

# Outcomes at Long-term Follow-up After Open Latarjet Versus Open Bankart Repair in Rugby Players

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**Background:** Because rugby is a collision sport, it exposes players to a high risk of recurrence after anterior shoulder stabilization. Therefore, the choice of surgical procedure warrants close attention in order to optimize the time to return to sport and the stability of the shoulder throughout the player's career.

**Hypothesis:** The open Latarjet procedure would allow for a faster return to play and provide a lower rate of recurrence than the open Bankart repair at long-term follow-up.

**Study Design:** Cohort study; Level of evidence, 3.

**Methods:** The study retrospectively enrolled 62 competitive rugby players who had undergone an anterior shoulder instability procedure and had at least 5 years of follow-up data. A total of 32 players treated with an open Bankart repair (BK group) were compared with 30 players (31 shoulders) treated with an open Latarjet procedure (LT group). Outcomes between groups were compared with the Rowe score, Walch-Duplay score, recurrence rate, and osteoarthritis evaluation on plain radiograph (Samilson classification).

**Results:** The recurrence rate was significantly higher at 18.8% for the BK group (mean follow-up, 6.9 ± 1.7 years) compared with 3.3% for the LT group (mean follow-up, 6.2 ± 1.4 years) ( $P = .04$ ). No postoperative complications occurred in the BK group, whereas 1 infection and 1 hematoma required a second surgery in the LT group ( $P = .14$ ). In the BK and LT groups, 97% and 90% of players, respectively, were able to return to rugby at the same level or higher ( $P = .27$ ), at a mean time of 8 and 6.3 months, respectively ( $P = .03$ ). The mean Rowe and Walch-Duplay scores were not significantly different between the groups; however, the osteoarthritis rate was significantly higher in the BK versus the LT group (68% vs 38%, respectively;  $P = .03$ ); 23% of patients, all in the BK group, had Samilson grade 2 osteoarthritis.

**Conclusion:** The open Latarjet procedure outperformed the open Bankart procedure in terms of stability, time to return to play, and radiological outcomes at long-term follow-up in competitive rugby players.

**Keywords:** rugby; contact sport; collision sport; shoulder instability; Bankart; Latarjet

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Ethical approval for this study was obtained from Toulouse University Hospital (No. RnIPH 2019-20).

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Rugby is a collision sport with a high risk of shoulder injury, especially during tackles. The rate of shoulder injury in this patient population is reported to be 28% of total injuries and 66% of upper limb injuries.<sup>18,19</sup> A rugby player has a 2.7 times higher risk of shoulder injury than a soccer player during a competition.<sup>17</sup>

In the case of anterior shoulder instability, surgical stabilization is generally required in order to optimize performance on the field and for career success.<sup>6,7,11</sup> The open Bankart repair based on an isolated soft tissue procedure was reported to fail in 1.6% to 23% of cases over the long term.<sup>4,5,10,25,32,36</sup> In contrast, the Latarjet procedure has a failure rate of 0% to 8.5% but has a greater risk of short-term complication.<sup>9,16,26,29,30</sup> At long-term follow-up, osteoarthritis was reported to be a concern, and technical issues after a Latarjet procedure were highlighted as clear risk factors.<sup>8,23</sup>

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The aim of our study was to compare clinical and radiological outcomes in a specific patient population of rugby players after anterior shoulder stabilization using an open Bankart or Latarjet procedure. We hypothesized that the open Latarjet procedure would allow for faster return to play and provide better clinical outcomes with a lower rate of recurrence at long-term follow-up.

