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Analysis and Outcomes of Coracoid Bone Block Radiologic Location In Anterior Shoulder Instabilities Treatment

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Abstract

Background: Coraoid bone block is a reliable technique to prevent the recurrence of anterior glenohumeral dislocations. The hypothesis was that a technical error in the abutment location in an unconventional location would lead to postoperative complications. This work aims to study the influence of the different bone block locations on the clinical and functional results of the Latarjet procedure.

Method: Between February 2011 and July 2015, 84 unstable shoulders were treated with the Latarjet procedure. The evaluation was done clinically by Constant and Rowe's quotation, subjectively by an investigation form. Omarthrosis were classified according to Samilson's classification.

Results: At a minimal eight-year follow-up, the average Constant quotation was 98,3, and Rowe's average quotation was 83,3. 89.3% of patients were satisfied. Four recurrence cases were found. There was 16.6% of Samilson type I postoperative glenohumeral arthrosis.

Conclusion: The touching and nonequatorial bone block location appears to be linked to developing postoperative complications, including glenohumeral arthrosis.

Keywords: Coracoid bone block, instability, location, radiography, results.

Introduction

The anatomical organization of the glenohumeral joint gives it great mobility but exposes it to problems of dislocation and instability. The onset of shoulder instability is a major functional handicap for young, athletic patients **[1,2]**. Anterior instability is the most common form **[3,4]**. They frequently occur after a sports accident or high-velocity trauma **[5]**. The mechanism directly impacts the shoulder with the arm in abduction and external rotation. Diagnosis is clinical and radiological. Treatment is exclusively surgical. Surgical treatment aims to stabilize the shoulder and allow rapid recovery of limb function and strength **[4]**. Four main surgical techniques have been described: the Bankart technique, the Trillat technique, the Patte technique, and the Latarjet coracoid bone block **[6,7]**. The Latarjet technique is the one that often leads to good results **[8,9]**. It consists of mobilizing the coracoid bone block at the anterior edge of the glenoid to ensure shoulder stability **[1]**. The subscapularis muscle is either incised or opened by the decision to allow the bone block to be anchored. The bone block must be fixed in a subequatorial position on the glenoid **[3]**. The subscapularis sometimes prevents the bone block from being positioned correctly. Poor positioning of the bone block impacts the quality of clinical and functional results. This study aims to investigate the influence of different bone block locations on the clinical and functional results of the Latarjet technique.

Method

The series

This 5-year multicentre descriptive cross-sectional survey study (February 2011 - July 2015) involved 84 patients with 84 shoulders, 71 of whom were men. The sex ratio was 5.46. The mean age was 36.7 years (extremes: 21 and 54). In order to be used, the files had to be complete. Patients were contacted and traced using the telephone numbers recorded in the files. Those who lost to follow-up and those who did not consent were excluded. The majority of patients were manual workers. Sports injuries predominated, followed by falls. Few patients were professional sportspeople. Most of the patients had more than 10 episodes of dislocation at the time of the operation. Preoperatively, patients were examined and assessed using the Constant score **[10]**.

Operating technique

The patient was placed in a half-seated position under a general anesthetic on a standard table. The approach was always deltopectoral. The coracoid was exposed by disinsertion of the acromioclavicular ligament and the pectoralis minor tendon. The horizontal branch of the coracoid was sectioned by osteotomy. The subscapularis was opened by decision in the direction of its fibers at the junction of the upper 2/3 and lower 1/3. The glenoid was then exposed. The glenoid bulge was systematically explored. The capsular plane was detached from the deep surface of the subscapularis. A horizontal capsulotomy was performed down to the edge of the glenoid rim. The glenoid rim was resected depending on its degree of damage. The anterior aspect of the glenoid was sharpened with an osteotomy. The underside of the coracoid bone was ground to a flat, cancellous surface. Two holes were drilled for the 2 3.5mm diameter screws.

The coracoid bone block was first inserted using the upper screw. The second screw was inserted after the rotation of the bone block had been adjusted. The inferior capsular flap was then tensioned upwards by suture, with the arm held at 50° of external rotation. In this way, the bone block was extra-articular and did not restrict mobility in external rotation. The horizontal arthrotomy was closed, with a capsuloplasty effect in the event of hyperlaxity. The lateral portion of the subscapularis tendon was then sutured. The skin was systematically closed with a suction drain. A control X-ray of the shoulder was always taken to ensure the bone block was in the correct position **(Figures 1,2)**.

