

Surgical interventions for anterior shoulder instability in rugby players: A systematic review

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literature on surgical treatment interventions for elite rugby players with anterior shoulder instability.

METHODS: We conducted a systematic review according to the PRISMA guidelines. A literature search was performed in PubMed, EMBASE and Google Scholar using the following search terms: "rugby" and "shoulder" in combination with "instability" or "dislocation". All articles published from inception of the included data sources to January 1st 2014 that evaluated surgical treatment of elite rugby players with anterior shoulder instability were examined.

RESULTS: Only five studies were found that met the eligibility criteria. A total of 379 shoulders in 376 elite rugby union and league players were included. All the studies were retrospective cohort or case series studies. The mean Coleman Methodological Score for the 5 studies was 47.4 (poor). Owing to heterogeneity amongst the studies, quantitative synthesis was not possible, however a detailed qualitative synthesis is reported. The overall recurrence rate of instability after surgery was 8.7%, and the mean return to competitive play, where reported, was 13 mo.

CONCLUSION: Arthroscopic stabilization has been performed successfully in acute anterior instability and there is a preference for open Latarjet-type procedures when instability is associated with osseous defects.

Key words: Shoulder; Instability; Dislocation; Rugby; Latarjet

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Core tip: Arthroscopic stabilization can be performed successfully for acute anterior instability and an open Latarjet procedure is preferred where there is instability associated with an osseous defect. Interestingly, within the latter group a large proportion of patients do not return to competitive play following their surgery. The

Abstract

AIM: To systematically evaluate the evidence-based

evidence base in this field is based on a limited number of studies which lack methodological rigor. As shoulder instability represents a serious musculoskeletal injury within competitive level rugby, there is a need for well-designed trials or sports medicine registries, to better inform orthopaedic surgeons on the management of this cohort of patients.

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INTRODUCTION

The glenohumeral joint is the most mobile joint in the human body owing to its relative lack of osseous constraint^[1]. The incidence of shoulder dislocation in the general population is estimated at between 23.9 and 56.3 per 100000 person-years^[2,3]. The incidence of instability is double this number in athletes^[4]. The largest and most current descriptive epidemiological study in young athletes found that the probability of at least one shoulder instability event per year is 2.8%^[5]. Although shoulder instability in professional rugby union accounts for 0.03 injuries per 1000 player-hours, only anterior cruciate ligament injuries cause more days of absence from competitive play^[6].

Existing literature on anterior shoulder instability supports primary repair in young and active patients owing to a lower risk of recurrent instability compared to conservative treatment^[7]. More recent research demonstrates superiority of open repair over arthroscopic repair in younger male patients in relation to recurrence of instability^[8]. Comparative analysis of popularized techniques such as Bristow-Latarjet and Bankart repairs has shown improved clinical outcomes in the former procedure irrespective of the presence of an osseous lesion^[9].

Research with a focus on treatment interventions in collision athletes most commonly describes sports such as judo, American football, wrestling and soccer^[10,11]. The mechanisms of shoulder instability in elite rugby players have been described as "try scoring" with a hyperflexed outstretched arm, "tackling" with extension and adduction of the arm, and "direct impact" when there is a compressive force applied to an adducted, internally rotated arm^[12]. Although similarities in mechanisms of injury exist with American football^[13], the collision forces acting on the shoulder are likely to be different owing to protective equipment worn by football players which are thought to contribute to a significant risk reduction of shoulder injuries when compared to rugby^[14]. With the exception of Australian Rules football, the biomechanics of shoulder instability injuries in rugby players is therefore probably distinctive from other collision sports

and there is clinical value in research on treatment interventions that specifically focuses on this group of athletes. This study aims to systematically evaluate the evidence-based literature on surgical treatment interventions for elite rugby players with acute and recurrent anterior shoulder instability.

MATERIALS AND METHODS

Review protocol

This study was performed in accordance with the guidelines from the preferred reporting items for systematic reviews and meta-analyses (PRISMA)^[15].

