Return to Play Criteria Following Operative Management of Acromioclavicular Joint Separation: A Systematic Review

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Return to Play Criteria Following Operative Management of Acromioclavicular Joint Injuries: A Systematic Review

Richard Gawel BS, Taylor D’Amore MD, Peters Otlans MD, Somnath Rao BS, Steven B. Cohen MD, Michael G. Ciccotti MD*

(*) indicates primary project advisor

No relevant conflicts of interest to disclose.
Introduction and Objective

Acromioclavicular (AC) Joint Injuries → one of the most common shoulder pathologies among contact-sport athletes.

• Treatment based on type of injury → Rockwood Classification

Various techniques for surgical repair and/or non-operative rehabilitation, but no consensus regarding athlete return to play (RTP) criteria.

OBJECTIVE: Provide criteria to help guide surgeons as to when athletes can safely return to play following injury

Research Question & Hypothesis

Research Question:
• Based on the current literature, what criteria can be established to help guide surgeons and athletes as to when it is safe to return to play following operative management of AC joint injuries?

Hypothesis:
• More severe injuries will coincide with more conservative Return-to-Play criteria.
• Progression through therapy and ultimately return to sport will be centered around time-based criteria.
Literature Search Criteria

Search Query: PubMed, EMBASE, Cochrane
Date Range: January 1999 – April 2020

1. Acromioclavicular
2. AC joint
3. [OR/1-2]
4. Dislocation
5. Separation
6. Disruption
7. [OR/4-6]
8. [3 AND 7]
9. Surgery
10. Surgical
11. Reconstruction
12. Repair
13. Stabilization
14. Outcome
15. [OR/9-15]
16. [8 AND 16]

1,253 unique published articles

Inclusion Criteria
1. Written in English Language
2. Study Mean Age >18 years-old
3. Primary Operative Treatment
4. Minimum 12-months follow-up

Exclusion Criteria
Review Articles & Case Reports
Biomechanical/Cadaveric/Laboratory Studies
Technical Notes with <5 patient outcomes reported

>10% of patients with ipsilateral concomitant injury
>10% of patients with 2° surgery s/p previous failed surgery
Unique records identified through database search (n=1,253)

Studies excluded by title (n=668)

Records screened by abstract (n=585)

Studies excluded by abstract (n=227)
- Non-English Language (129)
- Review Article (39)
- Case Report (19)
- Abstract (18)
- Biomechanical/Cadaveric (9)
- Commentary (5)
- Unable to Locate Study (3)
- Concomitant Pathology (2)
- Surgeon Survey (2)
- Database Analysis (1)

Full text articles assessed for eligibility (n=358)

Studies excluded by full text (n=296)
- No Return to Play Criteria (216)
- Technical Note with <5 Patient Cohort (37)
- Minimum Follow-up <1-year or Not Mentioned (20)
- Concomitant Shoulder Pathology >10% (15)
- Secondary AC Joint Surgery >10% (5)
- Review Article (1)
- Patient Cohort Overlap (1)
- Only Non-Operative Cohort (1)

Studies included in review and analysis (n=63)

Studies added during reference screen (n=1)

63 Unique Published Articles: 1,939 Shoulders of 1,939 Patients
Mean Age: 36.5 yr. (25.0 - 50.1)
Male Patients: 85.1%
Follow-up: 33.8 mo. (12.0 - 106.3)
## Literature Quality

Coleman Methodology Scoring (CMS), Study Level of Evidence

### CMS Rating

<table>
<thead>
<tr>
<th>CMS Rating</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Excellent”</td>
<td>85-100</td>
</tr>
<tr>
<td>“Good”</td>
<td>70-84</td>
</tr>
<tr>
<td>“Fair”</td>
<td>55-69</td>
</tr>
<tr>
<td>“Poor”</td>
<td>&lt;55</td>
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### CMS Quality Metric (maximum score)

<table>
<thead>
<tr>
<th>Metric (max score)</th>
<th>Score (±SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study Size (10)</td>
<td>2.4 ± 2.6</td>
</tr>
<tr>
<td>Average Follow-Up (10)</td>
<td>5.4 ± 2.1</td>
</tr>
<tr>
<td>No. Different Procedures (10)</td>
<td>8.9 ± 2.4</td>
</tr>
<tr>
<td>Type of Study (15)</td>
<td>2.2 ± 4.7</td>
</tr>
<tr>
<td>Diagnostic Certainty (5)</td>
<td>4.8 ± 0.9</td>
</tr>
<tr>
<td>Description of Surgical Technique (10)</td>
<td>9.5 ± 1.5</td>
</tr>
<tr>
<td>Description Post-Op Rehab (5)</td>
<td>5.0 ± 0.0</td>
</tr>
<tr>
<td>Outcome Criteria (10)</td>
<td>6.9 ± 1.5</td>
</tr>
<tr>
<td>Assessment of Clinical Outcome (15)</td>
<td>11.9 ± 2.8</td>
</tr>
<tr>
<td>Patient Selection Process (10)</td>
<td>7.8 ± 2.8</td>
</tr>
<tr>
<td>Total Score (100)</td>
<td>64.8 ± 9.5</td>
</tr>
</tbody>
</table>