## METHODS

### Study Design

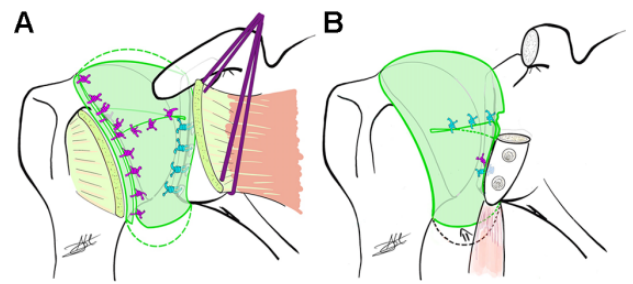
Institutional review board approval was obtained for the study protocol, and all of the participants provided informed consent. In a retrospective single-center design, we enrolled patients between January 1995 and December 2017 who (1) underwent surgery for anterior shoulder instability, (2) were rugby players at a competitive level, and (3) had a minimum follow-up of 5 years. Exclusion criteria were concomitant other pathologies of the shoulder (superior labral anterior-posterior lesion, cuff tear) or revision surgery. Between January 1995 and December 2001, the surgeons exclusively performed open Bankart repair. Our institution lost trained shoulder surgeons during the time period between December 2001 and January 2014. Between January 2014 and December 2016, the surgeons determined which procedure to perform based on their own preference.

From a database of 245 shoulders that underwent surgery for anterior shoulder instability during the inclusion period (1995-2001,  $n = 161$ ; 2014-2016,  $n = 84$ ), 35 players treated with open Bankart repair (BK group) and 31 players treated with open Latarjet procedure (LT group) met the inclusion and exclusion criteria. Because 3 of the 35 players (8.6%) in the BK group and 1 of the 31 players (3.2%) in the LT group declined to be reviewed or were lost to follow-up, 62 players (63 shoulders) were ultimately included in the statistical analysis: 32 players in the BK group and 30 players (31 shoulders) in the LT group.

### Surgical Technique

All the procedures were performed by well-trained surgeons (N.B., P.M.) who specialized in shoulder surgery. Patients were placed in the beach-chair position with a head rest. General anesthesia was combined with regional anesthesia using an interscalene nerve block.

For the open Bankart procedure, an anterior deltopectoral approach was used, and the subscapularis tendon was incised in an L-shaped fashion, preserving the distal one-third just above the circumflex vessels. The subscapularis tendon was then separated carefully from the anterior capsule using scissors in the coronal plane, with the shoulder in external rotation. A vertical capsulotomy was performed on the humeral side, 1 cm medial to its insertion on the humerus. Bankart lesions were reattached to the glenoid rim with 3 or 4 suture anchors. Then, a capsular shift using the Neer<sup>27</sup> technique was performed. A horizontal capsulotomy was added to the vertical one, creating a lateral



**Figure 1.** (A) Open Bankart procedure. (B) Open Latarjet procedure.

T-shaped capsulotomy. The inferior capsular flap was sutured superiorly to the cuff and rotator interval, as well as to the humeral capsule laterally, with the arm at 45° of abduction, 40° of external rotation, and 10° of forward flexion. The arm was then positioned at 0° of abduction and 40° of external rotation, and the superior capsular flap was sutured inferiorly and laterally over the inferior flap. The subscapularis tendon was then repaired in a normal anatomic position (Figure 1A).

For open Latarjet, after a short deltopectoral approach was made, the coracoid process was harvested, with care taken to preserve the coracoacromial ligament. The subscapularis muscle was split in the upper two-thirds with the shoulder in maximum external rotation, and the glenohumeral joint was exposed via a vertical capsulotomy. The glenoid rim was then decorticated and flattened and the coracoid fixed with 2 bicortical malleolar screws (4.5-mm, distally threaded, cancellous screws). The screws were placed using the freehand technique, and the bone block was positioned flush with the glenoid rim on the anterior-inferior area. Finally, a Bankart repair was performed with 1 suture anchor placed between the screws and the coracoacromial ligament stump fixed onto the closed capsule (Figure 1B).

The postoperative rehabilitation protocol was adapted to the procedure performed. After Bankart repair, the shoulder was protected in a sling for 6 weeks. Pendular and passive mobilization exercises were initiated in the second week. Active range of motion recovery started in the fourth week under the supervision of a physical therapist, with external rotation protected until the sixth week. Resumption of sports that did not involve the shoulder was allowed after the sixth week. To protect the subscapularis repair, rugby with contact was not allowed before the sixth month.

