Original article

A new method of arthroscopic reconstruction of the dislocated acromio-clavicular joint

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Background: **Symptomatic total acromio-clavicular joint dislocation (Rockwood *et al.* types III–VI) may be treated by surgical reconstruction.**
Aim: **To describe an arthroscopically assisted technique to reconstruct anatomically the coraco-clavicular ligaments in acute or chronic (> 6 weeks) acromio-clavicular joint dislocation.**
Methods: **This new technique involves arthroscopic exposure of the coracoid process. Prior to introducing this technique, cadaveric studies were undertaken.**
Results: **Five patients underwent this procedure. All engaged in regular sports or manual-type work. All patients were discharged the same day with the shoulder immobilised for 4 weeks, with no heavy lifting for 3 months. All patients were pain-free at 6 weeks with full function and maximum Constant scores at 3 months. There have been no complications.**
Conclusions: **A new, safe technique is described which provides a cosmetically acceptable, anatomically solid reconstruction of the coraco-clavicular ligaments.**

Key words: Acromio-clavicular joint – Dislocation – Coraco-clavicular ligaments – Arthroscopy – Coracoid process

Dislocation of the acromio-clavicular joint commonly occurs in young adults following a fall with direct impact onto the shoulder. This produces a sprain followed by rupture of the acromio-clavicular ligaments with loss of horizontal stability. With increasing force, rupture of the coraco-clavicular ligaments with displacement of the lateral clavicle occurs with loss of vertical stability, producing a complete dislocation. The upper limb loses its suspensory support from the clavicle with downward displacement of the shoulder and, to a lesser extent, an up-pull of the clavicle by trapezius.[1] Symptomatic total acromio-clavicular joint dislocation (Rockwood *et al.*[1] types III–VI) may be treated by surgical reconstruction to stabilise the lateral clavicle, reduce pressure symptoms and improve shoulder endurance; however, the choice of operative technique remains controversial. We present an arthroscopically assisted technique to reconstruct anatomically the coraco-clavicular ligaments. This technique requires exposure of the coracoid process during arthroscopy of the gleno-humeral joint and is suitable for both acute and chronic (> 6 weeks) acromio-clavicular joint dislocations. Prior to introducing this technique, a cadaveric dissection study was performed which showed that the base of the coracoid process protected the brachial plexus from possible damage during arthroscopic exposure of the coracoid, allowing us to use this technique *in vivo*.

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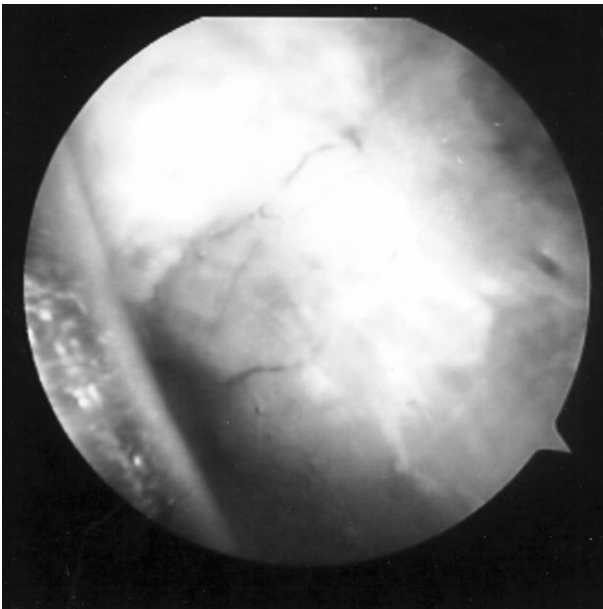
**Figure 1** Intra-operative arthroscopic view of debrided coracoid.
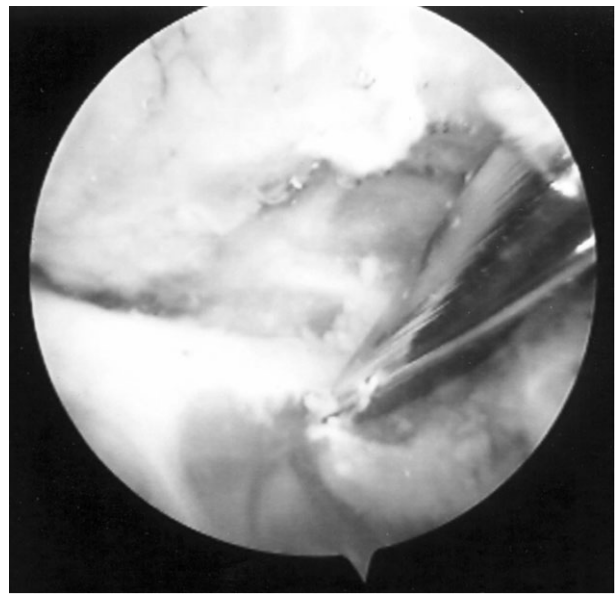
Figure 2 Guide wire followed by cannulated drill from clavicle to coracoid.

