

ORIGINAL PAPER

[Translated article] Does plate fixation improve the Latarjet procedure for anterior glenohumeral instability?



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KEYWORDS

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Abstract The Latarjet technique is a procedure used to treat anterior glenohumeral instability with glenoid bone loss. Various fixation systems for the coracoid have been described in the literature. This study aims to compare the results in quality of life and complications between patients treated with plate and screws (GP) and those with screws only (GSP) for coracoid fixation.

Material and methods: A retrospective study including patients with anterior glenohumeral instability and glenoid bone loss treated with Latarjet at the same center between October 2009 and February 2021. A total of 85 shoulders were analyzed, of which 64 completed at least one year of follow-up. Patients with previous surgical history in the same shoulder, bone loss <10%, ligamentous hyperlaxity (Beighton score >6), and previous infections were excluded. Complications were recorded, and the WOSI and Rowe tests were used to assess quality of life and return to sports activity.

Results: Of the 64 patients, 35 were treated with a plate (GP) and 29 with screws (GSP). The mean age was 30 ± 8.78 years. Both groups were statistically comparable. No significant differences were found in the WOSI test ($p = .140$), the Rowe test ($p = .380$) or in complications ($p = .692$). A higher percentage of the GP group returned to sports activity (77.1% GP vs. 51.7% GSP, $p = .039$).

Conclusions: No statistically differences were observed in quality of life, complications, or redislocations. However, the use of a plate showed a greater predisposition to return to sports activity ($p = .039$) in patients with anterior glenohumeral instability.

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PALABRAS CLAVE

Latarjet;
Inestabilidad;
Hombro;
Cirugía deportiva;
Luxación de hombro

¿Mejora la fijación con placa la cirugía de Latarjet para la inestabilidad anterior glenohumeral?

Resumen La técnica de Latarjet es un procedimiento utilizado para tratar la inestabilidad glenohumeral anterior con pérdida ósea glenoidea. Se han descrito diversos sistemas de fijación para la coracoides en la literatura. Este estudio tiene como objetivo comparar los resultados en calidad de vida y complicaciones entre pacientes intervenidos mediante placa y tornillos (GP) y aquellos con tornillos sin placa (GSP) para la fijación de la coracoides.

Material y métodos: Estudio retrospectivo que incluye a pacientes con inestabilidad glenohumeral anterior y pérdida ósea glenoidea tratados con Latarjet en un mismo centro entre octubre de 2009 y febrero de 2021. Se analizaron 85 hombros, de los cuales 64 completaron al menos un año de seguimiento. Se excluyeron antecedentes quirúrgicos previos en el mismo hombro, pérdida ósea < 10%, hiperlaxitud ligamentosa (test de Beighton > 6) e infecciones previas. Se registraron complicaciones y se utilizaron los test de WOSI y Rowe para evaluar la calidad de vida y la reincorporación a la actividad deportiva.

Resultados: De los 64 pacientes, 35 fueron intervenidos con placa (GP) y 29 con tornillos (GSP). La edad media fue de $30 \pm 8,78$ años. Ambos grupos fueron estadísticamente comparables. No se encontraron diferencias significativas en el test de WOSI ($p=0,140$), en el test de Rowe ($p=0,380$) ni en complicaciones ($p=0,692$). Un mayor porcentaje del grupo GP volvió a la actividad deportiva (77,1% GP vs. 51,7% GSP, $p=0,039$).

Conclusiones: No se observaron diferencias significativas en calidad de vida, complicaciones o relajaciones. Sin embargo, el uso de placa mostró una mayor predisposición al retorno deportivo ($p=0,039$) en pacientes con inestabilidad glenohumeral anterior.

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Introduction

The number of bone stabilisation interventions using the Latarjet technique has increased exponentially in recent decades,¹ becoming an increasingly common surgical procedure in patients with anterior glenohumeral instability. Despite this, the choice of this technique remains a matter of debate among experts. There is currently a growing tendency to consider it appropriate in patients with recurrent anterior instability and bone loss, especially when previous soft tissue stabilisation procedures have failed,² or when risk factors are identified that could increase the likelihood of failure (male sex, glenohumeral hypermobility).³

Types of fixation to secure the coracoid process to the glenoid include the use of one or two metal screws, a plate with screws, suspension systems with and without metal⁴ and non-absorbable sutures.⁵ Coracoid fixation in the Latarjet technique was originally performed using a single screw.⁶ The use of two screws to increase compression of the coracoid with the anterior rim of the glenoid was later standardised,⁷ although this technique was not free of complications, such as osteolysis and graft breakage. Therefore, the contact surface between the material and the graft was increased by means of a plate.⁸

Currently, there is no published article in the literature comparing the results in quality of life and return to sports activity between fixation with a plate and screws versus fixation with screws alone for the Latarjet technique.