Search strategy and information sources

A literature search was performed in PubMed, EMBASE and Google Scholar using the following search terms: "rugby" and "shoulder" in combination with "instability" or "dislocation". The time horizon for search was performed from inception of the databases to January 1st 2014. The last date the search was performed was the 1st July 2014. A summary of the search strategy is shown in Figure 1.

Inclusion and exclusion criteria

Studies that described a surgical treatment intervention for elite rugby players with anterior shoulder instability were included. Elite rugby players were defined as professional or semi-professionals who participated in both rugby league or rugby union. Studies that described surgical treatment interventions in collision athletes in which there was a sub-group of elite rugby players with their own clinical outcomes specifically reported were also included. Only studies with a minimum follow up of 12 mo were included. Clinical and biomechanical studies were deemed eligible for evaluation. Case reports, expert opinion and personal observations were excluded.

Data extraction

Two investigators (Sabharwal S and Patel NK) independently extracted the following data using a standardized spreadsheet: study title, authorship, year of publication, level of evidence according to the Oxford Centre for Evidence Based Medicine^[16], country of origin of research, number of players, type of anterior instability (acute/recurrent), descriptions and frequency of osseous lesions, mean age of surgery, mean time to surgery from injury, surgical stabilization technique, post-operative rehabilitation description, number of players that returned to competition at the same level, mean time for return to full training, mean time for return to competitive match, post-operative evaluation tools and summary, incidence of recurrence of instability, post-operative complications and mean follow up. Patients with acute instability were defined as those who received treatment after a first episode of dislocation. Discrepancies between data extracted by the two investigators were reviewed and corrected. Where there was disagreement on data