After the Latarjet procedure, the shoulder was protected in a sling for the first 3 weeks. Pendular exercises and active range of motion were initiated immediately under the supervision of a physical therapist, with external rotation protected until the sixth week. Resumption of sports that did not involve the shoulder was allowed at the fourth week and rugby with contact at 3 months, depending on clinical and radiological controls.

### Clinical Evaluation

Patients with a minimum of 5 years of follow-up were contacted to return to our center for a clinical examination and

TABLE 1  
Preoperative Patient Data<sup>a</sup>

Variable	All Patients (N = 62)	BK Group (n = 32)	LT Group (n = 30)	P
Age, y	21.6 ± 4.9	21.2 ± 5.1	21.7 ± 5.6	.72
Sex, male/female, n	62/0	32/0	30/0	>.99
Instability Severity Index Score	6.3 ± 2	6.3 ± 2.4	6.3 ± 1.9	.40
Age at first dislocation, y	18.7 ± 4.8	19.1 ± 4.9	18.2 ± 4.8	.52
No. of dislocations	2.05 ± 1.8	2.7 ± 1.8	1.5 ± 1.7	.07
Glenoid bone defect, type 0/1/2/3, n <sup>b</sup>	28/13/5/17	18/8/0/6	10/5/5/11	<b>.02</b>
Hill-Sachs lesion, %	18.8 ± 7	18.5 ± 7	19.1 ± 6	.36
Anterior active elevation, deg	174 ± 12.5	175 ± 10.6	173 ± 11.5	.881
External rotation with elbow at side, deg	71 ± 19.4	79 ± 14.1	66 ± 16.3	.10
External rotation at 90° of abduction, deg	93 ± 15.1	93 ± 8	92 ± 7	.829
Internal rotation, points <sup>c</sup>	9.6 ± 8.7	9.7 ± 8.7	9.6 ± 8.8	.35

<sup>a</sup>Values are expressed as mean ± SD or count. Boldface P value indicates statistically significant difference between the BK and LT groups ( $P < .05$ ). BK, Bankart procedure; LT, Latarjet procedure.

<sup>b</sup>According to Bigliani et al.<sup>3</sup>

<sup>c</sup>Points assigned depending on the highest spine level that the patient's thumb could reach in the back: higher than T7, 10 points; from T7 to T12, 8 points; from T12 to L3, 6 points; from L3 to sacrum, 4 points; from sacrum to greater trochanter, 2 points; lower than greater trochanter, 0 points.

radiographs. Patients in the LT group were evaluated more recently than those in the BK group (analyzed in 2006). Clinical examination was performed by 2 independent observers (L.M., N.B.).

Active range of motion was measured in anterior elevation, external rotation with the elbow at the side, external rotation at 90° of abduction, and internal rotation based on vertebral level reached by the thumb with the hand at the back. Shoulder stability was evaluated with an apprehension test at 90° of abduction and full external rotation. A custom-made dynamometric evaluation of subscapularis strength was performed in a "lift-off" position 3 times, with a rest period of 1 minute in between, and the mean value of the involved shoulder was compared with that of the contralateral shoulder when it was healthy.<sup>4,5</sup> Objective functional assessment was based on Rowe and Walch-Duplay scores (maximum score, 100).<sup>33,37</sup>

## Radiological Evaluation

Preoperative analysis was based on a standard anteroposterior radiograph with the shoulder in internal, external, and neutral rotation and a Bernageau view to assess bone defect.<sup>2</sup> Glenoid bone defect was evaluated according to the modified Bigliani classification: type 0 (no glenoid bone loss), type 1 (bony Bankart defect), type 2 (malunited fragment detached from labrum), and type 3 (glenoid erosion).<sup>3</sup> The depth of the Hill-Sachs lesion was measured according to the method of Hardy et al.<sup>15</sup>

At the last follow-up, a standard anteroposterior radiograph with the shoulder in neutral rotation was performed in order to evaluate osteoarthritis according to the Samilson classification, and an additional Bernageau view was used to assess a coracoid bone graft in the case of the Latarjet procedure.<sup>34</sup> The graft was considered *medial* when placed >2 mm from the anterior glenoid rim and was

considered *overhang* when placed >2 mm laterally from the glenoid rim. In between these measurements, the graft was classified as *flush*. Healing and lysis of the bone graft were explored as well as any possible screw mobilization.

