JSES International 5 (2021) 165–170

Contents lists available at ScienceDirect

JSES International

journal homepage: www.jsesinternational.org

Bristow versus Latarjet in high-demand athletes with anterior shoulder instability: a prospective randomized comparison

Paulo Santoro Belangero, PhD [a], Paulo Henrique Schmidt Lara, MD [a,*], Eduardo Antônio Figueiredo, PhD [a], Carlos Vicente Andreoli, PhD [a], Alberto de Castro Pochini, PhD [a], Benno Ejnisman, PhD [a], Ricardo Luiz Smith, PhD [b]

[a] *Universidade Federal de São Paulo (UNIFESP), Departamento de Ortopedia e Traumatologia, Centro de Traumatologia do esporte (CETE), São Paulo, SP, Brazil*
[b] *Departamento de Morfologia e Genética da Universidade Federal de São Paulo, São Paulo, SP, Brazil*

ARTICLE INFO

Keywords:
Shoulder
Athletes
Shoulder dislocation
Joint instability
Latarjet
Bristow
Anterior instability

Level of evidence: Level II; Randomized Controlled Trial; Treatment Study

Background: Traumatic anterior shoulder instability is a common disease, especially in young athletes. The Latarjet and Bristow techniques are nonanatomical surgeries that involve the transfer of the coracoid process to the anterior border of the glenoid and are indicated in cases at a high risk for recurrence and in the presence of associated bone lesions. Studies have evaluated the recurrence and complications associated with these techniques, but they have important differences, and should not be considered synonymous. The objective of this study was to prospectively compare the Bristow and Latarjet techniques in high-demand athletes. Hypothesis: Bristow and Latarjet techniques lead to similar results.

Patients and methods: Thirty-seven athletes (41 shoulders; three athletes underwent bilateral surgery) with anterior recurrent dislocation of the shoulder that was surgically treated using the Bristow or Latarjet technique were prospectively analyzed. The follow-up time was 5 years. The mean age was 26.4 years (range: 16-46 years). In 17 cases (41.5%), the dominant side was not affected.

Results: Elevation and external rotation (passive and active) decreased in the early postoperative period and achieved values in the final follow-up similar to those found in the preoperative period. The mean postoperative scores at 5 years were as follows: ASES, 79.1 (range: 66-95); ASORS, 77.8 (range: 60-100); WOSI, 52.6 (range: 18-77); and VAS, 1.88 (range: 0-6). All of the results presented statistical significance. There was a complication rate of 9.75% in the follow-up period. There were no new dislocations after the surgery. Most (75%) of the athletes returned to the sport after the surgery, and there was no correlation between poor results and any of the variables studied. There was a statistically significant difference in passive external rotation in favor of the Latarjet technique four weeks after surgery ($P = .01$). We also found a statistically significant difference in passive elevation in favor of the Latarjet technique eight weeks after the surgery ($P = .04$). When we compared the Bristow and Latarjet techniques regarding the ASES, ASORS, and WOSI scores, we found no statistically significant difference. In the comparison regarding whether the athletes returned to sports, we found no statistically significant difference.

Conclusion: The Bristow and Latarjet techniques lead to good results in athletes with no new dislocation episodes and are suitable for treating patients with anterior recurrent dislocation of the shoulder. The Latarjet technique showed better results in some of the variables studied.

Traumatic anterior shoulder instability is a common disease, especially in young athletes.[22] Several surgical techniques have been proposed for the treatment of this condition. The goals of these procedures are to re-establish a stable and functional shoulder and prevent the development of shoulder osteoarthritis.

The Bankart surgery, the most commonly used procedure in these cases,[3] involves soft-tissue retensioning and is usually performed arthroscopically.[24] The Latarjet and Bristow techniques are nonanatomical surgeries that involve the transfer of the coracoid process to the anterior border of the glenoid[13] and are indicated in cases at a high risk for recurrence and in the presence of associated bone lesions.[1,15,18] Studies have shown that contact athletes have

This study was approved by the Ethics Committee of Escola Paulista de Medicina (57674116.9.0000.5505). All patients provided written informed consent before participating in the study.