The objective of this study is to compare the results in quality of life for shoulder instability, complication and

redislocation rates, and the predisposition to return to sports activity after fixation with a plate and screws versus the use of screws alone for fixation of the coracoid. Our hypothesis is that there are no differences in terms of quality-of-life results, complication rate, redislocations and return to sports activity after stabilising the coracoid with a plate and screws (GP) or with two screws without a plate (GSP).

Material and methods

A retrospective study was conducted of cohorts which included patients with anterior glenohumeral instability associated with glenoid bone injury treated with bone stabilisation according to the Latarjet technique between October 2009 and February 2021. Sequentially, in those patients operated on between October 2009 and July 2017, the coracoid was fixed with two screws without a plate (GSP), while in the remaining 35 patients operated on between August 2017 and February 2021, the coracoid was fixed with a plate and screws (GP). All interventions were performed in a single centre and by a single orthopaedic surgeon specialised in shoulder surgery.

The study was conducted in accordance with the ethical standards recognised by the Declaration of Helsinki and resolution 008430 of 1993, and had the approval of the Research Ethics Committee of our centre (CEIC) with reference number 2023/11267, obtaining written informed consent from all patients who participated in the study.

Inclusion criteria

Patients aged 14 years or older diagnosed with anterior glenohumeral instability of the shoulder, glenoid bone loss (>10%) and Hill-Sachs lesion of the humeral head <40% (off-track lesions), with bone loss confirmed preoperatively by computed axial tomography (CT) and magnetic resonance imaging (MRI).

Exclusion criteria

Patients younger than 14 years, glenoid bone defect <10% or >40% of the humeral head, significant comorbidities in the affected shoulder (previous surgeries not related to instability, previous joint infection) and significant medical comorbidities that could alter the efficacy of the surgical intervention or follow-up.

Measurements of results

The main outcome measure was the percentage score of the WOSI scale adapted to Spanish to assess quality of life in shoulder instability. The scoring system described in the original publication was used, with a lower score reflecting better quality-of-life outcomes,⁹ with the highest possible score being 2100 points and the lowest being 0 points (to express WOSI test results, the cumulative total is subtracted from 2100 and divided by 21, with the result expressed as a percentage, where 0% is an excellent result and 100% is a poor result). In addition to quantitative differences, this was compared with the minimal clinically important difference (MCID) perceived by the patient in the WOSI test according to the study by Menendez et al.¹⁰

The Rowe test was also used to assess shoulder instability-adjusted quality of life, which is based on a scoring system from 0 to 100 points, with the lowest score (0 points) reflecting poorer results and the highest score (100 points) reflecting excellent results.

The rate of complications and return to sporting activity were recorded. Complications were considered to be: graft resorption or fracture, breakage or loosening of the material, recurrent dislocation or neurological injury, occurring at any time during follow-up. The diagnosis of these complications was established by correlating the patient's symptoms with control X-rays (anteroposterior, outlet and Bernageau), and complementing the study with CT images to obtain a more precise assessment.

Sports activity was assessed by two questions. All patients were asked if they had exercised before surgery. If they answered "yes", they were asked if they had resumed sports activity after surgery. Patients who had exercised at the same level after at least one year of follow-up were considered to have resumed sports activity.

Surgical technique

The open Latarjet-Patte technique was performed in all patients. A deltopectoral approach was used to do this, preserving the cephalic vein. The coracoid osteotomy was performed 2.5 cm from the tip of the coracoid. The arthro-

tomy was performed by means of a longitudinal section of the subscapularis, and the anterior capsule was sectioned parallel to the glenoid rim. The fixation method used was two 4.5 mm × 38 mm Synthes® malleolar screws (GSP), or two 3.75 mm × 36 mm screws and an Arthrex® plate (GP).

The postoperative period and immobilisation times were identical in both groups, with 3 weeks of immobilisation in a sling. At 3 weeks, the patient was instructed to perform passive exercises with a pulley. From the eighth week, active mobility exercises were started, and at 12 weeks, resistance exercises. During the first 6 months postoperatively, it was recommended to avoid contact sports.

Data analysis

Descriptive statistical analysis was performed for all pre-operative surgical variables, using measures of central tendency for quantitative variables and absolute and relative frequencies for categorical variables. The nonparametric Mann-Whitney test and Fisher's exact test were used to compare groups. A level of $p < .05$ was set for statistically significant differences. All analyses were carried out using the STATA v.15.1 statistical package.