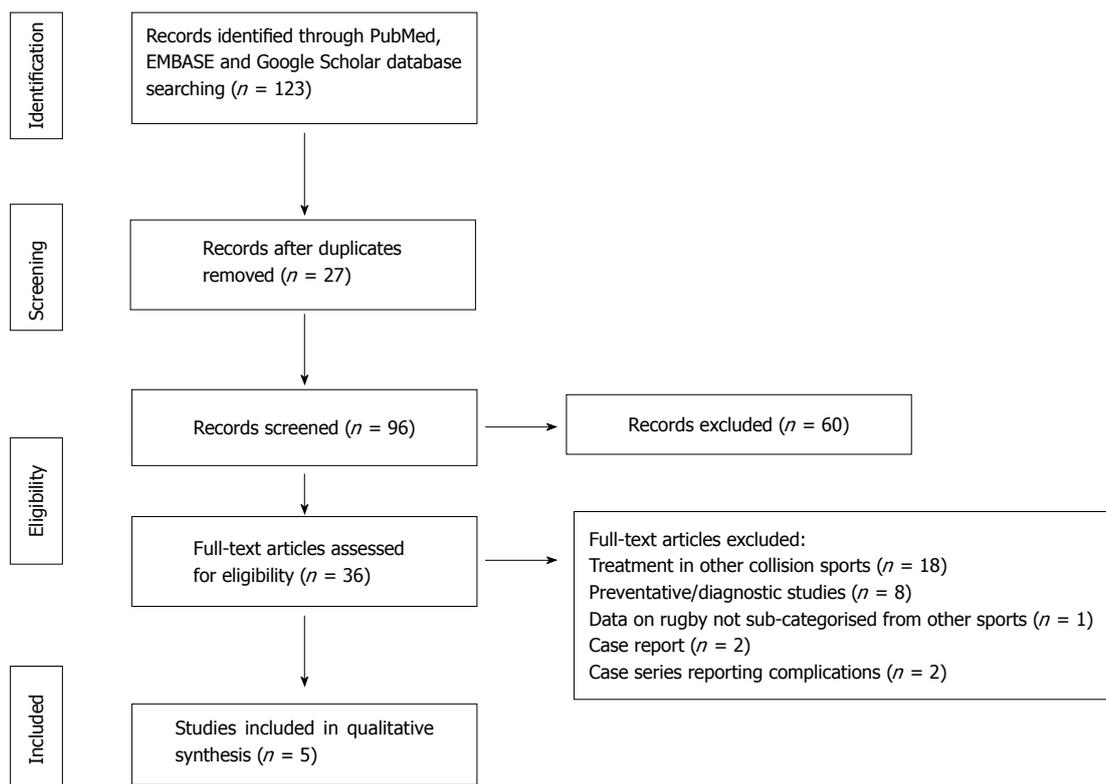


Figure 1 PRISMA flowchart showing search strategy for this study.

extracted, consensus was reached after discussion with a senior author (PR).

Quality assessment and risk of bias of individual studies

Study quality was assessed using a modified Coleman Methodology Score (CMS). The CMS is a quality assessment tool that was initially used to grade methodology in patellar tendinopathy studies^[17]. It has subsequently been adapted to a wide variety of musculoskeletal research^[18,19] and more recently has been used in evaluating methodology of shoulder instability studies^[20]. There are 10 criteria that are evaluated giving a total score from 0 to 100 points. A study that scores 100 represents clinical research that largely avoids chance, biases and confounding factors. Studies can be categorized as excellent (85-100), good (70-84), fair (50-69) and poor (< 50)^[20]. Two investigators (SS and NKP) independently scored the included studies using the modified CMS (Table 1).

Statistical analysis

Descriptive statistics were produced and data were analyzed in SPSS 21.0 (SPSS Inc, Chicago, IL). Inter-rater reliability for the modified CMS was assessed with a Pearson's R coefficient. An average of the two investigators' scores for each study was presented in the results.

RESULTS

In total only five studies were found that met the eligibility criteria of this systematic review (Table 2).

Bonneville *et al.*^[21] reported on 31 rugby players with recurrent shoulder instability and their data formed part of a subsequent study by Fabre *et al.*^[22] that examined outcomes in 49 contact athletes^[21,22]. To ensure the same patient group was not included twice, the latter group's article was excluded from our analysis. All the studies were retrospective cohort or case series studies (Level of Evidence IV). A total of 368 shoulders in 365 elite rugby union and rugby league players were included. Overall, the mean age at surgery was 23.2 years, with a range from 16 to 35 years (Table 3). The mean duration of follow up was 72 mo, with a range of 17 mo to 237 mo (Table 4). Return to competitive play was reported in 230 out of 269 patients (85.5%) at a mean time of 13 mo, with a range of 2 to 24 mo. Recurrence of instability occurred in 32 of the 368 cases (8.7%).

A complete sub-group comparison of all pathology and treatment related recurrence rates was not possible because of lack of specific descriptions within some of the studies. However, where reported recurrent instability after surgery occurred in only 1 out of 41 (2.4%) reported cases of acute instability and 16 out of 231 (6.9%) cases of chronic or recurrent shoulder instability. Furthermore, recurrence of instability after arthroscopic surgery was reported in only 2 out of 39 (5.1%) cases compared to reported recurrences in 14 out of 84 (16.7%) cases after an open surgical technique was performed. Recurrence after soft tissue surgical techniques were adopted occurred in 7 out of 133 (5.2%) cases and recurrence after a Latarjet procedure was performed occurred in 14 out of 77

Table 1 Modified Coleman Methodology Scoring system used to assess methodological quality of the studies included in this review

