



Arthroscopic anterior shoulder stabilisation in overhead sport athletes: 5-year follow-up

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Abstract

Introduction Shoulder instability following traumatic glenohumeral dislocation is a common injury sustained by athletes particularly in contact and collision sports. Overhead contact sports such as gaelic football and hurling pose a unique hazard to the glenohumeral joint, increasing the risk of dislocation.

Aims To assess return to sport, level of play, recurrence and functional outcomes in gaelic football and hurling athletes in comparison with players of other sports.

Methods A retrospective cohort study was carried out from 2007 to 2016. Follow-up was conducted via telephone interview using the Western Ontario Shoulder Instability Index (WOSI) score used to assess functional outcomes as well as return to sport, level of return and recurrence.

Results Ninety patients were included with follow-up which was obtained on 61 patients (68%) with a mean follow-up of 5.04 years. 91.8% played sport at the time of injury, 55.4% of those (31 patients) played a gaelic sport with 44.6% (25 patients) playing other sports. 76.8% returned to their sport, 80.4% of these able to return at their pre-injury level. Recurrence occurred in 10 patients (16.4%). WOSI scores were not significantly different between groups ($p = 0.77$). No significance in recurrence between groups was noted ($p = 0.78$).

Discussion Favourable outcomes can be expected for overhead contact sport athletes undergoing anterior arthroscopic stabilisation for recurrent instability. Players from these groups returned to sport sooner than those from other sports and no difference in recurrence was noted. The level at which they can expect to return to is favourable with most athletes reaching their pre-injury level.

Keywords Anterior stabilisation · Arthroscopy · Instability · Shoulder dislocation · Sports

Introduction

Shoulder instability following traumatic glenohumeral dislocation is a common injury sustained by athletes particularly in contact sports. These patients are at risk of further instability events ranging from atraumatic subluxations to traumatic dislocations. It invariably occurs after one or more dislocation event and can lead to significant loss of strength, range of motion and function of the joint. Instability following

glenohumeral dislocation can be anterior or posterior; however, over 90% of cases involve anterior instability [1].

It has been noted that players in the American and Australian football leagues as well as rugby players are at a higher risk due to the high level of contact required [2, 3]. Athletes in collision sports are known to have poorer outcomes in terms of recurrence and return to play following anterior arthroscopic stabilisation [4].

Gaelic football and hurling are two of the most common sports played in Ireland. Although there are no professional athletes currently, both sports are played to a high standard by amateur athletes. Similar to Australian rules football, a large part of the game requires overhead catching and fielding which can occur while receiving tackles from opposition players. Contact with the shoulder at maximum abduction poses a unique hazard to the glenohumeral joint, raising the potential for subluxation or dislocation events to occur. Studies on overhead athletes by Borsa et al. and originally

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by Kuitne et al. [5, 6] have shown adaptive changes to the capsuloligamentous complex which are likely due to the repetitive trauma to the glenohumeral complex. These studies looked at overhead non-collision athletes; however, it can be assumed that the added collision element of gaelic sports would contribute to further microtrauma over time and play a part in the higher rates of instability post-stabilisation. Research on outcomes in arthroscopic stabilisation has focussed on contact and collision sports; however, the outcomes in sports involving overhead contact are less well-known.

The aim of this study is to assess return to sport, level of play, recurrence and functional outcomes in gaelic football and hurling athletes undergoing arthroscopic anterior stabilisation in comparison with players of other sports. We also aim to assess if there are differences between overhead sport athletes and non-overhead sport athletes.

Methods

A retrospective review of consecutive patients who underwent arthroscopic anterior shoulder stabilisation was conducted from 2007 to 2016. All procedures were carried out by a single fellowship-trained orthopaedic surgeon. Inclusion criteria were patients over the age of 16 and under 50 years of age with recurrent instability as defined by glenohumeral instability without categorising extent or mechanism of injury (i.e. subluxation or dislocation) who underwent arthroscopic anterior stabilisation. Details of patient sporting activity and level of participation were recorded at the time of surgery and are shown in Table 1.

A mean follow-up of 5.5 years was achieved via telephone interview. The Western Ontario Shoulder Instability Index was used to assess patients' functional outcomes in four areas—physical symptoms, sport/work, lifestyle and emotion. A separate questionnaire was used to obtain return to sport, time to return, level of participation post-surgery and recurrence of instability/further dislocations. Patient consent was gained prior to obtaining information.

Patients received an interscalene regional block and a general anaesthesia. They were placed on the operating table in a

beach chair position and the spider (Smith & Nephew) arm support was utilised.

A diagnostic arthroscopy was initiated through a posterior viewing portal and the extent and location of the labour pathology were identified and noted. The Hill-Sachs lesion was assessed and the extent of the condition of the glenoid was assessed with reference to the bare spot note and any bone impaction was noted.