Figures 1 and 2: Post-operative control X-ray, Shoulder Front and Profile (source: surgical team).

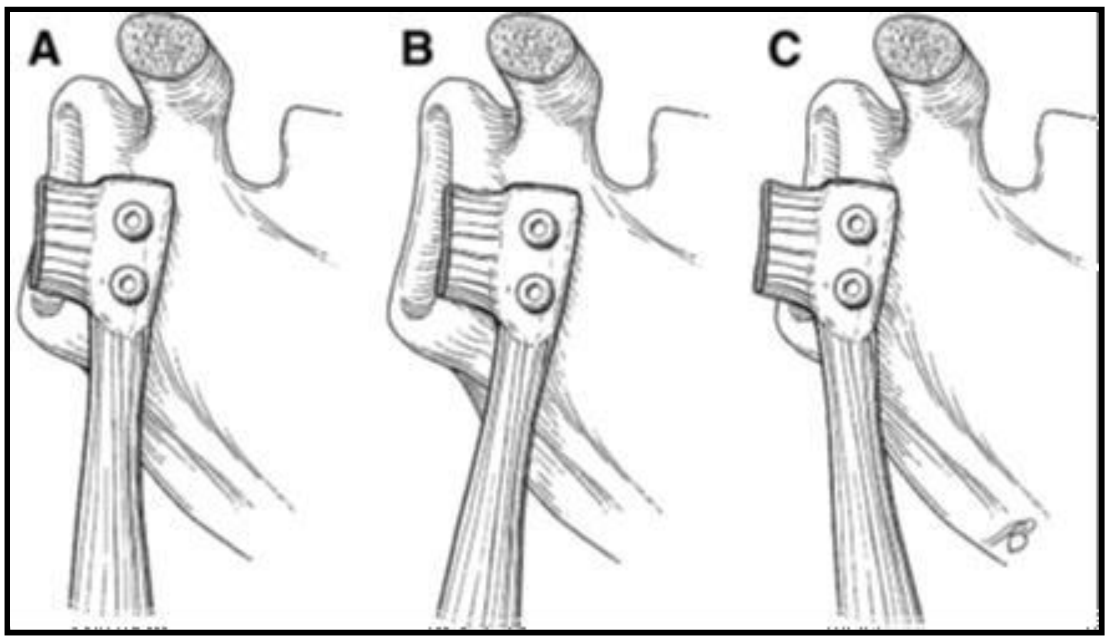

Figure 3: Transverse plane, A: effleurant position; B: medial position; C: overhanging position [Edward **11**].

In the transverse plane, the bone block was in the effleurante position in 58.3 % of cases **(Figure 3)**. In the sagittal plane, it was in the subequatorial position in 67.8% of patients **(Figure 4)**. Motor rehabilitation was systematic and started on average 21 days after the operation.

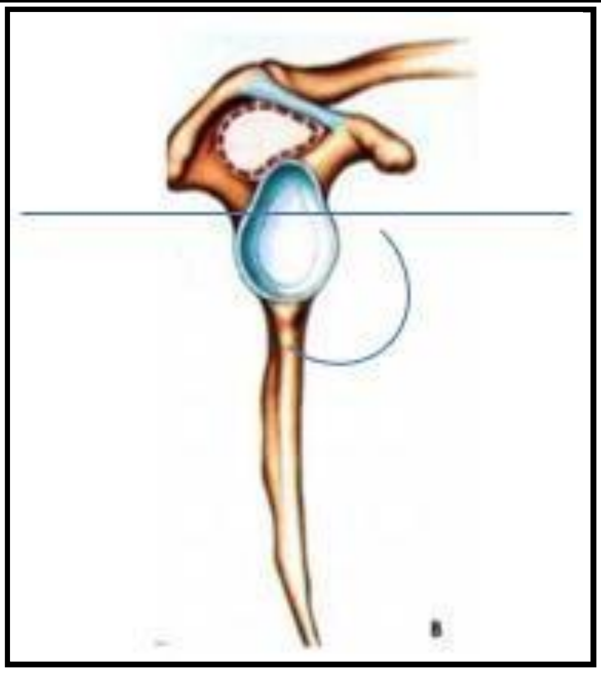

Figure 4: Sagittal plane indicating the subequatorial position (source: author's diagram).