Only one score to be given for each of 7 sections		
Study size	< 20	0
	20-50	4
	51-100	7
	> 100	10
Mean follow up	< 12 mo	0
	12-36 mo	4
	37-60 mo	7
	> 61 mo	10
Surgical or conservative approach	Different approach used and outcome no reported separately	0
	Different approaches used and outcome reported separately	7
	Single approach used	10
Type of study	Retrospective cohort	0
	Prospective cohort	10
	Randomised controlled trial	15
Description of indications/ diagnosis	Described without % specified	0
	Described with % specified	5
Description of surgical or conservative technique	Inadequate (not stated, unclear)	0
	Fair (technique only stated)	5
	Adequate (technique stated, details of surgical or conservative procedure given)	10
Description of postoperative rehabilitation	Described	5
	Not described	0
Scores may be given for each option in each of the 3 sections if applicable		
Outcome criteria	Outcome measures clearly defined	2
	Timing of outcome assessment clearly stated	2
	Use of outcome criteria that has reported reliability	3
	General health measure included	3
Procedure of assessing outcomes	Participants recruited	5
	Investigator independent of surgeon	4
	Written assessment	3
	Completion of assessment by patients themselves with minimal investigator assistance	3
Description of subject selection	Selection criteria reported and unbiased	5
	Recruitment rate reported > 90%	5
	≤ 90%	0

Table 2 Summary table on each study's demographics

Ref.	Journal	Level of evidence	Country	No. of players (shoulders)	Type of instability	Osseous lesion(s)
Neyton <i>et al</i> ^[23]	<i>Journal of shoulder and elbow surgery</i>	IV	France	34 (37)	Recurrent, anterior	Bony Bankart 18/37, Hills-Sachs 25/37
Bonneville <i>et al</i> ^[21]	<i>Rev Chir Orthop Reparatrice Appar Mot</i>	IV	France	31	Recurrent, anterior	None
Larrain <i>et al</i> ^[26]	<i>Arthroscopy</i>	IV	Argentina	198	Acute anterior instability (40), recurrent anterior instability (158)	Large bony defect: Bony Bankart 16/198, Hills-Sachs 2/198, Combined 9/198 Small bony defect: Bony Bankart < 25% 36/198, Hills Sachs < 1/4 172/198 1/6 Bony bankart
Goldberg <i>et al</i> ^[24]	<i>British Journal of Sports Medicine</i>	IV	Australia	6	Acute anterior instability (1/6), chronic recurrent (5/6), all patients had rotator cuff tears	1/6 Bony bankart
Burkhart <i>et al</i> ^[25]	<i>Arthroscopy</i>	IV	United States/ South Africa	96	Anterior instability acute and recurrent	8/96 Bony Bankart and Hill-Sachs

(18.2%) cases. It was observed that where open procedures were performed instead of arthroscopic procedures, or a Latarjet procedure in preference of soft tissue stabilization, the patients groups were more likely to have osseous defects.

Soft tissue lesions and bone defects

Descriptions of soft tissue and bone defects were found to be incomplete in a majority of the studies^[21,23-25].

Soft tissue Bankart lesions were reported in three studies^[21,24,26] in which they were identified in 208 (88.5%) out of 235 shoulders. The presence of a bony Bankart and Hills-Sachs lesion was described in two studies that evaluated a total of 235 shoulders^[23,26]. Cumulatively, they reported 79 (33.6%) bony Bankarts and 199 (84.7%) Hills-Sachs lesions. One study examined instability in conjunction with rotator cuff injury and reported a supraspinatus tear in all 6

Table 3 Summary table on mean age of rugby players, time to surgery, surgical procedure, return to match play and post-operative rehabilitation