Results

Eighty-five patients who underwent surgery using the Latarjet technique between October 2009 and February 2021 were included in the study. Twenty-one patients (24.7%) did not complete a minimum of 1 year of follow-up and were excluded, with a follow-up rate of 75.3%. In total, 64 patients were included (35 of them had the coracoid fixed with two screws and one plate, and the remaining 29 with two screws) with a mean age of 31.3 ± 8.78 years (Table 1). 82.8% of the patients were male, and a total of 37 cases (57.8%) underwent surgery on the right shoulder. Imaging tests (CT and MRI) prior to surgery showed a soft tissue lesion with a Hill-Sachs lesion and associated bone loss of <40% in the humeral head and >10% in the glenoid. The mean follow-up of the sample was 23.70 months, with a minimum follow-up of 12 months and a maximum of 103 months.

No statistically or clinically significant differences were found in the different scales used to evaluate shoulder instability, with values of $p = .140$ for the WOSI test (95% CI: 19.21–30.69) and $p = .380$ for the Rowe scale (95% CI: 72.53–83.01) (Table 2). The GP group obtained a higher score on both scales, reaching a mean percentage of 20.37% (SD: 19.90) in the WOSI test, compared to 30.48% (SD: 25.46) in the group of patients stabilised with screws without a plate (GSP). Regarding the Rowe scale, the GP group presented a mean score of 80.14 (SD: 21.47), in contrast to 75.52 (SD: 20.33) in the GSP group.

Regarding the number of complications, there were no statistically significant differences between both groups ($p = .692$) (Table 2). These were subdivided into graft rupture, material loosening, redislocation and neurological injury, with the most frequent complication being graft rupture (Table 3). Two patients in the GP group and one patient in the GSP group experienced graft rupture, and one patient in each group experienced graft loosening. Graft integration and resorption were assessed using anteroposterior (AP),

Table 1 Demographic data according to group.

Number of patients	Plate 35	Screws 29	Total 64	<i>p</i>
<i>Age</i>				.142
Mean (SDE)	29.69 (7.93)	33.24 (9.50)	31.30 (8.78)	
Median (Q1, Q3)	29.0 (25.0, 34.0)	30.0 (25.0, 41.0)	30.0 (25.0, 37.0)	
Min, max	17.0, 50.0	19.0, 55.0	17.0, 55.0	
<i>Sex</i>				.319
Male	27 (77.1%)	26 (89.7%)	53 (82.8%)	
Female	8 (22.9%)	3 (10.3%)	11 (17.2%)	
<i>Lesion^a</i>				.819
I	3 (8.6%)	4 (13.8%)	7 (10.9%)	
II	20 (57.1%)	15 (51.7%)	35 (54.7%)	
III	12 (34.3%)	10 (34.5%)	22 (34.4%)	
<i>Side</i>				1.000
Right	20 (57.1%)	17 (58.6%)	37 (57.8%)	
Left	15 (42.9%)	12 (41.4%)	27 (42.2%)	

SD: standard deviation.

^a L grade I lesion (soft tissue lesion), grade II (soft tissue + Hill-Sachs lesion), grade III (lesion with bone loss of <13.5% glenoid).**Table 2** Functional results and complications.

	Plate (<i>n</i> = 35)	Screws (<i>n</i> = 29)	Total (<i>n</i> = 64)	<i>p</i>
<i>WOSI (in %)</i>				.140
Mean (SD)	20.37 (19.90)	30.48 (25.46)	24.95 (22.96)	
Median (Q1, Q3)	14.0 (4.0, 29.0)	22.0 (7.0, 50.0)	19.5 (6.0, 38.0)	
Min, max	0.0, 74.0	0.0, 84.0	0.0, 84.0	
<i>Rowe (in score)</i>				.380
Mean (SD)	80.14 (21.47)	75.52 (20.33)	77.77 (20.98)	
Median (Q1, Q3)	90.0 (67.5, 95.0)	80.0 (55.0, 95.0)	80.0 (60.0, 95.0)	
Min, max	25.0, 100.0	40.0, 100.0	25.0, 100.0	
<i>Sport</i>				.039
Yes	27 (77.1%)	15 (51.7%)	42 (65.6%)	
No	8 (22.9%)	14 (48.3%)	22 (34.4%)	
<i>Complications</i>				.692
No	32 (91.4%)	25 (86.2%)	57 (89.1%)	
Yes	3 (8.6%)	4 (13.8%)	7 (10.9%)	
<i>Redislocations</i>				.201
No	35 (100.0%)	27 (93.1%)	62 (96.9%)	
Yes	0 (0.0%)	2 (6.9%)	2 (3.1%)	

SD: standard deviation.

Table 3 Types of complications by subgroups.