Assessment methods

At a minimum follow-up of eight years, the Constant score **[10]** was systematically reassessed. The variables were: pain / 15, activity / 20, mobility / 40 and strength in Kg x 2 / 25. The total score was 100. The closer the patient's total score was to 100, the better his functional status. Similarly, the Rowe score **[12]** was also used to assess patients at follow-up. Its variables were: Stability / 0, 10, 30, 50; mobility / 0, 5, 15, 20; return to activity / 0, 10, 25, 30. The overall result was: Excellent if the score was between 90 - 100, Good between 75 - 89, Fair between 51 - 74, and Poor if less than 50. Radiological assessment was done using a frontal X-ray with neutral rotation and a Bernageau profile. These two views were used mainly to look for complications related to the bone block. The complications were glenohumeral osteoarthritis, bone block nonunion, and bone block lysis. There were no cases of circumflex nerve injury or humeral head necrosis. The Rowe score was used to assess shoulder function. It was excellent in 35 cases (41.6 %) and good in 21 cases (25 %). Glenohumeral osteoarthritis was classified according to Samilson **[2]** **(Table I)**.

Table I: Samilson's Classification.

Stage	Description
Stage I	Osteophyte 3mm of anterior or inferior margin of glenoid or head
Stage II	Stage II Osteophyte 3 - 7mm from anterior or inferior margin of glenoid or head with slight irregularity
Stage III	Stage III Osteophyte 7mm of anterior or inferior margin of glenoid or head With pinching and joint sclerosis

Results

The results were presented in tabular form.

Discussion

The series

Patients were evaluated at a minimum follow-up of eight years. Several studies have also observed a longer follow-up **[4,10,12,13]**. In general, a longer follow-up allows the musculoligamentous structures of the shoulder to regain their anatomical effectiveness. In addition, time should be allowed to monitor the development of glenohumeral osteoarthritis. Males predominated, with a sex ratio of 2.3. In general, men are more involved in high-risk activities. Male predominance is also found elsewhere in the same demographic context **[3,4,13,14]**. The average age of the patients was 36.7 years (extremes: 21 and 54). As in other studies, most patients in this study were younger than 40 **[2]**. In general, anterior shoulder instability is seen in patients under 40 **[14]**. **(Table II)**.

Table II : Characteristics of the series.

Item	n (%)
Age	
<40 years	63 (75)
>40 years	21 (25)
Gender	
Male	71 (84,5)
Female	13 (15,4)
Practising sport	
Professional	17 (20,2)
Non professional	67 (79,7)
Number of dislocations at the time of the operation	
>10	62 (73,8)
5 – 10	17 (20,2)
<5	5 (5,9)

The circumstances

The regular practice of certain sporting activities favors shoulder dislocations. Several studies have shown that non-professional sportspeople suffer from anterior shoulder instability **[2,4,15]**. However, this study's predominance of non-professional sports patients was not related to the recurrence of anterior shoulder dislocations or postoperative complications.

Most patients had more than 10 episodes of dislocation at the time of the operation because they consulted late. This could be explained by the fact that the patients had been to the bonesetters before consulting a specialist **[3] (Table III)**. This lengthened their consultation time. These results differed from those of others. Gueye *et al.* found eight patients out of 15 who had a minimum of five recurrences at the time of the operation **[3]**. In work by Mba Mba *et al.*, 52.6% of patients had between five and 10 dislocations at the time of the operation. In this study, patients' preference for traditional treatments contributed to the delay in surgical management.

Table III : The proportions of bone locations and postoperative X-ray signs.

Parameters	n (%)
Transverse position of the bone block	
Overhanging	16 (19)
Effleurante	49 (58,3)
Medial	19 (22,6)
Sagittal position of the bone block	
Lower equatorial	5 (5,9)
Equatorial	22 (26,1)
Subequatorial	57 (67,8)
X-ray postoperative sign	
Glénohumeral arthrosis	16 (19)
Bone block consolidation	64 (76,1)
Bone block nonunion	3 (3,5)
Bone block Lysis	1 (1,1)

Postoperative complications

The occurrence of glenohumeral osteoarthritis postoperatively (19 %) is thought to be due to a protruding position of the bone block, as advocated by Gueye *et al.*, Oueslati *et al.*, Bouju *et al.* **[1,3,16]**. A bone block fixed in an extra-subequatorial and non-touching position increases the risk of glenohumeral osteoarthritis (p = 0.00012; p = 00004).