## Statistical Analysis

A descriptive analysis was used to report collected data (mean ± standard deviation for continuous variables and frequencies with proportions for categorical data). The Kruskal-Wallis test and Fisher exact test were used for univariate analysis of nonparametric data of the 2 groups (BK and LT). Statistical analysis was conducted using R (Version 3.3.2); significance was set at  $P < .05$ .

## RESULTS

In the 62 patients, the mean age was 21 years (range, 16-40 years); all study patients were male. In both groups, the mean Instability Severity Index Score was 6.3 (range, 3-10). The BK and LT groups were comparable except for glenoid bone loss, which was significantly higher in the LT group ( $P = .02$ ) (Table 1).

## Complications, Postoperative Outcomes, and Return to Rugby

No complications occurred after surgery in the BK group, whereas 2 shoulders (6.5%) ( $P = .14$ ) in the LT group required a second surgery: 1 infection cleared up uneventfully after a washout and administration of oral antibiotics, and 1 compressive hematoma needed to be surgically drained.

Table 2 summarizes the postoperative clinical outcomes and return-to-sport rates. The mean follow-up times in the BK and LT groups were  $6.9 \pm 1.7$  years (range, 5-10 years)

TABLE 2  
Postoperative Outcomes and Return to Rugby<sup>a</sup>

Variable	All Patients (N = 62)	BK Group (n = 32)	LT Group (n = 30)	P
Mean follow-up, y	6.5 ± 1.5	6.9 ± 1.7	6.2 ± 1.4	.06
Recurrence	7 (11.3)	6 (18.8)	1 (3.3)	<b>.04</b>
Rowe score	89.9 ± 10.3	90.7 ± 14.1	89.7 ± 9.3	.34
Walch-Duplay score	84.7 ± 18.1	82.5 ± 25.3	87.0 ± 15.6	.27
Return to rugby at same level	58 (94)	31 (97)	27 (90)	.27
Delay in return to rugby, mo	7.1 ± 3.3	8 ± 4.1	6.3 ± 2.3	<b>.03</b>

<sup>a</sup>Values are expressed as mean ± SD or count (%). Boldface P values indicate statistically significant difference between the BK and LT groups ( $P < .05$ ). BK, Bankart procedure; LT, Latarjet procedure.

and 6.2 ± 1.4 years (range, 5-12 years), respectively ( $P = .06$ ) (Table 2). In the BK group, 6 (18.8%) patients experienced a dislocation or subluxation, compared with 1 (3.3%) patient in the LT group ( $P = .04$ ). Recurrences occurred at a mean follow-up of 3.8 years (range, 0.6-6 years) in the BK group and 1.5 years in the LT group. The glenoid bone defect of patients in the BK group was Bigliani type 0 (n = 5) or type 1 (n = 1). Among stable shoulders without any recurrence at the last follow-up, the apprehension test was positive for 7 shoulders (27%) in the BK group compared with 5 (17%) in the LT group ( $P = .35$ ). We noted no differences between the BK and LT groups in the Rowe or Walch-Duplay scores. Six (20%) patients in the LT group and 3 (10%) in the BK group reported residual pain without apprehension in abduction with full external rotation ( $P = .25$ ).

A return to rugby at the same level or higher was possible for 31 (97%) patients in the BK group and 27 (90%) patients in the LT group ( $P = .27$ ). A delay in return required a mean of 8 ± 4.1 months (range, 6-12 months) in the BK group and 6.3 ± 2.3 months (range, 3-11 months) in the LT group ( $P = .03$ ) (Table 2).