	Plate (<i>n</i> = 3)	Screws (<i>n</i> = 4)	Total (<i>n</i> = 7)
Graft rupture	2	1	3
Loosening of material	1	1	2
Recurrent dislocation	0	2	2
Neurological injury	0	0	0

outlet, and Bernageau radiographic projections. In cases where signs of osteolysis, rupture, or resorption of the graft were observed on radiographs, the study was extended with a CT scan.

In the analysis of the number of redislocations, a total of 2 cases were recorded in the GSP group, while no redislocations were reported in the GP group. In both cases of redislocation, the patients were reoperated on using the technique described by Eden-Hybinette.

A higher percentage of patients in the GP group resumed sports activity at the same level as before surgery compared with patients in the GSP group (77.1% vs. 51.7%; $p = .039$) (Table 2).

Discussion

This study confirms the initial hypothesis that there are no differences in quality-of-life outcomes for shoulder instability, complication rate and redislocations after stabilisation of the coracoid with a plate and screws (GP) or with two screws (GSP). However, differences were found between these two methods in terms of return to sporting activity, with stabilisation with a plate showing a higher rate of return to the same level of sport.

The quality-of-life results using the WOSI test are similar to those described in the literature both after fixation with a plate and screws and with screws without a plate,^{11–13} highlighting that most studies only include patients operated on without a plate. Likewise, the results obtained for the Rowe instability scale are consistent with the findings documented in the existing literature.^{14,15}

Although in our sample no statistically significant differences were found in terms of quality of life for instability between both fixation methods, from August 2017 the coracoid began to be stabilised with a plate. This decision was made based on the reproducibility of the technique and the evidence provided by biomechanical studies, such as those of Di Giacomo,^{8,16} which show an improvement in the distribution of the forces applied to the compression between the glenoid and the transposed coracoid. This could facilitate the integration of the graft and have a positive impact on stability and the rate of complications, including redislocation.

Regarding the return to sports activity, Baverel et al.¹⁷ published a retrospective study in 2018 in which they analysed 106 patients with anterior glenohumeral instability in whom the coracoid was fixed with two screws using the Latarjet technique. They showed that, after an average follow-up of 46 months, 79% of elite athletes returned to the same level of sports activity, compared to 43% of recreational athletes. Hurley et al.¹⁸ found that after a mean follow-up of 83.5 months, 73% of patients returned to sport at the same or higher level. And in another systematic review, Abdul-Rassoul et al.¹⁹ reported that 84% of patients returned to sport after a Latarjet procedure, most of them at the same level as before. Our results regarding return to sport are similar to those reported in the literature. However, to date, no study has been published directly comparing return to sport for the different fixation techniques in the Latarjet technique. In our study, we found that the

willingness to return to sport was higher in the plate fixation group (77.1%) compared to the screw fixation group (51.7%).

Regarding the complication rate, we observed 8.6% of complications in patients in the GP group and 13.8% in patients in the GSP group. In the literature, the complication rate has proven to be highly heterogeneous. Gilat et al.,²⁰ in their systematic review published in 2020, observed 5% of complications after 5 years of follow-up. Schmid et al.²¹ reported a complication rate similar to that present in our study, with 12% of complications after 3 years of follow-up. In contrast, Shah et al.²² observed a complication rate of up to 25% at 3 years of fixation with two screws for the Latarjet technique.

Our study also demonstrated a relatively low rate of redislocation (0% for plate and 6.9% for screws) when compared to the literature, where it ranges between 0 and 12%.²³

This study also has several limitations. First, there are the limitations inherent to a retrospective study. Second, it is a study with a follow-up rate of 75.3%, which we believe may be conditioned by the fact that these were young patients who, once the symptoms of instability had resolved, decided to abandon follow-up. It could also be that these were dissatisfied patients or those with postoperative instability who decided to continue treatment at another centre, although there is no data in the electronic medical record that this was the case. Finally, there is also the possibility of a cognitive bias secondary to the learning curve by the surgeon responsible during the years in which the study was carried out.

Conclusions

The two fixation techniques do not show differences in terms of quality of life for glenohumeral instability assessed by the WOSI test, Rowe test, rate of complications and redislocations. However, there are differences with a greater predisposition to return to sports activity in those patients in whom plate fixation was performed.

Level of evidence

Level of evidence III.

Ethical considerations

The study was conducted in accordance with the ethical standards recognised by the Declaration of Helsinki and resolution 008430 of 1993, and was approved by the Research Ethics Committee of our centre (CEIC) with reference number 2023/11267, with written informed consent obtained from all patients who participated in the study.

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Conflict of interests

The authors declare that there are no conflicts of interest related to the publication of this article.

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