* Corresponding author: Paulo Henrique Schmidt Lara, R. Estado de Israel, 636 - Vila Clementino, São Paulo, SP 04022-001.
E-mail address: phslara@gmail.com (P.H.S. Lara).

https://doi.org/10.1016/j.jseint.2020.11.004

higher recurrence rates and worse prognoses regarding the progression of anterior shoulder instability and often require the Bristow-Latarjet surgery, especially when the amount of bone loss is >20%-25%.[6,21] The Bristow and Latarjet surgeries have shown good results in athletes of various sports.[5,8] Studies have evaluated the recurrence and complications associated with these procedures.[2,10,11,20,22,23] On the other hand, the two techniques have important differences, and should not be considered synonymous.[9]

The objective of this study was to prospectively compare the Bristow and Latarjet techniques in high-demand athletes and evaluate that even being different procedures, they could lead to similar results.

Materials and methods

Nine shoulders were lost to follow-up at five years, leaving 41 (82%) for final evaluation). The characteristics of the sample are shown in Table I.

The inclusion criteria for this study were anterior shoulder instability, no history of a shoulder procedure, high-demand sports participation (more than 7 hours/week), 10%-20% glenoid bone erosion in computed tomography scans and at least 24 months of follow-up. The exclusion criteria were history of surgery involving the shoulder in question, presence of associated lesions (as cuff tears or SLAP which directed patients for arthroscopic procedures) and bony defects in the glenoid greater than 20% (these patients were directed to Eden-Hybinette or Latarjet techniques) and those patients that did not complete the scheduled follow-ups. Generalized hyperlaxity was not considered a exclusion criterion but no patient had this feature.

The flowchart of patients treated for shoulder instability as index procedure during this period is shown in Figure 1.

Surgeries

The surgeries were performed with the patient in the beach chair position under a brachial plexus block and outpatient hospitalization system (the sealed envelop was opened just before skin incision). Anterior access of the coracoid process was extended to the deltopectoral interval by approximately 5 cm. Blunt dissection, exposure, and osteotomy of the coracoid were performed according to the proposed technique: tip of the coracoid (about 1 cm long) for the Bristow and 2-2.5 cm long for the Latarjet technique. The subscapularis muscle was opened longitudinally between the upper two-thirds and the lower one-third of the muscle. The capsule was opened vertically near the glenoid, and the graft was fixed with two small-fragment screws (3.5mm diameter) with washers (partial thread sponge) in the Latarjet technique and with one screw in the Bristow technique. The Latarjet technique is shown in Figure 2, and the Bristow technique is shown in Figure 3. The specific technical differences are the size of the coracoid graft and how to fix it in the glenoid: In Bristow, the osteotomy face is fixed in the glenoid and in Latarjet the inferior portion of the graft is fixed in the glenoid. We do not repair the capsule to coracoacromial ligament in Latarjet technique.

Table I
Sample characteristics

Sample (37 patients; 41 shoulders)	
Variables	Results
Age (yr)	
Mean	26.4
Variation	16-46
Sex (n,%)	
Male	37 (89.75%)
Female	4 (10.25%)
Member affected (n, %)	
Dominant	24 (58.5%)
Nondominant	17 (41.5%)
Dislocation mechanism (n, %)	
Traumatic	33 (80.4%)
Atraumatic	8 (19.6%)
Category	
Amateur	25 (60.9%)
Professional	16 (39.1%)
Surgery	
Bristow	19 (46.4%)
Latarjet	22 (53.6%)

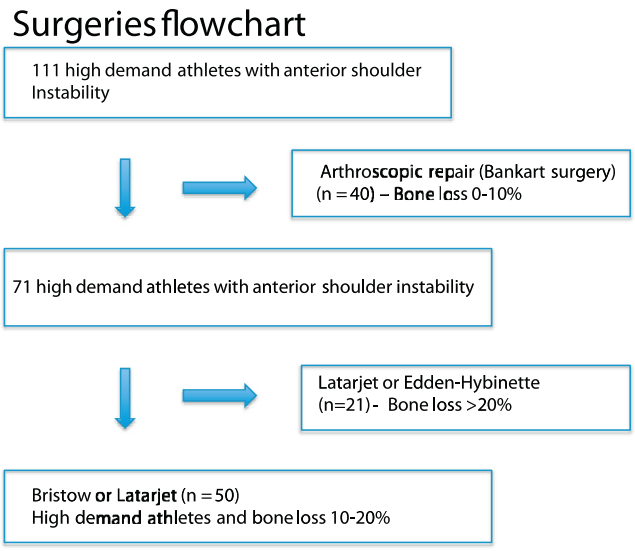

Figure 1 Patients' flowchart.