Ref.	Mean age of player at surgery Years (range)	Mean time to surgery Months (range)	Type of stabilization	Post-operative treatment	No. of players that returned to competition after surgery	Mean return to competitive match
Neyton <i>et al</i> ^[23]	23.4 (17-33)	40 (3-163)	Latarjet-Patte procedure (Anterior instability)	Sling for 15 d with passive exercises and no limitation on external rotation. Return to rugby advised at 3 mo	22/34	7 mo (3-24)
Bonneville <i>et al</i> ^[21]	21 (16-34)	4.44 (2-20)	Open Bankart capsular repair	Immobilisation Velpeau bandage for 2-3 wk. No formal physiotherapy	30/31	4.6 mo (2-8)
Larrain <i>et al</i> ^[26]	22 (16-35)	For acute (all within 3 wk, Recurrent not specified)	Arthroscopic acute (39/40) Mini open acute (conversion from arthroscopic 1/40) Arthroscopic recurrent (121/158) Open recurrent (Latarjet 37/158)	Not stated	Acute 40/40 Recurrent 133/158	Acute: 5.3 mo (4-7) Recurrent: 7.5 mo (5.5-9)
Goldberg <i>et al</i> ^[24]	26.5 (23-29)	Not stated: Mean time between presentation and operation 5.9 d (2-15)	2 Stage Open RC suture repair and approximately 9 wk later open capsular repair/osseous bankart repair	After RC repair: sling immobilisation for 6 wk with passive ROM exercise at 3 d. At 6 wk active exercise programe. After Stabilisation: 6 wk immobiisation then passive ROM exercises and light weights after 4 mo	5/6 players (1 player retired because of other injuries)	9 mo
Burkhart <i>et al</i> ^[25]	Not specified for rugby players	Not specified for rugby players	Arthroscopic capsular ± open capsular shift or Latarjet for when osseous lesion present	3 wk immobilisation in a sling, forward flexion at 3 wk, ER at 6 wk, Strengthening at 8 wk	Not stated	Not stated

ROM: Range of motion.

Table 4 Summary table on patient outcomes, recurrence of instability, complications and study quality

Ref.	Post-operative evaluation tools	Recurrence of instability	Complications	Mean follow up months (range)	Mean Coleman Methodology Score
Neyton <i>et al</i> ^[23]	Radiographic, Walsh-Duplay score (mean 86), Rowe score (mean 93), VAS score (mean 1.6)	0/37	3/37 (1 glenoid fracture, 1 post op haematoma, 1 pseudoarthrosis of bone block)	144 (68-237)	58
Bonneville <i>et al</i> ^[21]	Mean external rotation decreased 6.2 degrees, Rowe (excellent for 86%), Walsh-Duplay (excellent for 80%), patient satisfaction (88%), Samilson radiographic degeneration in 32%	6/31	None stated	82 (60-120)	48
Larrain <i>et al</i> ^[26]	Acute: Rowe 33/40 excellent, 4/40 good, 2/40 poor Recurrent: Rowe 105/158 excellent, 6/158 good, 10/158 poor)	Arthroscopic acute (2/40) Recurrent (10/158)	1/198 (radial paraesthesia)	68.4 (39.6-99.6)	55
Goldberg <i>et al</i> ^[24]	ROM normal except external rotation 70% and internal rotation 60% compared to contra-lateral side	0/6	None	34.3 (12-50)	42.5
Burkhart <i>et al</i> ^[25]	Not stated	Non osseous lesion (6/87 re-dislocated), osseous (8/9 re-dislocated)	Not specified	Not stated	35

ROM: Range of motion.

patients included in their case series^[24].

Outcome measures

A number of different outcome measures were reported in the included studies (Table 4). The most commonly adopted was the Rowe score for shoulder instability that was used in 3 (60%) of the 5 studies. The Walch-

Duplay Score was reported in 2 studies. There were two studies that did not adopt any patient reported outcome measures^[24,25].

Acute anterior instability

The surgical management of acute anterior instability was described in 3 studies^[24-26]. Interpretation of the

results of two of these studies is challenging because Burkhart *et al.*^[25] did not clearly differentiate their population of rugby players with acute instability from those with recurrence. However, this study did state that of the 87 rugby players that underwent an arthroscopic capsular repair, there were 6 (6.9%) that had a recurrent episode of instability and amongst the 9 players that had an open capsular shift or Latarjet procedure, there were 8 (88.9%) that had recurrent instability. Goldberg *et al.*^[24] described a two-stage procedure for management of rotator cuff injury associated with acute anterior instability in 6 players. None of the players were reported to have gone on to re-dislocate their shoulder. Only Larrain *et al.*^[26] clearly described the surgical management of acute anterior instability in rugby players in the absence of other significant shoulder pathology. There were 40 patients that underwent acute arthroscopic repair within 3 wk of the patient's first dislocation. A modification of the suture anchor technique described by Synder and Strafford was performed by the surgeons in this study^[26]. One of the cases was converted to a mini-open procedure intra-operatively for a humeral avulsion of the glenohumeral ligament (HAGL) reinsertion. Post-operative rehabilitation was not described, however all 40 rugby players returned to competitive play 7 mo after their surgery. Within this group of players 2 (5%) had a recurrent dislocation whilst playing rugby within 2 years of surgery.

