

Systematic Review

Return to Sport and Clinical Outcomes After Surgical Management of Acromioclavicular Joint Dislocation: A Systematic Review

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Purpose: To evaluate the rate at which athletes return to sport after surgical management of acute and chronic acromioclavicular (AC) joint dislocations. **Methods:** Three databases—PubMed, MEDLINE, and EMBASE—were searched from database inception until October 28, 2017, by 2 reviewers independently and in duplicate. The inclusion criteria were English language studies that reported return to sport outcomes in patients undergoing surgical management of AC joint dislocations. **Results:** Overall, 12 studies with a combined total of 315 patients met the inclusion criteria, with a mean age of 33.8 years (range, 18-65 years) and a mean follow-up of 34.9 months (range, 6-126 months). Of the 12 included studies, 1 was a prospective comparative study (Level II), 1 was a retrospective comparative study (Level III), 1 was a prospective case series (Level IV), and 9 were retrospective case series (Level IV). The rates of return to any level of sport ranged from 94% to 100% ($I^2 = 0\%$), whereas the rates of return to the preinjury level of sport ranged from 62% to 100% ($I^2 = 61\%$). The pooled rate of return to preinjury level of sport in type V AC joint separations was 86.2% (95% confidence interval = 68.1%-98.0%), whereas that after type III or IV AC joint injuries was 89.6% (95% confidence interval = 79.9%-96.9%). **Conclusions:** An almost perfect rate of return to sport participation after surgical management of AC joint dislocations have been reported, with most returning to their preinjury level of sport. The rates of return to sport were comparable across the different types of injuries and surgical procedures. **Level of Evidence:** Level IV, systematic review of Level II, III, and IV investigations.

Acromioclavicular (AC) joint dislocation is a common orthopaedic injury among athletes, typically occurring after a high-energy lateral blow to an adducted shoulder.¹ The consensus among most orthopedic surgeons is that minor dislocations (Rockwood type I and II) are managed successfully with nonoperative modalities.¹ There is controversy regarding the indications for surgical management of Rockwood type III AC joint dislocations, with a significant number of studies demonstrating no difference between operative and nonoperative treatment.²⁻⁴ Rockwood type IV and V AC joint dislocations

(involving stripping of the deltoid or trapezius) typically require operative reduction and fixation, although new data suggest that nonoperative treatment may be equivalent to operative treatment for these injuries.^{5,6}

Numerous surgical procedures have been described in the management of acute and chronic AC joint dislocations.⁷⁻¹⁰ In fact, at least 151 different techniques have been described.¹¹ Strong results have been reported across the literature following surgical management of type III through V AC joint injuries using various techniques.¹² However, for an athlete undergoing surgical management, often the most important patient outcome is the ability to return to sport. Several individual studies have reported high rates of return to sport after surgical management of both acute and chronic AC joint dislocations. However, the rate of return to sport following surgical management of AC joint dislocations has not been systematically reviewed.

The purpose of this systematic review was to evaluate the rate at which athletes return to sport after surgical management of acute and chronic AC joint dislocations. We hypothesize that most athletes would return to sport participation after surgical management of AC joint dislocation, particularly those

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participating in nonoverhead athletics and those with type III injuries.

Methods

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses statement was used for the reporting of study selection.¹³

Search Strategy

The online databases PubMed, MEDLINE, and EMBASE were searched for literature addressing return to sport following surgical management of AC joint disruption from database inception until October 28, 2017. The search terms "Acromioclavicular"/"AC," "dislocation"/"separation," "surgical," and "sport" were used (Appendix Table 1).

Study Screening

Two reviewers (J.K., M.M.) independently screened the titles, abstracts, and full-text articles resulting from the searches. Any disagreements were resolved by consensus discussion between reviewers and the senior author (B.A.) when necessary. The references of the included studies were then screened for additional articles that may not have been captured by the initial search strategy.

Assessment of Study Eligibility

The research question and eligibility criteria were determined a priori. The inclusion criteria included studies written in English, human studies, and studies investigating return to sport following surgical management of AC joint dislocations. Studies of all levels were included. Cadaveric studies, animal studies, conference papers, book chapters, review articles, and technical reports were excluded.

Quality Assessment

The methodological index for non-randomized studies (MINORS), which was designed to assess the methodological quality of comparative and non-comparative, nonrandomized surgical studies, was applied to the included studies and was scored independently by 2 reviewers (J.K., M.M.).¹⁴ These reviewers received informal training on the use of the MINORS tool for quality assessment. The MINORS checklist assigns a maximum score of 16 for non-comparative studies and a maximum score of 24 for comparative studies. Any disagreements were resolved by consensus discussion between reviewers and the senior author (B.A.) when necessary.

Assessment of Agreement

Inter-reviewer agreement was assessed by the kappa (κ) statistic for the title, abstract, and full-text screening stages. An intraclass correlation coefficient (ICC) was

calculated for the quality assessment using the MINORS criteria. Agreement was categorized a priori as follows: κ /ICC of 0.61 or greater was considered substantial agreement; κ /ICC of 0.21 to 0.60, moderate agreement; and κ /ICC of 0.20 or less, slight agreement.¹⁵

Data Abstraction and Analysis

Two reviewers (____) collected data in duplicate and recorded them in a Microsoft Excel spreadsheet (Version 2007, Microsoft, Redmond, WA). Data regarding authors, year of publication, location of study, study design, level of evidence,¹⁶ sample size, age, gender, follow-up, rehabilitation protocols, and complications were recorded.

The primary outcome was the rate at which patients returned to sport. Owing to the anticipated methodological flaws in the individual studies included in the present review, pooling of the individual rates from these nonrandomized studies was not performed. The Cochran Q and I^2 tests were used to assess heterogeneity. Values of I^2 between 25% and 49% were considered low, 50% to 74% were considered moderate, and values greater than 75% were considered to have high statistical heterogeneity.¹⁷ Funnel plots of the proportion against sample size of the individual studies were created and assessed using Egger and Harbord tests for evidence of publication bias.

For other variables, where results were presented in a nonuniform nature across studies, the results are presented in narrative summary fashion. Descriptive statistics including means, proportions, ranges, kappa values, and ICC values were calculated using Minitab statistical software (Version 17, Minitab, State College, PA).

Results

Search Strategy

The initial search of 3 databases resulted in 2,365 total studies. The immediate removal of duplicates (1,053 studies) resulted in 1,312 studies for title screening. A systematic screening approach removed articles failing to meet inclusion criteria and resulted in 12 available full-text articles for review (Fig 1). There was substantial agreement among reviewers at the title ($\kappa = 0.792$; 95% confidence interval [CI], 0.769-0.815), abstract ($\kappa = 0.841$; 95% CI, 0.818-0.864), and full-text ($\kappa = 1.00$) screening stages.

Study Characteristics

In total, 12 studies met the inclusion criteria, which included a total of 315 patients (315 AC joints) who underwent surgical treatment for AC joint dislocation. Overall, 90% of the included patients were male and the average age was 33.8 years (range, 18-65 years),

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