If the shoulder was deemed suitable for a soft tissue repair, an 8-mm anterior working portal was established with a cannula. A second working portal was established through the lateral aspect of the rotator interval (the anterior superior lateral portal) using a 6-mm cannula. The capsulolabral complex was elevated using a sharp liberator; the scorpion suture shuttle was utilised to secure the capsulolabral complex and a minimum of three 2.9-mm bioraptor anchors (Smith & Nephew). Post-operatively, patients were given an ice pack and a 2-week prescription of a non-steroidal anti-inflammatory and a paracetamol-based product. The shoulder was rested in a shoulder immobiliser for a total of 6 weeks. A four-phase rehabilitation programme was initiated from 0 to 2 weeks; patients were allowed to perform scapular setting exercises; elbow, wrist and hand exercises; and pendular exercises (Table 2). At 2 weeks, patients began an active assisted range of motion programme with a cuff isometrics. From 6 to 12 weeks, if the active assisted range of motion was satisfactory, patients were allowed to progress to an active range of motion programme if their passive range was acceptable. Towards the later stage of this phase, the patients were allowed to do balanced strengthening exercises if their range of motion had progressed. Between the 3 and 6 months (phase 4), a Graduate Strengthening Programme combined with proprioception exercises and sport-specific rehabilitation took place.

Statistical analysis was performed using Stata 14.2 (StataCorp. 2015. *Stata Statistical Software: Release 14*. College Station, TX: StataCorp LP.). *T* test was used to assess differences in WOSI scores between groups. Analysis of variance (ANOVA) was used to test means between groups and Fisher's exact test was used to look at differences between categorical data with a *p* value of less than 0.05 considered significant.

Table 1 Classification of sport participation (modified to include overhead sports as per the American Academy of Pediatrics Committee on Sports Medicine: Recommendations for participation in competitive sports – Pediatrics 1988)

	Contact/collision	Limited contact	Non-contact
Overhead	Gaelic football (<i>n</i> 23)	Basketball (<i>n</i> 1)	Swimming (<i>n</i> 2) Badminton (<i>n</i> 1) Golf (<i>n</i> 1) Weightlifting (<i>n</i> 1)
Non-Overhead	Hurling (<i>n</i> 8) Soccer (<i>n</i> 8) Rugby (<i>n</i> 4) Boxing (<i>n</i> 2)	Horse riding (<i>n</i> 3) Bicycling (<i>n</i> 1)	Running (<i>n</i> 1)

Table 2 Four-phase rehabilitation programme

Phase	Time	Treatment
1	0–2 weeks	<ul style="list-style-type: none"> • Scapular setting exercises • Elbow, wrist and hand exercises • Pendular movements
2	2–6 weeks	<ul style="list-style-type: none"> • Active assisted range of motion • Cuff isometrics
3	6–12 weeks	<ul style="list-style-type: none"> • Active range of motion programme • Balanced strengthening exercises
4	12–24 weeks	<ul style="list-style-type: none"> • Graduate strengthening programme • Proprioception • Sport-specific rehabilitation

Results

Ninety patients underwent the index procedure. Follow-up was obtained in 61 patients giving a response rate of 68%. Of the cohort, 53 (86.9%) were male and 8 (13.1%) were female. 91.8% were involved in sport at any level at the time of the initial injury with 5 patients (8.2%) not partaking in any sport. The mean age was 26.28 with a range of 16 to 48 years. A mean follow-up of 5.04 years was achieved (range 2–9 years). Ten patients (16.4%) developed further instability episodes including either dislocations or subluxations. Fifty-one patients did not experience any recurrence (83.6%).

The Western Ontario Shoulder Instability Index score was obtained at follow-up interview for each patient (Table 3). The mean score for the cohort was 21.64 (standard deviation 18.08, Min 0, Max 77.5).

There was no correlation between age and return to sport (p 0.89), post-operative instability (p 0.6) or return to same level of play (p 0.94).

Discussion

Athletes participating in contact and collision sports who undergo anterior stabilisation are known to have a higher risk of post-operative instability episodes [4, 7, 8]. Outcomes in

athletes involved in overhead sports are not as clear, and even less so for those playing overhead sports that sustain a high level of contact.

