pain syndrome</td>
<td>0</td>
<td>1</td>
<td>0.441</td>
</tr>
<tr>
<td>Surgery for impending open fracture</td>
<td>0</td>
<td>2</td>
<td>0.192</td>
</tr>
<tr>
<td>Transient brachial plexus symptoms</td>
<td>8</td>
<td>7</td>
<td>0.690</td>
</tr>
<tr>
<td>Abnormality of the acromioclavicular or sternoclavicular joint</td>
<td>2</td>
<td>3</td>
<td>0.653</td>
</tr>
<tr>
<td>Early mechanical failure</td>
<td>1</td>
<td></td>
<td>1.000</td>
</tr>
<tr>
<td>Other</td>
<td>2</td>
<td>2</td>
<td>0.784</td>
</tr>
<tr>
<td>Total</td>
<td>23 (37%)</td>
<td>31 (63%)</td>
<td>0.008</td>
</tr>
</tbody>
</table>

*One patient who was randomized to operative fixation declined surgery. He had a nonunion of the fracture at one year. According to the “intention-to-treat” principle, the complication was included in the operative group as a nonunion. See text.

One patient in the operative group experienced premature hardware failure in an all-terrain vehicle accident six weeks after fixation and required repeat fixation.
Background

Rate of Re-fracture

• Peds:
  – n=286, mean age 7.9 (range: 2-16), non-op
  – Re-fx fate <1 year = 1.6%

Management of paediatric clavicle fractures – is follow-up necessary? An audit of 346 cases

JDF Calder¹, M Solan², S Gidwani¹, S Allen², DM Ricketts¹

Purpose

- Assess features of a sub-population of diaphyseal clavicle fracture patients treated at pediatric center over a 10-year period who sustained a re-fracture
  - Rare but potentially debilitating complication of clavicle fracture treatment
- Compare features of these cases within 2 different treatment groups: operative vs. non-operative
  - Demographics
  - Timing, Etiology
  - Etiology
  - Radiographic characteristics
  - Healing rates
  - Additional complications (of re-fracture treatment)
Methods and Materials

• Analyzed refracture patients within previously established database of all diaphyseal clavicle fracture patients (n=659)
  – Primary treatment at BCH 2003-2012
  – Ages 10-19 y/o
  – 17 (2.6%) re-fracture patients identified

• Clinical/OR chart review and radiographic assessment performed
Demographics
- n=17 patients
- Mean age = 15.5 years
  - Range, 10-19 years

Timing:
- Mean time to re-fracture: 15.4 months
  - Range, 1-38 months
- <3mo post-1°Fx: n=6 (35%)
  - 50% were non-compliant w/ restrictions
Results: Re-Fx Rates per Tx Type

**ORIF**

1.7% (2/117)

**SLING**

2.9% (15/524)

(p=0.03)
Results: X-ray, Fx pattern

- Non-Op (n=15)
  - 100%: through prior site

- Op (n=2)
  - 1: adjacent to medial edge of plate
  - 1: through original fx site
    - 1.5y p plate removal
Results: Re-Fracture Pattern

- 8, 50% Completely displaced
- 7, 44% Partially displaced/angulated
- 1, 6% Non-/minimally displaced
Results: Treatment, Healing

Treatment:

• Plate fixation:
  – 1 pt (previous fx treated non-operatively)
• Non-Op
  – All others

Healing:

• 2-4 months: all successful union, RTS
Conclusions

• Rate of Re-Fracture:
  – Rare in adolescents (3%)

• More common post non-operative tx

• Often occur prior to complete healing

• Possible contributing factors:
  – Non-compliance
  – Insufficient f/u
THANK YOU