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ORIGINAL ARTICLE

Interobserver and intraobserver reliability of radiographic classification of acromioclavicular joint dislocations

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Hypothesis and background: The classification and treatment of acromioclavicular (AC) joint dislocations remain controversial. The purpose of this study was to determine the interobserver and intraobserver reliability of the Rockwood classification system. We hypothesized poor interobserver and intraobserver reliability, limiting the role of the Rockwood classification system in determining severity of AC joint dislocations and accurately guiding treatment decisions.

Methods: We identified 200 patients with AC joint injuries using the *International Classification of Diseases, Ninth Revision* code 831.04. Fifty patients met inclusion criteria. Deidentified radiographs were compiled and presented to 6 fellowship-trained upper extremity orthopedic surgeons. The surgeons classified each patient into 1 of the 6 classification types described by Rockwood. A second review was performed several months later by 2 surgeons. A κ value was calculated to determine the interobserver and intraobserver reliability.

Results: The interobserver and intraobserver κ values were fair ($\kappa = 0.278$) and moderate ($\kappa = 0.468$), respectively. Interobserver results showed that 4 of the 50 radiographic images had a unanimous classification. Intraobserver results for the 2 surgeons showed that 18 of the 50 images were rated the same on second review by the first surgeon and 38 of the 50 images were rated the same on second review by the second surgeon.

Conclusion: We found that the Rockwood classification system has limited interobserver and intraobserver reliability. We believe that unreliable classification may account for some of the inconsistent treatment outcomes among patients with similarly classified injuries. We suggest that a better classification system is needed to use radiographic imaging for diagnosis and treatment of AC joint dislocations.

Level of evidence: Basic Science Study; Validation of Classification System

Keywords: Acromioclavicular joint; dislocations; interobserver reliability; intraobserver reliability; radiographic reliability; Rockwood classification

This study was determined to be exempt from review by the Western Institutional Review Board: Work Order No. 1-814704-1.

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The acromioclavicular (AC) joint is a common site for shoulder injury. AC joint dislocations represent up to 12% of all shoulder dislocations and 8% of all joint dislocations.[8] Treatment and classification of AC joint dislocations remain controversial. The most common classification in clinical use today remains the Rockwood classification, which identifies 6 types of AC joint injury. Among these, types III and V are the most controversial in regard to recommending operative vs. conservative treatment. Recent publications have advocated more for conservative treatment of type III injuries[4,6,15,18,19,22-24,27] and surgical treatment of types IV and V.[13,18,25,28] However, other authors have called into question the reliability of radiographic classification of AC injuries, particularly Rockwood types III, IV, and V.[1-3,7,11,17,21]

Differences between studies on the treatment of AC dislocations, particularly the controversy about treatment for Rockwood type III, may be due to the difficulty in accurately classifying types III, IV, and V on radiographic imaging. Rockwood types III and V both involve superior displacement of the distal clavicle, and Rockwood type IV dislocations involve a posterior displacement of the clavicle.[8] Distinguishing types III, IV, and V on radiographic imaging can be difficult. Viewing posterior displacement in type IV dislocations requires adequate axillary views.[1,2,7,11,14,16,20,26] Obtaining adequate axillary images may be impossible in patients with acute pain, making radiographic imaging insufficient in accurately differentiating type IV dislocations from types III and V.[7,20,26] In addition, a lack of consensus on the exact amount of posterior displacement required to be type IV may contribute to the inconsistency in accurate grading.[7,11] Rockwood types III and V, both involving superior displacement of the clavicle, are differentiated only by a coracoclavicular distance being 25%-100% greater than the normal side in type III and 100%-300% greater than the normal side in type V (Fig. 1).[8]

The ability to diagnose and to treat AC joint injuries using radiographic imaging requires a classification system that is accurate, reliable, and reproducible.[7] The purpose of this study was to determine the interobserver and intraobserver reliability in using the Rockwood system to classify AC joint dislocations. We hypothesized that there would be poor interobserver and intraobserver reliability, limiting the role of the Rockwood classification system in determining the severity of injury and accurately guiding decisions for operative vs. nonoperative treatment.

Materials and methods

This was an evaluation study looking at the interobserver and intraobserver reliability of the Rockwood classification system. A member of the coding department retrospectively identified 200 patients with AC joint injuries using the *International Classification of Diseases, Ninth Revision* code 831.04. Once a patient was identified, a member of our radiology staff reviewed the radiographs to

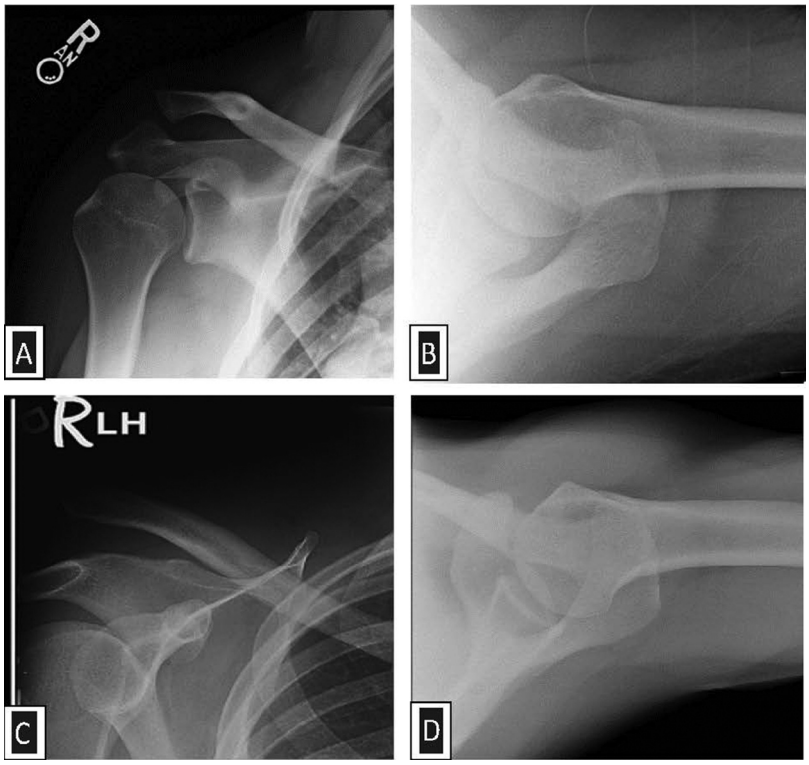

Figure 1 Anteroposterior (**A**) and axial (**B**) radiographs showing a Rockwood type III dislocation. Anteroposterior (**C**) and axial (**D**) radiographs showing a Rockwood type V dislocation.