### Subscapularis Strength

Subscapularis strength was tested in 61 patients (1 patient in the LT group was not tested). In the BK group, the mean strength of the involved shoulder was 8.65 ± 3.1 daN (range, 5.1-13.4 daN), with a loss of 2.20 daN compared with the healthy shoulder ( $P = .01$ ). In the LT group, the mean strength was 10.6 ± 1.83 daN (range, 8.2-13.7 daN) in the involved shoulder, with a loss of 1.01 daN compared with the healthy shoulder ( $P = .06$ ). The strength of the involved shoulder was 84% and 91% that of the uninjured shoulder in BK and LT groups, respectively ( $P = .21$ ).

### Radiological Findings

Radiological analysis was conducted in 43 patients (22 in the BK group, 21 in the LT group) at a mean follow-up of

TABLE 3  
Results of Radiological Analysis<sup>a</sup>

	Total (n = 43)	BK Group (n = 22)	LT Group (n = 21)	P
Follow-up, y	6.6 ± 1.5	6.9 ± 1.4	6.4 ± 1.2	.58
Osteoarthritis	23 (54)	15 (68)	8 (38)	<b>.03</b>
None	20 (47)	7 (32)	13 (62)	
Samilson grade 1	18 (42)	10 (45)	8 (38)	
Samilson grade 2	5 (12)	5 (23)	0 (0)	
Samilson grade 3	0 (0)	0 (0)	0 (0)	
Coronal graft position <sup>b</sup>				
Flush	—	—	15 (71)	—
Medial	—	—	6 (29)	—
Overhang	—	—	0 (0)	—

<sup>a</sup>Values are expressed as mean ± SD or count (%). Boldface P value indicates statistically significant difference between the BK and LT groups ( $P < .05$ ). Dashes indicate areas not applicable. BK, Bankart procedure; LT, Latarjet procedure.

<sup>b</sup>Medial, >2 mm medial from the anterior glenoid rim. Overhang, >2 mm lateral from the anterior glenoid rim.

6.6 ± 1.5 years. A higher rate of osteoarthritis was found in the BK group compared with the LT group (68% vs 38%, respectively;  $P = .03$ ) (Table 3). No specific complications related to the bone block were identified. However, a partial osteolysis was observed in 40% of cases, with no case of any complete resorption.

### DISCUSSION

This study confirmed the hypothesis that the open Latarjet procedure would allow for a faster return to play and provide a lower rate of recurrence compared with open Bankart repair at a mean follow-up of 6.5 years (minimum 5 years). Moreover, the rate of osteoarthritis was higher in the Bankart group.

Rugby needs to be studied independently of other sports. Indeed, it is a very high collision sport responsible for a large number of traumatic injuries.<sup>6</sup> The tackle, direct impact, and try-score situations create a common mechanism for shoulder injury, ranging from severe shoulder dislocation to acromioclavicular injury.<sup>11</sup> The higher the level of competition, the greater the risk of recurrence after primary shoulder dislocation.<sup>18,20</sup>

Rhee et al<sup>32</sup> reported a 12.5% rate of recurrence after open Bankart repair in collision athletes and a 25% rate of recurrence after using an arthroscopic technique. Among a series of 58 American football players analyzed with a mean follow-up of 3 years, Pagnani and Dome<sup>28</sup> reported a 3.5% rate of subluxation. With a longer follow-up (3.9 years), Uhorchak et al<sup>36</sup> identified only a 3% rate of new dislocations but a 20% rate of subluxation in 66 collision athletes.

In a study of patients undergoing arthroscopic Bankart repair, Nakagawa et al<sup>24</sup> included patients with glenoid bone loss and reported a failure rate of 23.7% for all players and 33.3% for rugby players. The amount of glenoid bone loss that would be acceptable for performing an open

Bankart repair remains unclear. In our series, 44% of patients in the BK group had glenoid bone loss, which increased the risk of failure and lower clinical outcomes. Moreover, this rate was probably underestimated because radiological preoperative evaluation was based on radiography and not computed tomography, which would be more accurate.