Sling immobilization was sustained for 3 weeks, followed by a physiotherapy protocol aimed at progressively increasing active and passive movements. Strengthening exercises began 8-12 weeks after surgery. A return to sports was allowed after 4-5 months.

All patients underwent the Bristow or Latarjet technique in accordance with the decision map (Figure 4). There were 19 Bristow and 22 Latarjet techniques performed. We used a randomization computer program to randomize the 50 patients into the two groups, and then we inserted the group allocation results into sealed envelopes to blind the patients and assessors to the results

All patients were prospectively evaluated in accordance with a pre-established protocol. All initial evaluations and postoperative follow-ups were performed by independent physiotherapists with no influence from the surgical team. Neither the patients nor the physiotherapists knew which procedure was performed for each case. Before the surgery, the patients underwent radiography and tomography studies of the affected shoulder. The amount of glenoid bone defect was measured by the tomography study. All patients were evaluated in the preoperative and postoperative periods regarding the degree of active and passive external rotation; degree of active and passive elevation; visual analog scale (VAS) score for pain[19]; Athletic Shoulder Outcome Rating Scale (ASORS)[14] score; Western Ontario Shoulder Instability Index (WOSI)[4] score; and the American Shoulder and Elbow Surgeons Standardized Shoulder Assessment (ASES)[12] score. The ASORS[14] score reflects shoulder stability, range of motion, daily function, and pain. For this scale, scores of $\leq$ 50 points indicate poor results, scores of 51-74 points are typical, scores of 75-89 points are good scores, and scores of 90-100 points are excellent scores. The WOSI[4] score reflects the quality of life in patients with shoulder instability, and a higher score indicates worse quality of life; the scores range from

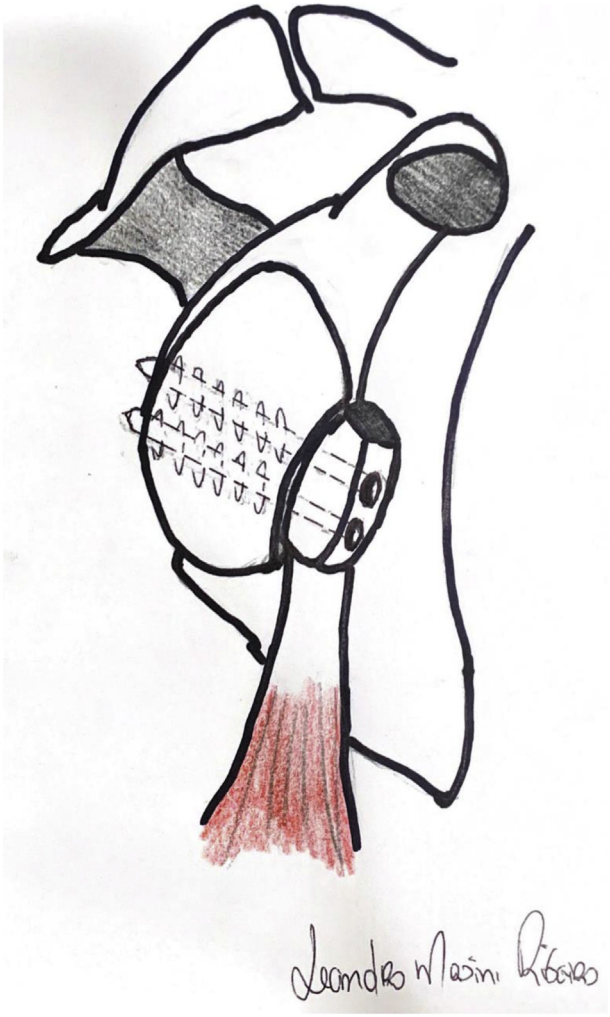

Figure 2 Latarjet technique.