One of the main findings from our study was that 5 athletes (14.7%) involved in gaelic sports developed post-operative instability. Of those involved in non-overhead collision sports, one recurrence was recorded (8.3%), and 2 (18.2%) in the athletes in non-collision sports. There was no significance found when gaelic athletes were compared with the rest of the group (p 0.48). Studies on arthroscopic stabilisation of athletes have shown widely varying results when comparing open and arthroscopic techniques. Uhorchak et al. [9] quoted a failure rate of 23% in collision sport athletes treated with open stabilisation, defining failure as either recurrent subluxation or dislocations post-operatively. In contrast, Pagnani et al. [10] demonstrated a failure rate of 3% in a cohort of American football players treated with open stabilisation with all being subluxations and no dislocations recorded. Most recently Bonacci et al. [11] in 2017 compared open and arthroscopic stabilisation of Australian rules football players with a failure rate of 16% in the arthroscopic group and 9% in the open group. Other studies focusing on arthroscopic stabilisation only have shown more consistent results. Mazzocca et al. in 2005 [12] had an 11% recurrence rate in collision athletes when compared with non-collision. Similarly, Saper and Petrera had rates of 10% and 9% respectively [7, 8]. The use of arthroscopic stabilisation is becoming more favourable due to enhanced post-operative recovery, pain control and better cosmesis [13]. Our results show that similar success rates can be expected for athletes involved in overhead collision sports as for contact and collision sports with no overhead activity.

The time taken to return to sport and returning to the same level is of high importance to most athletes undergoing treatment for recurrent instability. Of the overhead collision athletes in our study, 28 (90.3%) returned to play at an average of 9.3 months. Of this group, 77.4% returned to the same level of play. Of the overhead non-collision athletes, 7 (58.3%) returned to play at an average of 10.1 months. Since the introduction of arthroscopic stabilisation techniques, a number of

Table 3 Outcome measures

Outcome	Overhead collision (n 31)	Non-overhead collision (n 14)	Non-collision (n 11)	<i>p</i> value
Recurrence	14.7% (n 5)	8.3% (n 1)	18.2% (n 2)	0.78
Mean WOSI score (SD)	17.87 (14.59)	21.27 (14.97)	22.54 (17.19)	0.77
Return to play	90.3% (n 28)	58.3% (n 7)	63.64% (n 7)	0.03
Average time to return (months)	9.32	10.07	9.43	0.76
Return to same level	77.4% (n 24)	91.6% (n 11)	81.8% (n 9)	0.9

SD standard deviation

studies have shown the clinical benefit of arthroscopic versus open techniques regarding return to sport. Blonna et al. randomised 60 athletes with recurrent instability into treatment with an open Latarjet or arthroscopic Bankart repair with 30 in each group [14]. Patients treated arthroscopically achieved better return to sport rates and higher sports and subjective shoulder value scores than treatment with an open approach. Referring again to Bonacci's study of Australian Football League athletes, return to sport at an elite level was longer in the open group compared with the arthroscopic group although just by 2 weeks [11]. Pantalone et al. treated 25 professional athletes arthroscopically and 21 using an open approach, finding that the open group returned to play later than the arthroscopic group by an average of 2 weeks [15]. Gerometta et al. looked at 46 patients undergoing arthroscopic stabilisation and noted an average return to play of 9.8 ± 5.4 months with 95.7% returning to the same level of competitiveness [16]. Return to the same level of play rates of 73% and 78.1% in collision athletes can be expected based on findings from previously mentioned studies by Petrera and Saper respectively [7, 8]. The literature would suggest that an arthroscopic approach to recurrent instability provides the athlete with a higher chance of returning to play at the same level in a shorter period of time than if treated using an open approach. From our experience, the results for overhead collision athletes were excellent in terms of return to play and level of return and were similar to rates for collision athletes with no overhead activity.

Patient satisfaction as measured by the Western Ontario Shoulder Instability Index (WOSI) was generally favourable for athletes involved in overhead contact sports. These athletes had a mean WOSI of 17.9 compared with 21.3 for overhead non-collision athletes. Non-collision athletes had a mean score of 22.5.

It has been shown by Blonna et al. in their study of 60 patients that WOSI scores were universally lower in those treated with arthroscopic stabilisation compared with open techniques [14]. Gerometta also showed favourable WOSI scores in their cohort of athletes treated with arthroscopic stabilisation, and proved its positive correlation with patient satisfaction [16]. We have shown that overhead collision athletes are generally satisfied with outcomes after this procedure, and although significance was not reached when compared with other groups, this is reassuring given the potentially more severe instability episodes occur in this group.

Conclusion

Athletes with recurrent glenohumeral instability involved in overhead collision sports can be treated effectively with arthroscopic stabilisation. Repetitive trauma with the

shoulder at maximal abduction places the glenohumeral complex at an increased risk of microtrauma and the development of instability. Despite this, our results show similar results when compared with collision athletes treated with arthroscopic stabilisation from the literature. Most of these patients can expect to return to sport at a similar level with high satisfaction and low recurrence rates.

Compliance with ethical standards

Patient consent was gained prior to obtaining information.

Conflict of interest The authors declare that they have no conflict of interest.

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