Hurley et al<sup>16</sup> reported that regardless of glenoid bone loss, the Latarjet procedure provided a stable shoulder for rugby players in 96.8% of cases after >10 years of follow-up. The supraphysiological load on the shoulder during rugby play and the bony lesion seem to be the worst prognostic factors for long-term stability after an isolated Bankart repair. Moreover, from a technical point of view, we added a Bankart repair to the coracoid transfer, expecting to improve the stability and make the bone block extra-articular. However, a positive apprehension test in 17% of patients proved that this is more complex than a simple mechanical consequence and may involve central neurological impairment.<sup>21</sup>

Resuming rugby at the preinjury level as soon as possible is an integral part of a successful result after surgical treatment of shoulder instability. In our series, we noted no significant difference in return to the same level of play between the LT and BK groups. However, the time to return to sport at a competitive level favored the LT group over the BK group (mean, 6 months vs 8 months, respectively). Abdul-Rassoul et al<sup>1</sup> reported the same trends in a systematic review. One explanation would be that subscapularis recovery takes longer after an open Bankart repair. Technically, a tenotomy was performed in one group (BK) and a split of muscle fibers was done in the other (LT); this difference in the treatment of the subscapularis allowed us to authorize the LT group to return to sport 2 months sooner. Moreover, subscapularis strength evaluation highlighted that in the BK group, the weakness in internal lift-off position was significantly higher on the surgical side compared with the nonsurgical side.

Residual pain was observed in 20% of the LT group, without any apprehension. This outcome, which was previously identified in the literature, can affect >20% of patients.<sup>16</sup> An impingement between the screws and surrounding soft tissue would be a reasonable explanation and would require hardware removal.<sup>9,13,14,35</sup> In the future, this weakness of the open Latarjet procedure could be solved by using specifically designed screws or by switching to modern cortical-button fixation of the graft.<sup>12,31</sup>

Surprisingly, the BK group experienced a higher rate of osteoarthritis than the LT group (68% vs 38%, respectively), with grade 2 in 23% of the BK patients. Neviasser et al<sup>25</sup> reported an osteoarthritis rate of 47% after open Bankart at 17 years of follow-up. Examining a more specific patient population of rugby players, Fabre et al<sup>10</sup> identified an osteoarthritis rate of 69% at 26 years of follow-up. Older age (>20 years) at the time of surgery was one of the negative prognostic factors reported.<sup>5</sup> In contrast, only Samilsson grade 1 osteoarthritis was identified in our series of Latarjet procedures. This finding was similar to that reported by Neyton et al<sup>26</sup> in the same patient population. With a longer follow-up, Mizuno et al<sup>23</sup> reported a rate of

20% of osteoarthritis. Provided that the bone block does not overhang the glenoid rim, it seems that the Latarjet procedure entails a lower rate of osteoarthritis compared with the open Bankart procedure.<sup>8,22,37,35</sup>

## Strengths and Limitations

This is the first study to compare the results of Latarjet and Bankart techniques in competitive rugby players. A minimum follow-up of 5 years strengthened our evaluation of shoulder stability and provided the opportunity to evaluate the presence of osteoarthritis.

Our study has some limitations attributable to its retrospective, nonrandomized nature. In addition, the small size of each group limited the statistical significance of the findings. Moreover, we used a long inclusion period (starting in 1995) in order to compare a historical cohort (BK) with a modern one (LT), during which time preoperative bone loss exploration with computed tomography scanning improved significantly. Such accuracy in evaluation of glenoid bone defects, in particular, would probably modify the indications for Latarjet or Bankart repair. From a technical standpoint, implants used for Bankart repair changed over time, improving biomechanical performance. Finally, the rehabilitation protocol was not similar in both groups, because it needed to be adapted to the involvement of the subscapularis muscle.

## CONCLUSION

This comparative study showed that in rugby players, the open Latarjet procedure outperformed the open Bankart repair at long-term follow-up. The rate of recurrent instability was lower in the Latarjet group; the rate of return to play to at least the same level was equivalent in the 2 groups, but return to play was faster after Latarjet. Osteoarthritis occurred at a higher rate and was more severe after open Bankart in this series.