Recurrent anterior instability

Surgical intervention for recurrent anterior instability was described in 4 of the studies^[21,23,25,26]. Burkhart *et al.*^[25] reported on the combined results of both acute and recurrent anterior instability. Neyton *et al.*^[23] performed a Latarjet-Patte procedure on 37 shoulders in 34 rugby union players. A bony lesion on the glenoid was present in 27 (73%) cases, of which 18 (48.6%) were reported to be glenoid fractures. Only 22 (64.7%) players returned to play competitive rugby and the mean time of return to match fitness was 7 mo (range 3-24). The authors reported that only 1 of the 12 players stopped competitive rugby because of a problem related to his shoulder. This patient had apprehension to contact. The remaining 11 patients were reported to have retired from competitive rugby because of reasons independent from their operated shoulder. None of the patients had a recurrence of their instability at a mean follow up of 144 mo (range 68-237).

Bonnevalle *et al.*^[21] performed an open Bankart repair for recurrent instability in 31 rugby players. The authors reported that none of the players had a major bony Bankart or Hills-Sachs lesion. Thirty (96.8%) of the players returned to competitive match play at a mean time of 4.6 mo (range 2-8). There were 6 (19.4%) cases of recurrence of dislocation whilst playing rugby that occurred on average 3.8 years (range 0.5-6) years after surgery.

Larrain *et al.*^[26] reported on the management of 158 shoulders in rugby players with recurrent anterior instability^[26]. Players were managed with a modified Latarjet procedure, or an arthroscopic suture anchor technique that they also used for their patients with acute anterior instability. A specific exclusion criteria for arthroscopic reconstruction in their study included; bone loss > 25% on the glenoid, a Hills-Sachs lesion comprising greater than one quarter of articular head, capsular laxity with poor quality tissue and the presence of a HAGL. Of the 121 arthroscopic cases for recurrent anterior instability, there were 10 (8.3%) recurrences of instability which fared slightly worse than the 2 (5%) cases of recurrence in their acute anterior instability cohort. There were no cases of recurrent instability in the group of patients that underwent a modified Latarjet procedure. One hundred thirty-three (84.2%) of the 158 players with recurrent anterior instability returned to competitive match play at a mean time of 7.5 mo (range 5.5-9). The authors did not provide data on how this differed between open and arthroscopic surgery.

Complications

Complications were reported in only 4 of the studies^[23,24,26] (Table 4). There was an overall complication rate of 1.7% (5 out of 290 patients). In Neyton *et al.*^[23]'s study, 3 patients had a fracture of the bone block observed on radiographs taken 3 mo postoperatively and one of these patients required revision surgery. Larrain *et al.*^[26] had one case of radial nerve paraesthesia which resolved after 9 mo.

Quality assessment

A comparison of each CMS domain scores between the two raters using a Pearson's correlation was 0.966, indicative of strong inter-rater reliability. The mean CMS score for the 5 studies included in this systematic review was 47.4 (range 35-58) (Table 4). None of the studies had "excellent" (85-100) or "good" (70-84) CMS scores. Two studies had a "fair" CMS score (55-69) and 3 had a "poor" CMS score (< 55).

DISCUSSION

This systematic review has found that there is a dearth of published evidence that evaluates surgical interventions for shoulder instability in the elite rugby player. The few studies that exist are based on retrospective cohort or case series, and on average their methodological quality is poor. Considerable heterogeneity between the 6 studies means that inference of overall outcomes, instability recurrence rates and complications rates has limitations.