All patients with more than 10 pre-operative dislocations had developed glenohumeral osteoarthritis in the late postoperative period. The more dislocations occurred, the greater the risk of developing osteoarthritis. However, statistical tests showed no significant correlation between these two parameters. This theory could only be believed in the absence of surgery, which would slow the progression to osteoarthritis. Furthermore, no author has demonstrated a link between the high number of glenohumeral dislocations pre-operatively and the occurrence of glenohumeral osteoarthritis postoperatively.

Patients in whom the bone block was in the overhanging, equatorial location or the medial, equatorial location had developed glenohumeral osteoarthritis postoperatively **(Table IV)**. In general, the location of the bone block that favors good results is the recommended location: effleurage and subequatorial **[1,16]**. Postoperative complications with the Latarjet technique are thought to be largely due to the non-recommended position of the coracoid bone block **[3,14]**. The bone block extending beyond the glenoid rim causes friction with the humeral head. This friction promotes wear on the articular cartilage, which is responsible for the long-term development of glenohumeral osteoarthritis. The authors recommend fixing the bone block in a flush position **[3,14,16]**.

Although fixed in a subequatorial location, the bone block was nonunion in three patients **(Table V)**. In the sagittal plane, the equatorial location is most implicated in glenohumeral osteoarthritis postoperatively **[1]**. The patients with glenohumeral osteoarthritis had a bone block fixed in the equatorial location. These explanations have been found in other studies **[1,3]**.

The subequatorial location effectively prevents the recurrence of anterior glenohumeral dislocation **[3]**. Four cases of recurrence were observed in this study. They were due to technical errors in which the bone block was placed in the subequatorial supine location. All had been successfully reoperated.

Table IV: Correlation between postoperative X-ray sign and transverse bone block location.

X-ray postoperative sign	Overhanging	Effleurante	Medial	Total
Glenohumeral arthrosis	14	1	4	16
Bone block consolidation	0	59	5	64
Bone block nonunion	0	0	3	3
Bone block lysis	0	0	1	1

p = 0,00004

Table V: Correlation between post-operative X-ray sign and sagittal bone block location.

X-ray postoperative sign	Subequatorial	Equatorial	Lowequatorial	Total
Glenohumeral arthrosis	12	4	0	16
Bone block consolidation	3	3	58	64
Bone block nonunion	3	0	0	3
Bone block lysis	1	0	0	1

p = 0,00012

Assessments

The average Constant score was 98.3 **(Table VI)**. This was anobvious result, as it demonstrated the technique's efficiency. This finding was observed in several studies, such as the work of Jouve etal. **[10]**.

The satisfaction assessment showed that 63 % of patients were satisfied, 32.1 % were delighted, and 4.7 % were disappointed. Disappointed patients were those who had developed postoperative complications. Three of these were repeat cases. The patient who had lysis of the bone block refused the second operation and would have consulted in another country. According to the authors, the cases of disappointment were linked to the delay and screws in the rehabilitation procedures. However, the most convincing explanation was errors in surgical technique **[3]**. The technique's effectiveness cannot be judged solely based on patients' subjective assessments.

According to Rowe's score, 41.6 % of the results were excellent **(Table VII)**. There was one case of poor results. These results were close to several others with the same score **[3,12]**. A well-conducted surgical technique always leads to good results.

Table VI: The results of the Contant score pre- and post-operatively.

Outcome	Preoperative	Postoperative
Pain	10,4	14,8
Activity	15,5	19,6
Mobility	31,5	39,1
Strength (Kg x2)	20	24,5
Average	77,4	98,3

Table VII: The results of the Rowe score and patient satisfaction at follow-up.

Results	n (%)
Rowe quotation	
Excellent	35 (41,6)
Good	21 (25)
Average	24 (28,5)
Bad	4 (4,7)
Patient satisfaction	
Very pleased	53 (63)
Pleased	27 (32,1)
Sorry	4 (4,7)

Study Limitations

Pre- and postoperative information could have been more sufficient. The interpretations given were sometimes subjective. A rotator cuff tear was not sought because patients could not afford magnetic resonance imaging.

Conclusion

The Latarjet coracoid bone block technique is the main therapeutic choice for treating anterior shoulder instability. Disconnecting the subscapularis and correctly positioning the bone block can ensure stability and satisfactory functional recovery. A technical error in which the bone block is positioned in a non-recommended position could lead to postoperative complications such as glenohumeral osteoarthritis, pseudarthrosis or lysis of the bone block, or recurrence of the instability. Poor positioning of the bone block affects the clinical and functional results of the Latarjet technique. However, results remain good when the technique is used correctly. Errors and complications are not uncommon in large series, but they depend on the experience of each surgical team.