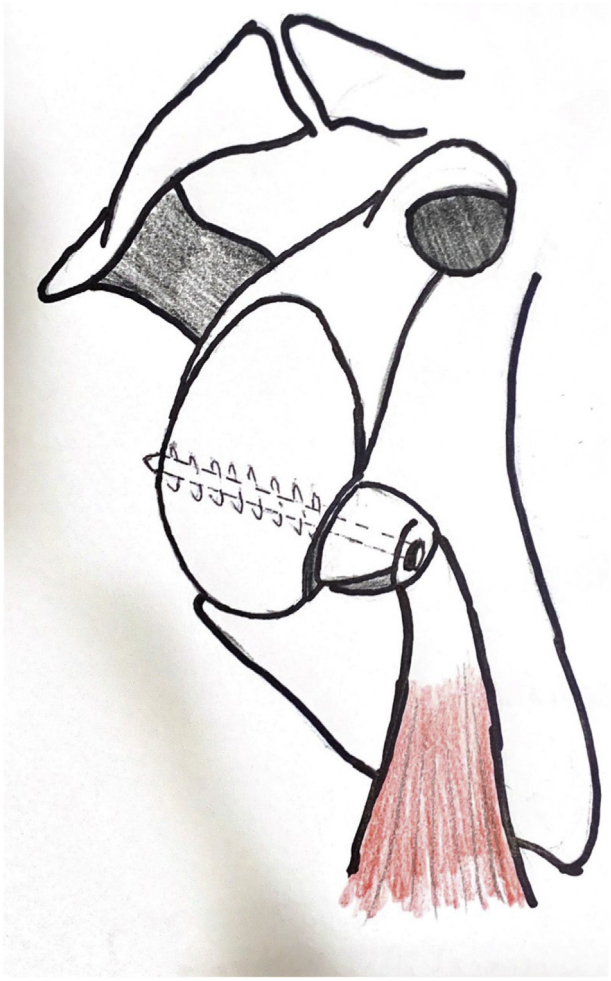

Figure 3 Bristow technique.

0 (excellent) to 210 (very poor). The ASES[12] score reflects pain and shoulder function and ranges from 0 to 100, with higher values indicating better results. The postoperative evaluations were performed in accordance with the protocol.

Statistical analysis

We used parametric statistical tests because the data were quantitative and continuous. We used the equality of two proportions test to characterize the distribution of the relative frequency of the qualitative variables. We used Pearson's correlation to evaluate the correlations between the variables and scores. We used ANOVA to compare both procedures. Differences with values of $P < .05$ were considered statistically significant. SPSS version 20 software (IBM, Armonk, NY, USA) was used for the analysis.

This study was approved by the Ethics Committee of Federal University of São Paulo (57674116.9.0000.5505).

Results

In 17 athletes (41.5%), the nondominant extremity was affected. The mean body mass index of the patients was 24.14 kg/m^2 (range: 20.8-31.6 kg/m^2). The distribution of sports is shown in Table II. Sixteen athletes were professionals, and 22 were amateurs (all participated in competitions and trained for at least seven hours per week). The mean practice duration of the athletes before the first dislocation was 91.82 months (range: 12-360 months). The mean follow-up of clinical data was 60 months. There was no statistical difference between both groups in the preoperative parameters.

Shoulder range of motion

Elevation and a lateral rotation (passive and active) achieved values in the final follow-up similar to those found in the preoperative period. The results are shown in Table III.

Functional scores and pain

Table IV shows improvement in the results in the postoperative period. The mean preoperative scores were as follows: ASES, 41 (range: 15-75); ASORS, 40 (range: 12-78); WOSI, 122 (range: 46-185); and VAS, 5.32 (range: 0-9). The mean postoperative scores after five years were as follows: ASES, 79.1 (range: 66-95); ASORS, 77.8 (range: 60-100); WOSI, 52.6 (range: 18-77); and VAS, 1.88 (range: 0-6). All of the results presented statistical significance.

Redislocation and instability symptoms

We did not have any case of redislocation. However, seven (17%) patients presented positive apprehension test (three (16%) patients in the Bristow and four (18%) in the Latarjet group).