Larrain *et al.*^[26] produced the most comprehensive analysis on treatment of acute anterior shoulder instability. Amongst the 40 rugby players that underwent arthroscopic capsular repair there were only 2 (5%) episodes of recurrent instability. These results compare

favorably to a cited recurrence rate of 11% in the general population^[27] and 14.3% in young athletes^[28] treated with arthroscopic stabilization repairs for acute anterior instability. Interestingly, Larraine *et al*^[26] found that amongst the 121 patients who underwent arthroscopic stabilization for recurrent instability the results were slightly poorer as 10 (8.3%) players sustained a subsequent dislocation. Higher rates of dislocation are reported after arthroscopic surgery for patients with recurrent instability in other collision sports. Mazzoca *et al*^[10] reported on a case series of 13 collision athletes (American football) who underwent arthroscopic stabilization for recurrent anterior shoulder instability and 2 (15%) experienced a recurrent dislocation. Larrain *et al*^[26] described specific criteria for patients undergoing arthroscopic surgery, and therefore it is unlikely that underlying osseous pathology contributed to a higher risk of dislocation in the group with recurrent instability. Existing evidence indicates that there is no difference in recurrence among patients undergoing arthroscopic stabilization after primary dislocation compared with those who have surgery after multiple recurrent episodes^[29]. This research is based on general population studies and this limits its applicability to collision athletes or rugby players. Repeated traumatic dislocations in rugby may attenuate anterior soft tissue structures in the shoulder and make delayed arthroscopic surgery more difficult. Furthermore it is possible that there is more disruption to sporting activities from recurrent instability and apprehension that occurs in players treated conservatively after their first dislocation. Such factors lend credence to the hypothesis that early arthroscopic stabilization in rugby players may result in better clinical outcomes and earlier return to competitive play. Future research within this domain should test this hypothesis from a clinical viewpoint as well examine the financial impact on both player and club.

Open anterior stabilization surgery is recommended in young male patients and has been demonstrated to be more favorable than arthroscopic surgery in collision athletes based on a lower incidence of recurrence of instability^[8,30]. With the exception of a single mini open procedure performed for a HAGL by Larrain *et al*^[26], only Bonneville *et al*^[21] performed open capsular repair on their patients with anterior instability. Their study reported that 19.4% of rugby players had a subsequent dislocation. This is more than twice the recurrence rate Larrain *et al*^[26] presented in their cohort of rugby players treated with arthroscopic capsular repair and considerably higher than the results of an American study that reported a recurrence rate of 3% for open capsular repair in American football players with recurrent anterior instability^[31]. Heterogeneity between the studies in our review and the limitations of their methodological quality underline the need for rugby specific studies to reliably inform clinicians whether a significant difference in outcome exists between open and arthroscopic anterior shoulder stabilization.

Two of the three studies that described a Latarjet type procedure for anterior shoulder instability stated it was performed for specific indications related to bone loss on the glenoid. Although Burkhart *et al*^[25] reported 8 recurrent dislocations out of their 9 patients, there were no subsequent episodes of instability in the 64 shoulders operated on in the other 2 studies^[23,26]. Despite the apparent success of restoring shoulder stability, both these studies reported that a large number of players were not able to return to a competitive level. Bony stabilization for anterior shoulder instability is often considered the gold-standard treatment especially in cases where there are osseous defects, however they are associated with a 30% complication rate^[32]. More evidence is needed to establish whether it offers any benefit over capsular repair when osseous defects are not present, and specifically whether it can achieve stability in rugby players and allow them to return to their previous sporting level.

