Acromioclavicular ligament patch reconstruction - A comparative biomechanical analysis -

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Disclosure

• Augustus D. Mazzocca
  • Consultant: Arthrex and Orthofix.

• Other Authors
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Background

Acromioclavicular (AC) joint dislocation

- > 160 different techniques for AC dislocation have been published. However, the optimal surgical procedure is still debated.

  Beitzel et al., Arthroscopy 2013

- Posterior instability of AC joint is one of the reason for poor clinical outcomes after AC surgery.

  Scheibel et al., AJSM 2011

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|      | Dynamic posterior instability

Alexander view
Acromioclavicular ligament complex (ACLC) provides horizontal (anterior-posterior) stability.


Thickest/most consistent portion runs obliquely at 30°

Variations of ACLC for wrapping of AC joint

Nakazawa 2016 AJSM
Background
Current our previous studies of AC joint stability

1. Dissection of the entire ACLC with intact CC ligaments
   Posterior translational stability: < 25% of intact condition
   Posterior rotational stability: < 10% of intact condition

2. Currently published AC brace techniques
   Translational stability: 71% of intact (91.6% - 64.3%),
   Rotational stability: < 45% of intact condition

3. Repair of entire superior ACLC best restores posterior translational and rotational stability
Based on the current studies, we have developed a new ACLC patch technique which reconstruct the superior half of the ACLC using dermal allograft for both posterior translational and rotational stability.
To biomechanically evaluate the posterior translational and rotational stability of an ACLC-patch technique in direct comparison to three suture brace techniques constructs.
Methods

- 28 fresh-frozen cadaveric shoulders assigned to 1 of 4 AC surgical techniques.

- The force and torque to achieve 10 mm of posterior translation and $20^\circ$ of posterior rotation were recorded in following conditions using custom fixture. (Dyrna AJSM, Morikawa KSSTA 2018)

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<th>Condition</th>
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<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
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</thead>
<tbody>
<tr>
<td>AC ligament</td>
<td>Intact</td>
<td>Dissected</td>
<td>Repair</td>
<td>Repair</td>
<td>Repair</td>
</tr>
<tr>
<td>CC ligaments</td>
<td>Intact</td>
<td>Intact</td>
<td>Intact</td>
<td>Dissect</td>
<td>Repair</td>
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1. Posterior rotation torque (N-m)
2. Posterior translation force (N)
Results

**Posterior rotational force (N-m)**

- In condition-3 (AC: repair, CC: intact), the ACLC-patch (77.1%) restored more stability than the oblique (35.3%), anterior (48.5%), and x-frame (23.0%) brace repairs ($P < .001$, $P = .002$, $P < .001$, respectively).

- In condition-5 (AC: repair, CC: repair), the ACLC-patch (41.0%) continued to have improved stability compared to the oblique (16.0%), anterior (14.0%), and x-frame (12.7%) brace repairs ($P = .006$, $P = .003$, $P = .002$, respectively).
Results

Posterior translational force (N)

- In condition-3 (AC: repair, CC: intact), the ACLC-patch (59.1%), oblique brace (54.1%), and anterior brace (60.7%) provided significantly greater stability than the x-frame brace (33.2%; $P < .001$, $P = .008$, $P < .001$, respectively).

- In condition-5 (AC: repair, CC: repair), the ACLC-patch (65.6%), oblique brace (58.4%), and anterior-brace (61.2%) continued to have significantly higher resistance to posterior translation than the x-frame brace (35.1%, $P < .001$, $P = .003$, $P < .001$, respectively).

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Conclusion

- The ACLC-patch technique restored a greater degree of posterior rotational AC stability than three brace techniques, and restored posterior translational AC stability to a similar extent as the oblique and anterior brace techniques.


