(iv) Disorders of the acromioclavicular joint and distal clavicle

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Abstract

The acromioclavicular joint (ACJ) is a common source of pathology in patients of all age groups and lifestyles. Young patients, particularly those engaged in contact sports, often suffer injuries that result in instability of the ACJ. Advances in arthroscopic surgery and implant technology have opened new avenues for the treatment of these injuries. Despite this, in many cases, there remains considerable controversy as to whether surgical intervention is warranted in the acute setting. Fractures of the distal clavicle may occur in any age group, and have a reputation for having a high incidence of non-union. The development of anatomically contoured locking plates offers the potential for improved outcomes in this difficult group of fractures. The ACJ is a common site for degenerative change and advances in arthroscopic techniques have changed the way this condition is managed. The aim of this article is to give the general reader an overview of the current understanding of these conditions and provide an up-to-date account of the treatment options available.

Keywords acromioclavicular joint; osteoarthritis; osteolysis; shoulder arthroscopy; sports injuries

Introduction

Disorders of the acromioclavicular joint (ACJ) are common, and may affect individuals at any age. Advances in implant technology have created new solutions for conditions that have historically seldom been treated surgically. This article aims to give an overview of conditions affecting the ACJ and distal clavicle, an approach to patient assessment and an appraisal of the available evidence for treatment methods.

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Surgical anatomy

The acromioclavicular joint is a diarthrodial joint containing a fibrocartilaginous disc, which may be incomplete. Stability is achieved by static and dynamic structures. Static stability in the horizontal plane is provided by the superior acromioclavicular ligament (which blends with the fibres of the deltoid and trapezius muscles). The inferior, anterior and posterior acromioclavicular ligaments are all condensations of the joint capsule (Figure 1). The coracoclavicular ligament confers considerable stability to the ACJ, predominantly in the vertical plane. This ligament has fibres passing from the outer inferior surface of the clavicle to the base of the coracoid process. The coracoclavicular ligament consists of two portions; the conoid and the trapezoid. The conoid is cone shaped, with its apex attaching on the posteromedial side of the coracoid base. The base of the conoid attaches to the conoid tubercle on the under surface of the clavicle. The trapezoid arises anterior and lateral to the attachment of the conoid on the coracoid. The insertion on the clavicle is similarly anterior and lateral to the conoid insertion. The trapezius and deltoid provide an element of dynamic stability. Considerable variation in the osseous configuration of the joint has been observed.[1] Cadaveric, CT and radiological analysis have demonstrated that the joint may be classified as flat, oblique or curved in both the transverse and coronal planes.

Evaluation of ACJ conditions

Although subluxation and dislocation are by far the most common conditions affecting the ACJ, it is also prone to all conditions involved within a surgical sieve. Degenerative or post-traumatic arthropathy, inflammatory arthropathy, crystal arthropathy, osteolysis and neoplastic conditions must all be considered as part of a differential diagnosis requiring a history, examination and appropriate investigation to confirm the diagnosis.

Acromioclavicular joint separation

Injuries to the ACJ represent 12% of all shoulder girdle injuries. They commonly result from high-energy impact to the point of the shoulder, as frequently occurs in contact sports. This forces the acromion downwards and medially. There is a strong male preponderance and injuries are most common in the first three decades of life. The acromioclavicular ligaments, coracoclavicular ligaments and deltopectoral fascia may fail either alone or in combination. With a complete injury to all soft tissue constraints the distal end of the clavicle may "button hole" superiorly, posteriorly, or inferiorly.

These injuries are generally clinically obvious, with pain and tenderness localized to the ACJ. The apparent deformity may vary with respect to the degree and direction of displacement but it is predominantly a downward displacement of the scapula. Plain radiographs are sufficient to confirm the diagnosis, although weight-bearing views are sometimes helpful to determine the degree of instability.

Several classification systems exist for ACJ dislocations. The most widely accepted is that developed by Rockwood (Figure 2).

Treatment of acromioclavicular injuries depends on whether they are incomplete or complete. The vast majority of Type I and Type II injuries require no surgical intervention, however, there

