

## ORIGINAL ARTICLE

## Surgical management of large rotator cuff tears combined with instability in elite rugby football players

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Large rotator cuff tears are extremely uncommon in young people and when they occur they may be associated with shoulder instability. This paper reports on a series of six elite rugby union and rugby league footballers who presented with shoulder instability and large rotator cuff tears. They were treated with a two stage procedure: an open rotator cuff repair followed by an open shoulder stabilisation some 10 weeks later. All had successful outcomes. The paper also highlights the risk of tearing the rotator cuff when a patient continues to play contact sport with an untreated unstable shoulder.

We are unaware of any papers in the literature that outline methods of management of collision athletes with large rotator cuff tears combined with instability. There are no studies that we are aware of that look at surgical outcomes in this subgroup of patients.

Rotator cuff tears are known to occur more frequently with age.<sup>1,2</sup> They may be related to a single macrotraumatic event and generally occur in the older population who have degenerate cuffs. Macrotraumatic failure and tearing of the rotator cuff in the young is less common.<sup>3</sup>

In the younger patient, a rotator cuff tear is more likely when associated with a high energy contact sport such as rugby, but it is rare that a single extraneous force from an injury is greater than the tensile strength of the normal tendon. When rotator cuff tears occur in such athletes, the cuff may already be weakened from an accumulation of micro-trauma, such as occur with tackles (20–30 per match), scrums (25 per match), mauls (30 per match), and lineouts (31 per match).<sup>4</sup> Furthermore, with the increased professionalism, the football seasons are longer and the training more intense. Repetitive tensile overloading of the static shoulder stabilisers of the glenohumeral joint can cause weakening and incompetence. The loss of these static stabilisers result in overstraining and weakening of the rotator cuff leading to failure when subjected to macrotrauma.<sup>5,6</sup> Thus in these athletes a single severe injury may lead to a large tear in an already damaged rotator cuff.

We chose to treat our patients with open rather than arthroscopic procedures. The senior author (JAG) felt that, because of the large nature of the cuff tears, open surgery would provide a better outcome on return to these collision sports, as the results of arthroscopic stabilisations and arthroscopic rotator cuff repairs are, as yet, not as good as the optimum open repairs.<sup>7–10</sup> We also decided on a two stage procedure because of the benefits of early mobilisation after rotator cuff repairs and of immobilisation after stabilisation surgery.

#### MATERIALS AND METHODS

Between 1994 and 1999, we performed a two stage rotator cuff repair and stabilisation on six elite male professional rugby union and rugby league players with large rotator cuff tears and instability. All patients were available for review. Of the three rugby union players, two played at international level and one at national level. Of the three rugby league players, one played at international level and the others at regional

level. It is noteworthy that five of the six players were forwards whose shoulders are subjected to far more microtrauma than players in other positions. The mean age of the patients was 26.5 years (range 23–29), and the dominant shoulder was involved in half of the patients.

Five of the six patients had had instability symptoms for more than six months before the catastrophic injury, with four of them having symptoms for longer than 18 months. These patients had difficulty with abduction and external movements and symptoms of a “dead arm” with forced overhead activity and tackling. Four of the six patients complained of “looseness”. There is little doubt, with hindsight, that these were clear instability symptoms. Only one of these patients had a documented dislocation during that period of time. Two patients had ruptured their long head of biceps during that time and the significance of this had not been recognised. Only one patient presented after the catastrophic injury without having had any previous symptoms.

All six patients presented with symptoms and signs of a rotator cuff tear. Four patients sustained the injuries while tackling, whereas two players fell with the ball in their arm, sustaining forced abduction injuries as they hit the ground. One patient sustained a frank dislocation at the time of the injury, while three patients had a “dead arm” at the time of the injury. All patients had positive anterior apprehension signs and loss of power. The diagnosis was confirmed by magnetic resonance imaging: arthrography in five cases and computed tomographic arthrography in one case.

All patients were operated upon by the senior author (JAG). The mean time between presentation and the operation was 5.9 days (range 2–15). The size, site, and type of tear plus any associated injury were documented. The size of the rotator cuff tears was categorised as small (less than 1 cm), moderate (1–3 cm), large (3–5 cm), or massive (larger than 5 cm). All patients were clinically assessed before surgery and at several consultations during follow up.

All patients were treated with a two stage procedure. The initial surgery repaired the rotator cuff tear. This was followed by a procedure to stabilise the glenohumeral joint with an anterior capsular shift, after which near full range of motion was restored. One Bankart lesion was found, and this was repaired with transosseous sutures. The mean duration between the first and second procedures was 9.5 weeks (range 8–12).

The surgical procedures were performed using techniques described by Neer.<sup>11,12</sup>

### Rotator cuff repair

With the patient in a beach chair position, a superior approach was made to the shoulder. The deltoid was lifted subperiosteally off the acromion. An acromioplasty was performed and the coracoacromial ligament was excised. The distal 1.5 cm of clavicle was removed in four patients who had associated acromioclavicular pathology.

The rotator cuff was explored and mobilised. A bone trough was created around the greater tuberosity and the rotator cuff edges were tagged with five ethibond sutures. These sutures were then secured through the bone trough and tied down to the lateral aspect of the proximal humerus after the rotator cuff had been pulled into the bone trough.

The deltoid was repaired and the wound was closed in layers. The patient was immobilised in a sling for six weeks after the operation but began a passive exercise programme after two days. At six weeks, an active exercise programme was begun.