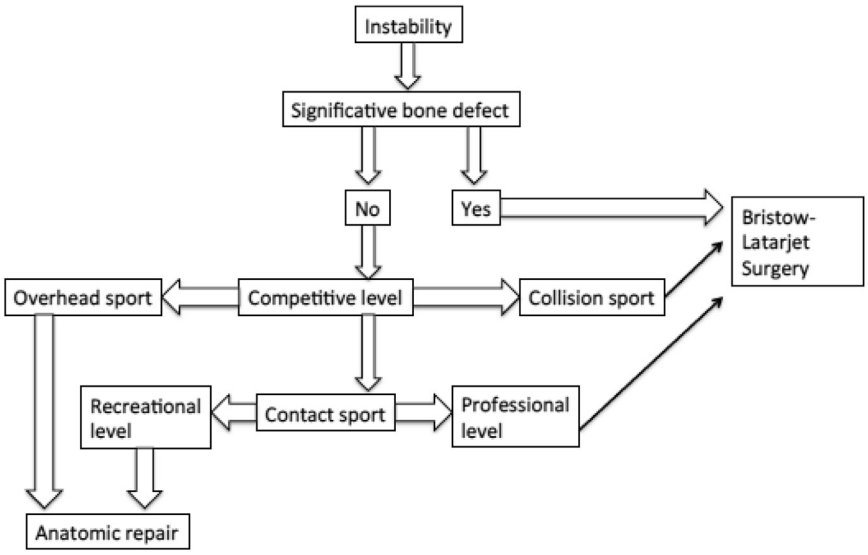

Figure 4 Decision map.

Table II
Sports' distribution

Sport	Athletes
Soccer	9
Rodeo	9
Handball	4
Jiu jitsu	4
Muay thai	2
Mixed martial arts	2
Rugby	2
Volleyball	2
Boxing	1
Chinese boxing	1
Motocross	1

Radiographic evaluation

All patients were submitted to a standardized X-ray evaluation (AP, scapular Y and Axilar view) in the first week after surgery and subsequently after six weeks, three months, six month, one-year follow-up and then every year. Our results showed two cases of graft reabsorption that needed surgery to screw removal (one in each group). Two cases of screw malpositioning (with the graft being intra articular). Both cases were in the Bristow group and were surgically revised in two weeks from initial surgery.

Complications

A total of six cases (14.6%) had complications during the follow-up period. In the Latarjet group, there was one case of screw irritation and one case of axillary nerve palsy that resolved three months after the procedure. In the Bristow group, there were two cases of screw malpositioning that were surgically revised two weeks after the initial surgery, one case of screw irritation that was surgically removed three months after the initial surgery and one case of superficial infection that was treated with surgical drainage. There were no cases of recurrence.

Return to sports

Seven athletes (17%) did not return to sports; four did not return to sports due to shoulder pain, one did not return due to pubalgia and one did not return due to voluntary retirement. All other athletes returned to the same level of sport that they had before the injury.

Comparison between Bristow and Latarjet

Range of motion

We found no statistically significant difference in active external rotation and active elevation. We found a statistically significant difference in passive external rotation in favor of the Latarjet technique four weeks after surgery (Latarjet average: 29.1 degrees; Bristow average: 20.53 degrees; $P = .01$). We also found a statistically significant difference in passive elevation in favor of the Latarjet technique eight weeks after the surgery (Latarjet average: 132.73 degrees; Bristow average: 120.21 degrees; $P = .04$).

Functional scores (ASES, ASORS, and WOSI)

We found no statistically significant difference.

Sports return and complications

When we compared both procedures regarding whether the athletes returned to sports and complications, we found no statistically significant difference.

Comparing patients' age, body mass index, sports experience, dominant limb, injury mechanism, and whether they were amateur or professional athletes with the functional shoulder scores to evaluate whether any of the factors were related to a worse functional result, no statistically significant correlation was found.

Discussion

This is the first study in the literature to prospectively and randomly evaluate the results of the Bristow and Latarjet procedures in high-demand athletes. Our results showed that although the procedures are not equivalent or synonymous, both effectively stabilize the shoulder.