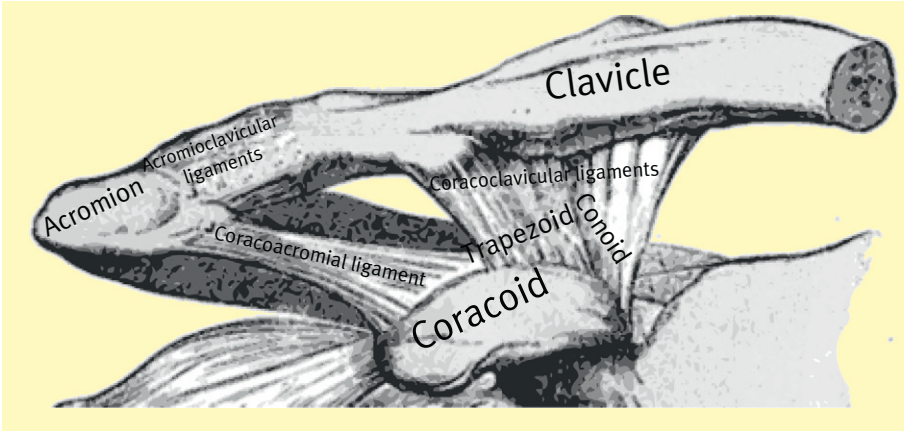

Figure 1 Osseo-ligamentous anatomy of the acromioclavicular joint.

remains huge controversy regarding which complete injuries require surgical intervention. There are few if any prospective trials comparing non-operative to operative treatment in two well matched groups.

Type I

A type I injury represents a simple sprain of the acromioclavicular ligaments. Clinically, this is manifested as pain and tenderness at the ACJ with normal radiographs. Treatment is symptomatic, with early mobilization as comfort allows.

Type II

Type II injuries involve a complete tear of the acromioclavicular ligaments, with intact coracoclavicular ligaments. In addition to localized tenderness, there may be slight displacement of the acromion inferiorly. Treatment is the same as for type I injuries. The long-term prognosis is good.

Type III

This injury involves injury to both the acromioclavicular ligaments and the coracoclavicular ligaments. In addition to localized tenderness there is a clinically obvious deformity manifested as a prominent distal end of clavicle. Radiographs demonstrate overriding of the distal clavicle over the acromion by at least 100% (Figure 3). It is important to realize that the deformity is an inferior displacement of the scapula, rather than superior displacement of the clavicle.

The treatment of acute type III injuries is the most controversial aspect of this condition. Most surgeons advocate symptomatic treatment as for type I and II injuries, although some suggest that anatomic reduction and ligament reconstruction is beneficial in the younger, more active patient. Only three randomized or quasi-randomized studies exist. Imatani et al. studied 23 patients who were allocated on an alternating basis to non-operative treatment or fixation with open reduction and fixation with either a coracoclavicular screw or Steinman pin fixation across the ACJ.[2] Outcome was assessed using a 100-point scale developed for the study. Outcomes were categorized into excellent, good, fair and poor. There were more excellent and good outcomes in the conservatively treated group than in the surgically treated group, although a statistical analysis was not performed.

Larsen et al. followed 84 patients who had been randomized to either conservative treatment or open reduction with K-wire stabilization of the ACJ and repair of both the acromioclavicular and coracoclavicular ligaments. Outcome was assessed at 3 months and 13 months by the use of a scoring system that stratified results into poor, fair, good and excellent. At 3 months, patients treated conservatively scored better than those treated surgically, although this difference was not seen at 13 months.

Bannister et al. randomized 60 patients to either non-operative treatment or open reduction and fixation with a coracoclavicular screw.[3] Fifty-eight patients were followed for 4 years. They found that patients treated non-surgically returned to work and sport significantly earlier, and at both 1-year and 4-year follow-up outcomes as determined using the same non-validated scoring system employed by Imatani were better in the conservatively treated group. In the conservatively treated group the initial displacement of the ACJ improved by 5 mm over 12 months. In contrast 35% of patients treated surgically reduction was lost following removal of the coracoclavicular screw. When 12 patients with displacement more than 2 cm were analysed separately, there were a greater number of good or excellent outcomes associated with surgical treatment than conservative treatment.

Type IV

The acromioclavicular and coracoclavicular ligaments are torn and the lateral end of the clavicle is driven posteriorly through the trapezius muscle and lies in the subcutaneous tissue. An AP radiograph demonstrates subtle widening of the acromioclavicular distance and without careful clinical examination or an oblique X-ray the severity of this injury may be underestimated. Treatment is with open reduction and internal fixation with ligament repair or reconstruction.

Type V

The acromioclavicular and coracoclavicular ligaments are torn and the lateral end of the clavicle is buttonholed superiorly through the deltotrapezial fascia such that it tents the skin (Figure 4). X-rays demonstrate a dramatically increased coracoclavicular distance. Treatment is the same as for type IV injuries.

Type VI

This is by far the rarest injury subtype. The lateral end of the clavicle is displaced inferiorly beneath the coracoid and conjoined tendon. These are high-energy injuries and there is an increased risk of co-existing injuries to the brachial plexus,