## REFERENCES

1. Abdul-Rassoul H, Galvin JW, Curry EJ, Simon J, Li X. Return to sport after surgical treatment for anterior shoulder instability: a systematic review: response. *Am J Sports Med.* 2019;47(3):NP24-NP27.
2. Bernageau J, Patte D, Debeyre J, Ferrane J. Value of the glenoid profile in recurrent luxations of the shoulder. *Rev Chir Orthop.* 1976; 62:142-147.
3. Bigliani LU, Newton PM, Steinmann SP, Connor PM, McIlveen SJ. Glenoid rim lesions associated with recurrent anterior dislocation of the shoulder. *Am J Sports Med.* 1998;26(1):41-45.
4. Bonneville N, Mansat P, Bellumore Y, Mansat M, Bonneville P. Surgical treatment of anterior shoulder instability in rugby players: clinical and radiographic results with minimum five-year follow-up. *Rev Chir Orthop Reparatrice Appar Mot.* 2008;94(7):635-642.
5. Bonneville N, Mansat P, Bellumore Y, Mansat M, Bonneville P. Selective capsular repair for the treatment of anterior-inferior shoulder instability: review of seventy-nine shoulders with seven years' average follow-up. *J Shoulder Elbow Surg.* 2009;18(2):251-259.
6. Brooks JH, Kemp SP. Recent trends in rugby union injuries. *Clin Sports Med.* 2008;27(1):51-73.