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Author Contributions

DP: main author, study design, data collection, data analysis, redaction.

HVF: co-author, data collection, manuscript revision and supervision.

DAK, JBSE, IB: supervision.

References

1. Oueslati A, Rafrafi A, Znagui T, Saadi S, Nouisri L (2021) Les résultats de la technique de Latarjet dans l'instabilité antérieure de l'épaule en fonction de la position radiologique de la butée coracoïdienne. Pan Afr Med J. 38 : 215.
2. Louaste J, Hicham B, Taoufik C, Mohammed W, Larbi A, et al. (2016) Anterior shoulder instabilities : about 73 cas. Pan Afr Med J. 1: 1-9.
3. Gueye AB, Kinkpe CVA, Niane MM, Fotso B, Dieme C, et al. (2020) Traitement par la technique de Latarjet des instabilités antérieures de l'épaule au centre hospitalier de l'Ordre de Malte de Dakar. J Afr Chir Orthop Traumatol. 5(1): 9-13.
4. Dossim A, Abalo A, Dosseh E, Songne B, Ayite A, et al. (2008) Traitement des instabilités antérieures de l'épaule par la technique

de Bristow-Latarjet: résultats cliniques et radiologiques au recul moyen de 8,2 ans. Chirurgie de la main. 27(1): 26-30.

5. Thon SG, Branche K, Houck DA, Didinger T, Vidal AF, et al. (2021) Effectiveness of Latarjet for anterior shoulder instability in patients with seizure disorder. JSES international. 5(2): 171-174.
6. Latarjet M (1953) Treatment of recurrent dislocation of the shoulder. Lyon Chir. 49(8): 994-997.
7. Patte D, Bernageau J, Rodineau J, Gardes JCGJ (1980) Épaules douloureuses et instables. Rev Chir Orthop Reparatrice Appar Mot. 1: 157-165.
8. Toffoli A, Teissier J, Lenoir H, Lazerges C, Coulet B, et al. (2017) Chirurgie de l'instabilité antérieure d'épaule par butée coracoïdienne : corrélation entre le volume du subscapulaire sous la butée et la stabilité postopératoire. Rev Chir Orthop Traumatol. 103(6): 577-581.
9. Balestro J-C, Young A, FRACS, Maccioni C, Walch G (2014) Graft osteolysis and recurrent instability after the Latarjet procedure performed with bioabsorbable screw fixation. J Shoulder Elbow Surg. 74: 1-8.
10. Jouve F, Graveleau N, Nové-Josserand L, Walch G (2008) Luxation récidivante antérieure de l'épaule et rupture de la coiffe des rotateurs : résultats du traitement chirurgical. Rev Chir Orthop Traumatol. 94(7): 659-669.
11. Edwards TB, Walch G (2012) The Latarjet Procedure for Recurrent Anterior Shoulder Instability: Rationale and Technique. Operative Techniques in Sports Medicine. 20(1): 57-64.
12. Louaste J, Amhajji L, Chkoura M, Khalid K (2010) Les instabilités antérieures de l'épaule : à propos de 50 cas. J Traumatol Sport. 27(3): 107-111.
13. Bah A, El Antri I, Jalal Y, Ibo NM, Kouevidjin TB, et al. (2017) La stabilité du Latarjet se dégrade-t-elle avec le recul ? Etude rétrospective à 5 ans de recul minimum. Rev Marocaine Chir Orthop Traumatol. 69: 18-25.
14. Mba Mba C, Mezene Mendome C, Ondo Edzang SM, Allogo Obiang JJ, Ondo N'dong F (2021) Résultats du traitement des luxations antérieures récidivantes de l'épaule par la technique de la butée ostéoplastique selon Latarjet au CHU d'Owendo. Health Sci Dis. 22(7): 97-101.
15. Roulet S, Borel F, Franger G, Liotard JP, Michelet A, et al. (2019) Immediate self-rehabilitation after open Latarjet procedures enables recovery of preoperative shoulder mobility at 3 months. K Surg Sport Traum Arthrosc. 27(12): 3979-3988.
16. Bouju Y, Gadéa F, Stanovici J, Moubarak H, Favard L (2014) Shoulder stabilization by modified Latarjet-Patte procedure: Results at a minimum 10 years' follow-up, and role in the prevention of osteoarthritis. RCOT. 100(4 Suppl): S213-8.