### Shoulder stabilisation

With the patient in a beach chair position, a deltopectoral approach was made. The subscapularis was dissected from the capsule and a T shaped incision was made into the capsule. The labrum was inspected and in one case a Bankart lesion was repaired using transosseous number 2 ethibond sutures. A capsular shift procedure was performed and fixed with ethibond sutures. The wound was closed in layers and the patient placed in a sling.

All the patients remained strictly immobilised in a sling for six weeks. This was followed by a passive then an active exercise programme. Light supervised weights were started at four months, but any exercises involving anterior capsular stretches were forbidden.

A return to rugby was allowed about six months after the stabilisation on the return of strength and control to the shoulder.

### RESULTS

At the first procedure, in which the rotator cuff was repaired, the examination under anaesthetic found a grade 3 anterior instability in three patients and a grade 2 anterior instability in the other three. The contralateral side was normal in all patients. The average size of the tears was 3.8 cm (range 1.5–6). All tears involved the supraspinatus muscle and in the large tears the infraspinatus also. The subscapularis muscle was not torn in any of the cases. In five cases, the rotator cuffs showed considerable degeneration with some lamination. Two patients had preoperative tears of the long head of biceps and one patient sustained a postoperative rupture with weights training. It was noted at surgery that this patient had a particularly poor biceps tendon with fraying and fibrillation. One patient had a Bankart lesion.

All patients were able to return to contact sport at nine months. Five of the six patients returned to rugby at the same or an improved level. All the internationals played for their country within 12 months of the initial surgery. One player decided to retire after the surgery because of the large number of injuries that he had sustained over the preceding few years. This patient, however, is asymptomatic with a stable shoulder and has returned to farming.

All patients were contacted at an average of 34.3 months (range 12–50) after surgery. All were asymptomatic. They denied any instability symptoms or weakness. Five of the players were playing professional rugby and the sixth was carrying out heavy farm work.

At the last review, range of motion was found to be near full as compared with the unoperated shoulder, except for external rotation, which was an average of 70% of normal, and internal rotation, which was 76% of normal. The anterior

### Take home message

Players of contact sports may develop shoulder instability as a result of repetitive microtrauma from playing and training. They then risk tearing the rotator cuff if they continue to play with unstable shoulders. A two stage surgical procedure has been shown to yield excellent results.

apprehension sign was negative in all patients. Rotator cuff strength was 5/5 in four patients and slightly limited in two patients.

### DISCUSSION

Full thickness large rotator cuff tears associated with shoulder instability are uncommon and pose a challenge in the management of elite collision athletes. To date there has been little guidance in the literature to help manage this combination of pathologies. Should a one or two stage procedure be performed and should surgery be arthroscopic or open? Should these collision athletes be treated differently from the non-athletic population?

These elite athletes have some degree of instability that may predispose their rotator cuffs to the microtrauma from the forceful repetitive activities of their game and training. This leads to weakening of the rotator cuff, which subsequently tears when subjected to an acute macrotraumatic event such as is common in rugby football. In addition, tensile overload may occur secondary to this instability.<sup>13 14</sup>

In common with another report,<sup>15</sup> five of this group of six with anterior capsular laxity did not have a Bankart lesion.

We, like many others, believe that the shoulder instability should be treated surgically in addition to the rotator cuff repair to avoid future recurrences. The first stage of the procedure to repair the rotator cuff requires early rehabilitation to encourage gliding between the rotator cuff and the acromion and deltoid. In addition, the capsuloligamentous complex of the shoulder then remains pliable. After the second procedure—the shoulder stabilisation—a period of immobilisation is required to allow the repair to heal and to avoid stretching it. It is because of these different rehabilitation regimens that we believe a two stage repair is likely to lead to a better long term result.

In addition, because arthroscopic procedures do not seem to be as successful as open procedures,<sup>7–10</sup> we elected to perform the procedures in an open manner to give these athletes the best possible outcome without recurrence because of their limited playing life. The results of the two stage procedure reported here show it to be beneficial in rapidly returning the patients to their professional highly demanding sports.

The administrators and medical consultants for rugby union and league should consider a number of aspects of the game that predispose these athletes to these serious injuries. These include overtraining and techniques with weights, the long professional season, and the use of prophylactic bracing. In addition, athletes with instabilities who play these contact sports should have the instability treated early before secondary changes occur that may lead to severe rotator cuff injuries.

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## COMMENTARY

This paper, as stated in the abstract, outlines an uncommon, but clinically very important injury to the elite contact sports-person. The lack of published literature describing methods of management of this athletic population underlines the clinical significance of this contribution. It is my experience that the contacts described in the introduction are quite appropriate and they are highlighted by increased professionalism. More is demanded of athletes in both the weights room and on the training field predisposing them to accumulated trauma of the rotator cuff. The small series in this study is unavoidable, given the uncommon nature of the pathology. I hope that it encourages surgeons and doctors at other units treating elite contact sporting athletes to publish their operative outcomes for comparison. The paper highlights a return to contact sport at a pre-morbid level in five of six athletes, an excellent outcome measure for a professional athlete.

I agree with the authors that the nature of this injury pattern highlights the potential for overtraining that now exists in professional sport and the importance of appropriate supervision of resistance training sessions where technique is paramount. This is particularly important in young athletes involved in elite academy programmes.

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