In a biomechanical study, Giles et al[9] compared Latarjet and Bristow techniques in cadaveric specimens. The authors found that both procedures have equivalent stabilizing effects in unstable shoulders with preserved glenoid osseous anatomy, but the Latarjet technique confers superior stabilization when there is substantial glenoid bone loss. Our results corroborate clinically the

Table III
Range of motion results

Variables	Active external rotation (at side)	Passive external rotation (at side)	Active elevation	Passive elevation	N	*P* value
Before surgery						.07
Bristow	60.3	75	157.7	170	19	
Latarjet	62	80	160	180	22	
4 weeks						
Bristow	16.8	20.53	102.7	120	19	.014
Latarjet	20	29.1	110	125	22	
8 weeks						
Bristow	30.4	38	110.2	132.73	19	.043
Latarjet	31	38	30-150	120.21	22	
12 weeks						
Bristow	45	60	150	175	19	.07
Latarjet	45	60	153	176	22	
6 mo						
Bristow	60	76	170	180	19	.08
Latarjet	58	78	175	178	22	
1 y						
Bristow	62	80	170	178	19	.08
Latarjet	60	78	173	175	22	
2 y						
Bristow	63	81	171	175	19	.09
Latarjet	62	80	175	173	22	
3 y						
Bristow	65	77	168	171	19	.08
Latarjet	63	80	165	169	22	
4 y						
Bristow	63	75	165	172	19	.07
Latarjet	61	73	163	170	22	
5 y						
Bristow	59	73	163	175	19	.08
Latarjet	60	76	172	177	22	

Table IV
Scores' results

Variable	ASES	WOSI	ASORS	*P* value
Before surgery				
Bristow	40	121	40	
Latarjet	41	120	39	.07
6 mo				
Bristow	70.5	61	71.8	
Latarjet	71	65	74	.08
1 yr				
Bristow	76.8	51.5	78.5	
Latarjet	77	53	79	.07
2 yr				
Bristow	81.4	46	83.9	
Latarjet	85	51	85	.07
3 yr				
Bristow	82.7	43.9	86.4	
Latarjet	83	45	88	.08
4 yr				
Bristow	80.1	53.6	78.8	
Latarjet	82	52	80	.06
5 yr				
Bristow	79.1	52.6	77.8	
Latarjet	83	54	80	.07

data presented although we did not include patients with critical bone loss.

Duazère et al[7] compared active and passive external rotation in the preoperative and follow-up periods of patients who underwent the Bristow-Latarjet surgery and found values similar to those found in our study, with a mean of 167 degrees of active elevation, 50 degrees of active external rotation, and 82 degrees of passive external rotation at the final follow-up.

Mook et al[16] assessed the ASES scores and found a mean of 70.2 (range: 28.3-100) in the preoperative period and a mean of 89.2 (range: 56.6-100) in the follow-up period. Our results showed a mean of 41 (range, 15-75) in the preoperative period and a mean of 71.8 (range: 45-90) at the 6-month follow-up. In the study by Mook et al[16], the sample consisted of athletes and nonathletes, whereas our study included only high-demand athletes with at least seven hours of sports practice weekly.

In the Beranger et al[5] study, there was a return to sports rate of 100% after the Bristow-Latarjet surgery. In the Neyton et al[17] study that evaluated only rugby players, there was a return to sports rate of 56%. In our study, the return to sports rate was 75%. This difference may be explained by the fact that our study included only two rugby players (collision sport) and nine soccer players, which did not require to play with their shoulders. It is noteworthy that four athletes in our study did not return to sports due to specific shoulder problems; when we excluded the athletes who did not return for reasons unrelated to the shoulder (three athletes), the return to sports rate was higher (92.7%).

Several studies used the ASORS[14] to evaluate Bristow-Latarjet surgery outcomes (Table IV). Most patients had excellent or good scores, showing satisfactory results in this group of patients, and this result is similar to those in previous studies.