### Study Level of Evidence

<table>
<thead>
<tr>
<th>Level</th>
<th>Evidence Type</th>
<th>No. Studies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level I</td>
<td>Randomized Controlled Trial</td>
<td>2</td>
</tr>
<tr>
<td>Level II</td>
<td>Prospective Cohort</td>
<td>3</td>
</tr>
<tr>
<td>Level III</td>
<td>Case Control (Retrospective)</td>
<td>4</td>
</tr>
<tr>
<td>Level IV</td>
<td>Case Series, Technical Note</td>
<td>54</td>
</tr>
<tr>
<td>Level V</td>
<td>Commentary, Expert Opinion</td>
<td>0</td>
</tr>
</tbody>
</table>

### Overall Literature Quality: Fair

Majority of Published Reports Describing Return to Play Criteria following AC Joint Separation are **Retrospective Case Series**

Return to Play Criteria

Combinations of RTP Criteria (n=63) | Studies, n (%)
--- | ---
Time | 59 (93.7)
Time, Range of Motion, Strength | 1 (1.6)
Clinical Stability, Radiographic Stability | 1 (1.6)
Strength, Functional Assessment, Safety Assessment | 1 (1.6)
Hardware Removal | 1 (1.6)

Return to Play Timeline (n=60) | Studies, n (%)
--- | ---
2 months | 1 (1.7)
3 months | 18 (30.0)
4 months | 5 (8.3)
4-5 months | 2 (3.3)
5 months | 2 (3.3)
4-6 months | 5 (8.3)
5-6 months | 1 (1.7)
6 months | 23 (38.3)
6-8 months | 1 (1.7)
10 months | 1 (1.7)
12 months | 1 (1.7)

Most studies used ONLY time-based Return-to-Play criteria → most common time points are 6 months and 3 months after surgery
Return to Play Outcomes

23 Studies Reported Number of Athletes (594)
24 Studies Reported Sports-Related Mechanism of Injury (281)
16 Studies did NOT mention Number of Athletes

Rate of RTP Reported (19 Studies)

<table>
<thead>
<tr>
<th>Return to Play:</th>
<th>% of Subjects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any Level</td>
<td>94.2% (72.4 - 100)</td>
</tr>
<tr>
<td>Pre-Injury Level or Higher</td>
<td>81.1% (50 - 100)</td>
</tr>
</tbody>
</table>

Rates of Return to Play among this cohort of studies consistent with the literature: >90%

Limitations

Heterogeneity in Reporting of Outcomes: meta-analysis not performed

Variability in Reporting of RTP Criteria:
- Only included explicitly mentioned RTP criteria in analysis
- Authors may have had criteria, but did not report them in manuscript

Variation in Surgical Technique:

- 52 Studies (82.5%) → 1 Surgical Technique
- 9 Studies (14.3%) → 2 Surgical Techniques
- 2 Studies (3.2%) → 3 or more Techniques

21 Studies (33.3%) → Arthroscopic Technique

11 Modes of Primary Stabilization:
- 9 reconstructed/repaired CC ligaments
- 2 reconstructed/repaired AC ligament

5 Modes of Auxiliary AC Stabilization
- 15 Combined AC & CC Stabilization

<table>
<thead>
<tr>
<th>Technique</th>
<th>Studies</th>
<th>Technique</th>
<th>Studies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Stabilization Method</td>
<td></td>
<td>Number of Techniques Described</td>
<td></td>
</tr>
<tr>
<td>Suture Button Construct</td>
<td>28</td>
<td>1</td>
<td>52</td>
</tr>
<tr>
<td>Suture Only Construct</td>
<td>8</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>Soft Tissue Graft Reconstruction</td>
<td>8</td>
<td>$\geq 3$</td>
<td>2</td>
</tr>
<tr>
<td>Synthetic Graft</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clavicular Hook Plate</td>
<td>7</td>
<td>Open Surgical Approach</td>
<td>44</td>
</tr>
<tr>
<td>Suture Anchor</td>
<td>4</td>
<td>Arthroscopic Assistance</td>
<td>21</td>
</tr>
<tr>
<td>Weaver-Dunn Procedure</td>
<td>2</td>
<td>Use of Distal Clavicle Excision</td>
<td>58</td>
</tr>
<tr>
<td>Combined Soft Tissue Graft and Suture Button</td>
<td>3</td>
<td>Yes/Sometimes</td>
<td>7</td>
</tr>
<tr>
<td>Coracoclavicular Screw</td>
<td>3</td>
<td>Weaver-Dunn</td>
<td>3</td>
</tr>
<tr>
<td>Combined Weaver-Dunn and Soft Tissue Graft Augmentation</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acromioclavicular Pinning</td>
<td>1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Auxiliary Acromioclavicular Stabilization       |         | Free Soft Tissue Graft Utilization            |         |
| None                                           | 37      | None                                          | 55      |
| Reconstruction with Soft Tissue Graft          | 8       | Autograft                                     | 6       |
| Suture Repair                                  | 8       | Allograft                                     | 3       |
| Pinning                                        | 7       | Both or Unclear Source                        | 2       |
| Suture Reconstruction                          | 6       |                                                |         |
| Reconstruction with Artificial Graft           | 1       | No Coracoclavicular Ligaments Repair          | 58      |
|                                                |         | Coracoclavicular Ligaments Repaired           | 9       |

*Due to the number of studies describing multiple techniques, values exceed the number of included studies.
Conclusions/Future Directions

Return to Play criteria following AC joint separation remains insufficiently defined.

Majority of published studies report exclusively time-based criteria (principally, 3 months & 6 months); no studies offered detailed functional return to play guidelines.

First systematic review evaluating return to play criteria following AC joint separation.

Results help provide foundation for developing a comprehensive return to play checklist.
Thank you!