Patients and Methods

Five patients, four males, with a mean age of 32 years underwent this procedure. All engaged in regular sports or manual labour involving work above head height. Four patients with acute dislocations, Rockwood types III and V, had obvious acromio-clavicular joint deformities that were palpably tender. One patient with a chronic dislocation, Rockwood type III, at 8 weeks was still dissatisfied in terms of pain, cosmetic appearance and reduced function. Standard anteroposterior and axillary lateral radiographs were taken. Full informed consent was obtained in each case and the patients were operated on within 48 h of presentation.

Surgery is performed in the day-surgery unit using a combination of general and interscalene regional anaesthesia for pre-emptive and postoperative analgesia. The patient is placed in the beach chair position with the shoulder in 30° of abduction and 15° of forward flexion. Standard arthroscopy portal sites are used. The arthroscope is introduced into the gleno-humeral joint via a posterior portal. An anterior portal is created over the arthroscope trochar, which is passed from inside to out through the rotator interval. The arthroscope is directed over the superior border of subscapularis and medially into the subcoracoid recess.[2] A shaver inserted into the gleno-humeral joint debrides the subcoracoid bursa through the rotator interval to expose and define the inferior lateral surface of the coracoid (Fig. 1). An arthroscopic distal clavicle resection is performed, if required, to achieve

anatomical reduction. The clavicle is then reduced and a 1.5 cm incision is made over the clavicle. A modified Anterior Cruciate Ligament (Acufex) drill guide/marking hook is used to pass a standard 2 mm guide wire from the clavicle to the coracoid accurately. The drill guide is placed on the clavicle directly and the marking hook is placed on the base of the coracoid via the anterior portal. The guide wire is then replaced by a cannulated 3.5 mm drill (Fig. 2).
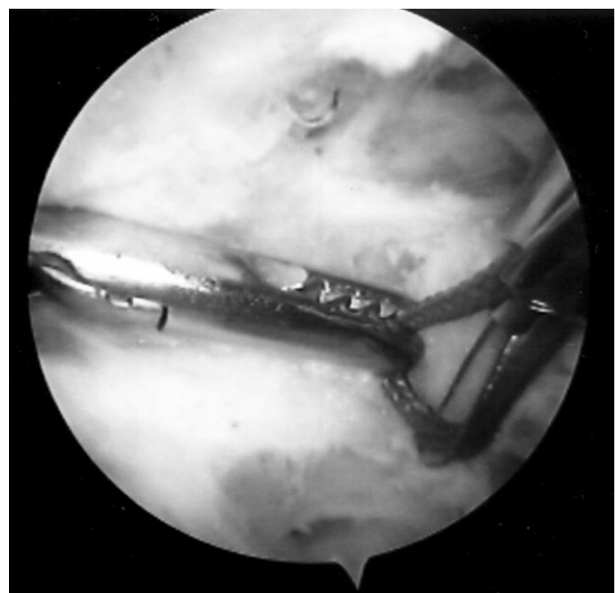
Figure 3 Pulling through suture to reconstruct the coraco-clavicular ligaments.