Griesser et al[10] reported a complication rate of 30%; the complications included recurrence, neurovascular lesions, hematomas, infections, graft pseudarthroses, and range of motion limitations. We had a complication rate of approximately 14.6%. In our study, we did not observe any cases of recurrence for any of the techniques. However, we had 17% of positive apprehension positive test (without significant difference between groups). We could not find any studies that compared the range of motion for these two techniques. In our study, we found better results for the Latarjet technique regarding active and passive external rotation and elevation in the follow-up period, especially in the initial follow-up

period. We believe that the Latarjet technique yields stronger initial stabilization, which may be the reason that there were better results for this procedure. The Bristow technique was associated with a higher complication rate, but the patients had the same rate of return to sports as the patients who underwent the Latarjet technique, and there was no statistically significant difference regarding the complication rate ($P = 0.6$).

We believe that the surgeries are very similar but not synonymous, and we believe that the choice between the techniques is mainly the surgeon's choice, given that the results are very similar. Perhaps when there is significant bone loss in particular, the Latarjet procedure can yield superior results due to a greater coverage of the glenoid defect. On the other hand, the usual indication of bone block procedures is related not only to bony defects but also to sports activity and patient age[9]. A strong point in the Latarjet technique is the solid fixation with two screws and larger bone coverage of the glenoid, on the other hand, the Bristow technique is easier to perform because it relies in a single screw fixation. Bone healing is favored in Bristow because of the osteotomy face being in contact with the glenoid. In the Latarjet, the inferior aspect of coracoid is fixed to the glenoid and has lower intrinsic potential for healing.

We believe that an important data of this study is that a surgeon can choose which surgery to perform in the scenario of shoulder instability for patients with less than 20% glenoid bone loss.

The strengths of this study are its prospective design, independent evaluation by the physiotherapy team, and sample of high-demand athletes.

The main limitation of this study is the follow-up time of five years that is not enough to show complications such as arthrosis. Although it is sufficient to assess the main complications, clinical outcomes, and return to sports rate. Another limitation is the absence of postoperative long follow-up imaging results. However, our objective was to assess patients' function and the return to sports rate, which are fulfilled with clinical scores and interview information.

Conclusion

The Bristow and Latarjet techniques showed significant improvement in functional scores, a low complication rate, an absence of recurrence, a good return to sports rate, and preservation of the shoulder range of motion. The Latarjet technique showed better results in the initial range of motion, but in the last follow-up, both procedures yielded similar ranges of motion.

Disclaimer

The authors declare no conflicts of interest.
The authors declare no funding.