7. Brophy RH, Gill CS, Lyman S, Barnes RP, Rodeo SA, Warren RF. Effect of shoulder stabilization on career length in National Football League athletes. *Am J Sports Med.* 2011;39:704-709.
8. Buscayret F, Edwards TB, Szabo I, Adeleine P, Coudane H, Walch G. Glenohumeral arthrosis in anterior instability before and after surgical treatment: incidence and contributing factors. *Am J Sports Med.* 2004;32(5):1165-1172.
9. Dauzère F, Faraud A, Lebon J, Faruch M, Mansat P, Bonneville N. Is the Latarjet procedure risky? Analysis of complications and learning curve. *Knee Surg Sports Traumatol Arthrosc.* 2016;24(2):557-563.
10. Fabre T, Abi-Chahla ML, Billaud A, Geneste M, Durandeu A. Long-term results with Bankart procedure: a 26-year follow-up study of 50 cases. *J Shoulder Elbow Surg.* 2010;19(2):318-323.
11. Funk L. Treatment of glenohumeral instability in rugby players. *Knee Surg Sports Traumatol Arthrosc.* 2016;24(2):430-439.
12. Girard M, Dalmas Y, Martinel V, Mansat P, Bonneville N. Arthroscopic Latarjet with cortical buttons versus open Latarjet with screws: a short-term comparative study. *Am J Sports Med.* 2022;50(12):3326-3332.
13. Godenèche A, Merlini L, Roulet S, et al. Screw removal can resolve unexplained anterior pain without recurrence of shoulder instability after open Latarjet procedures. *Am J Sports Med.* 2020;48(6):1450-1455.
14. Guity MR, Roques B, Mansat P, Bellmore Y, Mansat M. Painful or unstable shoulder after coracoid transfer: result of surgical treatment. *Rev Chir Orthop Reparatrice Appar Mot.* 2002;88(4):349-358.
15. Hardy P, Lopes R, Bauer T, Conso C, Gaudin P, Sanghavi S. New quantitative measurement of the Hill-Sachs lesion: a prognostic factor for clinical results of arthroscopic glenohumeral stabilization. *Eur J Orthop Surg Traumatol.* 2012;22:541-547.
16. Hurley ET, Jamal MS, Ali ZS, Montgomery C, Pauzenberger L, Mullett H. Long-term outcomes of the Latarjet procedure for anterior shoulder instability: a systematic review of studies at 10-year follow-up. *J Shoulder Elbow Surg.* 2019;28(2):e33-e39.
17. Junge A, Cheung K, Edwards T, Dvorak J. Injuries in youth amateur soccer and rugby players—comparison of incidence and characteristics. *Br J Sports Med.* 2004;38(2):168-172.
18. Kawasaki T, Ota C, Urayama S, et al. Incidence of and risk factors for traumatic anterior shoulder dislocation: an epidemiologic study in high-school rugby players. *J Shoulder Elbow Surg.* 2014;23(11):1624-1630.
19. King DA, Hume PA, Milburn PD, Guttenbeil D. Match and training injuries in rugby league: a review of published studies. *Sports Med.* 2010;40(2):163-178.
20. Kralinger FS, Golser K, Wischatta R, Wambacher M, Sperner G. Predicting recurrence after primary anterior shoulder dislocation. *Am J Sports Med.* 2002;30(1):116-120.
21. Lädermann A, Tirefort J, Zanchi D, et al. Shoulder apprehension: a multifactorial approach. *EFORT Open Rev.* 2018;3(10):550-557.
22. Menon A, Fossati C, Magnani M, Boveri S, Compagnoni R, Randelli PS. Low grade of osteoarthritis development after Latarjet procedure with a minimum 5 years of follow-up: a systematic review and pooled analysis. *Knee Surg Sports Traumatol Arthrosc.* 2022;30(6):2074-2083.
23. Mizuno N, Denard PJ, Raiss P, Melis B, Walch G. Long-term results of the Latarjet procedure for anterior instability of the shoulder. *J Shoulder Elbow Surg.* 2014;23(11):1691-1699.
24. Nakagawa S, Ozaki R, Take Y, Iuchi R, Mae T. Relationship between glenoid defects and Hill-Sachs lesions in shoulders with traumatic anterior instability. *Am J Sports Med.* 2015;43(11):2763-2773.
25. Neviasser RJ, Benke MT, Neviasser AS. Mid-term to long-term outcome of the open Bankart repair for recurrent traumatic anterior dislocation of the shoulder. *J Shoulder Elbow Surg.* 2017;26(11):1943-1947.
26. Neyton L, Young A, Dawidziak B, et al. Surgical treatment of anterior instability in rugby union players: clinical and radiographic results of the Latarjet-Patte procedure with minimum 5-year follow-up. *J Shoulder Elbow Surg.* 2012;21(12):1721-1727.
27. Neer CS. Surgical repair for recurrent anterior dislocations. In: Neer CS, ed. *Shoulder Reconstruction.* Saunders W.B.; 1990:300-308.
28. Pagnani MJ, Dome DC. Surgical treatment of traumatic anterior shoulder instability in American football players. *J Bone Joint Surg Am.* 2002;84(5):711-715.
29. Privitera DM, Sinz NJ, Miller LR, et al. Clinical outcomes following the Latarjet procedure in contact and collision athletes. *J Bone Joint Surg Am.* 2018;100(6):459-465.
30. Ranalletta M, Rossi LA, Bertona A, et al. Modified Latarjet without capsulolabral repair in rugby players with recurrent anterior glenohumeral instability and significant glenoid bone loss. *Am J Sports Med.* 2018;46(4):795-800.
31. Rattier S, Druel T, Hirakawa Y, Gröger F, van Rooij F, Neyton L. Use of cannulated screws for primary Latarjet procedures. *Orthop J Sports Med.* 2022 25;10(8):23259671221117802.
32. Rhee YG, Ha JH, Cho NS. Anterior shoulder stabilization in collision athletes: arthroscopic versus open Bankart repair. *Am J Sports Med.* 2006;34(6):979-985.
33. Rowe CR. Evaluation of the shoulder. In: Rowe CR, ed. *The Shoulder.* Churchill Livingstone; 1988:165-291.
34. Samilson RL, Prieto V. Dislocation arthropathy of the shoulder. *J Bone Joint Surg Am.* 1983;65(4):456-460.
35. Shah AA, Butler RB, Romanowski J, Goel D, Karadagli D, Warner JJP. Short-term complications of the Latarjet procedure. *J Bone Joint Surg Am.* 2012;94(6):495-501.
36. Uhorchak JM, Arciero RA, Huggard D, Taylor DC. Recurrent shoulder instability after open reconstruction in athletes involved in collision and contact sports. *Am J Sports Med.* 2000;28(6):794-799.
37. Walch G. Chronic anterior glenohumeral instability. *J Bone Joint Surg Br.* 1996;78(4):670-677.