Figure 4 Postoperative anteroposterior view showing coraco-clavicular drill hole and anatomical reduction.

A suture passer placed through the drill is used to pull a 2-mm polydiaxone-sulphate (PDS) cord through the coracoid (Fig. 3). This is then passed superiorly through a second medialised hole in the clavicle and tied to fix the clavicle in the reduced anatomical position (Figs 4 and 5). In chronic dislocations, autologous grafts of semitendinosus tendon with bio-absorbable fixation and arthroscopic excision of the outer clavicle augment the reconstruction.

The patients are discharged the same day with the shoulder immobilised in a poly-sling for 4 weeks, with no heavy lifting for 3 months. Active range of movements is initiated at 6 weeks. The patients were reviewed at regular intervals with respect to pain using a visual analogue score, Constant score[3] and radiographic loss of reduction.

Results

All five patients have been reviewed at 6 months with three also at 1 year. All patients were pain-free by 6 weeks and have remained so at latest follow-up. At 3 months, all had full function and maximum Constant scores. All patients were back at work by 6 weeks for non-manual work. Manual-type work and non-contact sports were resumed by 3 months. At 6 month review, the four sporting patients were back to previous levels of activity.

Anatomical and clinical reduction has been maintained in four patients. One patient suffered a slight loss of reduction; however, he was non-compliant with the heavy lifting restriction and resumed manual labour by 8 weeks. He had no symptoms of pain, weakness, or loss of motion. There have been no complications.

Figure 5 Postoperative axial view showing coraco-clavicular drill hole and anatomical reduction.

Discussion

There has been much controversy over the surgical treatment of traumatic acromio-clavicular joint dislocation and many open operative techniques have been described. The most popular procedures include the transfer of the coraco-acromial ligament to the outer clavicle as popularised by Weaver and Dunn.[4] This requires a substantial anterior incision with partial detachment of the deltoid origin leaving a prominent scar. There is transfer of an intact structure with a non-anatomical anterior pull on the clavicle.[2,5] There have been many modifications to this procedure; however, they still fall short of the ideal operative procedure described by Weaver and Dunn in 1972.[4] Coraco-clavicular screw fixation as described by Bosworth[6] does not allow acromio-clavicular joint debridement or coraco-clavicular ligament reconstruction and has been associated with hardware failure and osteolysis of the clavicle.[7]. Intra-articular acromio-clavicular fixation using pins or k-wires (threaded or smooth) can lead to infection or migration and necessitate removal.[8,9]

Coraco-clavicular ligament reconstruction reduces anterior displacement of the clavicle in relation to the scapula, reduces lateralisation of the acromium and reduces clavicle malrotation.[5,10] In cadaveric studies, Jerosch et al.[5] showed that coraco-clavicular ligament reconstruction with a distal fix in the base of the coracoid and a medialised hole in the clavicle restored anatomy best.

Despite only having five patients in the operated group, we feel encouraged by our early results with excellent patient satisfaction. Our technique leaves a cosmetically acceptable, anatomically solid reconstruction of the coraco-clavicular ligaments. There is less soft tissue dissection and associated morbidity, with minimal scarring. The use of bio-absorbable fixation avoids the need for metalwork and associated complications of migration, infection, and future removal. There is no articular surface involvement.

Many authors advocate conservative immobilisation of Rockwood type III dislocation[11] and the mainstay of treatment remains non-operative. However, operative stabilisation may be considered in carefully selected individuals.[1,4,6,8,11,12] With the recognised benefits of surgical intervention (time to attain pain-free status, subjective impression of pain, range of motion, functional limitations, cosmesis and long-term satisfaction[12]) and now minimally invasive corrective techniques using only bio-absorbable materials, we feel that the immediate surgical treatment in carefully selected patients (young and more active, athletes, and heavy manual labourers) should remain an important aspect of treatment in this controversial injury.

Acknowledgement

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