References

1. Balg F, Boileau P. The Instability Severity Index Score a simple pre-operative score to select patients for arthroscopic or open shoulder stabilisation. J Bone Joint Surg Br 2007;89:1470-7. https://doi.org/10.1302/0301-620X.89B11.18962.
2. Banas MP, Dalldorf PG, Sebastianelli WJ, DeHaven KE. Longterm follow-up of the modified Bristow procedure. Am J Sports Med 1993;21:666-71.
3. Bankart AS. Recurrent or habitual dislocation of the shoulder joint. Br Med J 1923;2:1132-3.
4. Barbosa G, Leme L, Saccol MF, Pochini AC, Ejnisman B, Griffin S. Translation and cultural adaptation of the western ontario shoulder instability index (WOSI) for the Portuguese from Brazil. Rev Bras Med Esporte 2012;18:35-7. https://doi.org/10.1590/S1517-86922012000100007.
5. Beranger JS, Klouche S, Bauer T, Demoures T, Hardy P. Anterior shoulder stabilization by Bristow-Latarjet procedure in athletes: return-to-sport and functional outcomes at minimum 2-year. Eur J Orthop Surg Traumatol 2016;26:277-82. https://doi.org/10.1007/s00590-016-1751-5.
6. Bonnevialle N, Mansat P, Bellumore Y, Mansat M, Bonnevialle 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;94:635-42. https://doi.org/10.1016/j.rco.2008.02.008.
7. Duazère F, Faraud A, Lebon J, Faruch M, Mansat P, Bonnevialle N. Is the Latarjet procedure risky? Analysis of complications and learning curve. Knee Surg Sports Traumatol Arthrosc 2016;24:557-63. https://doi.org/10.1007/s00167-015-3900-5.
8. Figueiredo EA, Belangero PS, Cohen C, Louchrad RL, Terra BB, Pochini AC. Rodeo athletes: management of shoulder instability. J Sports Med Phys Fitness 2016;56:560-4.
9. Giles JW, Degen RM, Johnson JA, Athwal GS. The Bristow and Latarjet procedures: why these techniques should not be considered synonymous. J Bone Joint Surg Am 2014;96:1340-8. https://doi.org/10.2106/JBJS.M.00627.
10. Griesser MJ, Harris JD, McCoy BW, Hussain WM, Jones MH, Bishop JY. Complications and re-operations after Bristow–Latarjet shoulder stabilization: a systematic review. J Shoulder Elbow Surg 2013;22:286-92. https://doi.org/10.1016/j.jse.2012.09.009.
11. Hovelius L, Sandstrom B, Sundgren K, Saebö M. One hundred eighteen Bristow-Latarjet repairs for recurrent anterior dislocation of the shoulder prospectively followed for fifteen years: study I—clinical results. J Shoulder Elbow Surg 2004;13:509-16. https://doi.org/10.1016/j.se.2004.02.013.
12. Knaut LA, Mooser AD, Melo SA, Richrads RR. Translation and cultural adaptation of the American Shoulder and Elbow Surgeons Standardized Shoulder Assessment Form (ASES) for the Portuguese from Brazil. Rev Bras Reumatol 2010;50:176-89. https://doi.org/10.1590/S0042010000200007.
13. Latarjet M. A propos du traitement des luxations recidivantes de l'epaule. Chir Lyon 1954;49:994-1003.
14. Leme L. Translation, cultural adaptation and validation of the "Athletic Shoulder Outcome Rating Scale" for the Portuguese language. São Paulo, Brazil: Universidade Federal de São Paulo; 2005. Dissertation.
15. Matthes G, Horvath V, Seifert J, Ptok H, Stengel D, Schmucker U, et al. Oldie but goldie: Bristow-Latarjet procedure for anterior shoulder instability. J Orthop Surg 2007;15:4-8. https://doi.org/10.1177/230949900701500102.
16. Mook WR, Petri M, Greensponn JA, Horan MP, Dornan GJ, Millett PJ. Clinical and anatomical predictors of outcomes after the Latarjet procedure. Am J Sports Med 2016;44:1407-16. https://doi.org/10.1177/0363546516634089.
17. Neyton L, Young A, Dawidziak B, Visona E, Hager JP. 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;21:1721-7. https://doi.org/10.1016/j.jse.2012.01.023.
18. Pap G, Machner A, Merk H. Treatment of recurrent traumatic shoulder dislocations with coracoid transfer — Latarjet-Bristow operation [in German]. Zentralbl Chir 1997;122:321-6.
19. Revill SI, Robinson JO, Rosen M, Hogg MI. The reliability of a linear analogue for evaluating pain. Anaesthesia 1976;31:1191-8.
20. Ruci V, Duni A, Cake A, Ruci D, Ruci J. Bristow-Latarjet technique: still a very successful surgery for anterior glenohumeral instability - a forty year One clinic experience. OA Maced J Med Sci 2015;3:310-4. https://doi.org/10.3889/oamjms.2015.066.
21. Sachs RA, Lin D, Stone ML, Paxton E, Kuney M. Can the need for future surgery for acute traumatic anterior shoulder dislocation be predicted? J Bone Joint Surg Am 2007;89:1665-74. https://doi.org/10.2106/JBJS.F.00261.
22. Schroder LDT, Provencher LMT, Mologne CTS, Muldoon MP, Cox JS. The modified Bristow procedure for anterior shoulder instability 26-year outcomes in Naval Academy midshipmen. Am J Sports Med 2006;34:778-86. https://doi.org/10.1177/0363546505282618.
23. Singer GC, Kirkland PM, Emery RJ. Coracoid transposition for recurrent anterior instability of the shoulder. A 20-year follow-up study. J Bone Joint Surg Br 1995;77:73-6.
24. Zhang AL, Montgomery SR, Ngo SS, Hame SL, Wang JC, Gamradt SC. Arthroscopic versus open shoulder stabilization: current practice patterns in the United States. Arthroscopy 2014;30:436-43. https://doi.org/10.1016/j.artrho.2013.12.013.