Over the last decade there has been a significant increase in publication of Level I and II evidence in sports medicine and orthopaedic surgery^[33,34]. As a result of the potential of serious injury and disability, the management of head and neck injury has been the focus of much of the current clinical research that is ongoing in rugby^[35-37]. Research evaluating shoulder instability in rugby players may be lacking because of the perception that the disability that follows such an injury is not common or severe enough to warrant the effort and financial cost of research. Epidemiological research in English professional rugby union has shown that on average, shoulder instability is the second most severe musculoskeletal injury after ACL rupture in terms of absence from competitive play, and results in a mean time of 22.4 wk of absence from training or match play^[6]. Furthermore, many of the studies identified in this review have demonstrated that a concerning proportion of players are unable to return to their previous level of sport and are forced to retire soon after surgery. Professional rugby has been transformed over the last 20 years and the revenue of the Rugby Football Union in the 2012/2013 financial year was £153.5 million^[38]. Responsible professional bodies have financial and ethical interests in supporting research related to the prevention and management of injuries sustained by their athletes. This is often seen in football, for example, where the Fédération Internationale de Football Association funds clinical research in football players^[39].

Prospective randomized trials comparing interventions such as arthroscopic versus open capsular repair in rugby players would be the gold-standard model for future research, however the creation of professional rugby association health databases, similar to the National Basketball Association epidemiological database in the United States^[40], would also provide important retrospective data on outcomes of treatment. Furthermore biomechanical laboratory and computer simulation studies that are tailored to the forces exerted

on a rugby player's shoulder^[41] and compare stability and function after different surgical procedures would also offer important information on optimal management.

Limitations

The main weakness in this study relates to a lack of existing research within this field which has limited our ability to draw conclusions on the benefit of different treatment interventions. The 5 studies we identified were heterogeneous in patient selection, pathologies and measurement of outcome measures. Despite this, we adopted recognized methodology to systematically reviewing the evidence in this field^[15] and this has allowed us to summarize successful management techniques as well as recurrence rates of instability cited by different studies.

Conclusion

Existing research that evaluates surgical treatment interventions for shoulder instability in elite rugby players is limited. Arthroscopic stabilization has been performed successfully in acute anterior instability and there is a preference for an open Latarjet procedure when instability is associated with osseous defects, however the current evidence base consists of a small number of studies with poor methodological quality. Clinicians are likely to continue to inform their practice using research that is based on other collision sports or general population studies. This paper underlines aspects of treatment that future clinical and basic science research should be directed towards in order to improve management of one of the most severe musculoskeletal injuries in elite rugby players.

COMMENTS

Background

Anterior shoulder instability is one of the most severe musculoskeletal injuries in elite-level rugby in terms of days of competitive play lost. The biomechanics of this injury are distinct from other contact sports and therefore research with a focus on rugby players may have more clinical applicability.

Research frontiers

To the best of our knowledge, no systematic review evaluating treatment options for anterior shoulder instability in rugby players has been published. The aim of this study was to systematically review all published studies that investigated surgical management for anterior shoulder instability in elite rugby players.

Innovations and breakthroughs

Arthroscopic stabilization for acute anterior instability has been performed successfully in a few clinical studies. A Latarjet-type procedure is performed preferentially when there is an osseous defect associated with the instability, however a large proportion of rugby players with such injuries do not return to competitive level sports.

Applications

Although this study can inform clinicians on proven surgical techniques such as arthroscopic stabilization in the case of acute anterior instability, or Latarjet-type procedures where there an osseous defect, the results also provide realistic rehabilitation timeframes and return to match play information based on the current evidence base. Importantly, the limitations in currently available evidence, underlines aspects of treatment that future clinical and basic science research should be directed towards in order to improve management of one of the most severe musculoskeletal injuries in elite rugby players.

Terminology

A Bankart lesion is an injury of the anterior-inferior glenoid labrum that occurs due to an anterior shoulder dislocation. It predisposes the shoulder to further episodes of anterior instability. A bony Bankart is a fracture of the anterior-inferior glenoid rim that may accompany this injury. A Latarjet procedure is a surgical procedure often used to treat a bony Bankart lesion, in which a section of the coracoid process and its attached tendons are transferred to the anterior aspect of the glenoid to prevent ongoing anterior instability.

Peer-review

This manuscript is well organized and written.

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