



Effectiveness of Latarjet for anterior shoulder instability in patients with seizure disorder



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Background: A paucity of literature exists on the outcomes after Latarjet for anterior shoulder instability in patients with seizure disorders (SDs). The purpose of this study was to determine the effectiveness of the Latarjet procedure for anterior shoulder instability in patients with SDs.

Methods: A retrospective review of patients undergoing Latarjet from 2013 to 2017 for anterior shoulder instability with minimum 2 years of clinical follow-up was performed. Patients were divided into two groups: patients diagnosed with SD, and patients without a history of seizure (control). Demographics, indications, SD details, and postoperative outcomes were collected. The incidence of complications, recurrent instability, revision surgery, and repeat seizure(s) were also examined.

Results: A total of 53 patients were identified, including 10 shoulders in 9 patients with an SD (88.9% male; mean age, 29.2 years [range, 20–37]), and 44 shoulders in 44 non-SD patients (86.4% male; mean age, 30.3 years [range, 18–52]). The mean follow-up time was 3.4 (range, 2.2–4.8) and 3.8 (range, 2.1–5.6) years in the SD and control group, respectively. During the follow-up period, 4 of 9 (44.4%) patients with an SD (50% shoulders) had a recurrent seizure postoperatively. Of those 4 patients, three sustained a recurrent dislocation of the operative shoulder(s) resulting from a postoperative seizure, including one who dislocated bilateral shoulders from a single seizure event after bilateral Latarjet procedures. There was no recurrent instability in patients who did not sustain a seizure in the postoperative period. Having a seizure in the postoperative period significantly increased the risk of recurrent dislocation (OR = 39.9, $P = 0.04$).

Conclusions: Latarjet is a successful operation for recurrent anterior shoulder instability in patients without an SD. While it can still be successful in patients with SD, adequate control of seizures postoperatively is paramount to prevent recurrent instability episodes. Patients with an SD can be advised that if their seizures can remain controlled, they have a high likelihood of clinical success equal to that of patients without an SD.

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Shoulder instability is a significant problem for patients with seizure disorders (SDs). Dislocations can be secondary to violent muscle contractions during a seizure or from a fall related to the seizure and are often recurrent in nature.^{2,6} While posterior dislocations are commonly associated with patients with an SD, anterior dislocations have been shown to be 15.5 to 21.7 times more common than posterior dislocations.¹² Because patients with an SD often have multiple dislocations, anterior bone loss is a significant

concern. Increasing levels of attritional bone loss lead to more frequent dislocations and less force required for each dislocation. Over time, as bone loss accumulates, shoulders may dislocate in the absence of seizure and with minimal trauma leading to significant anxiety and fear of recurrent dislocations for these patients. When anterior bone loss is present bony augmentation is necessary to decrease not only the risk of recurrence but also improve patient function. The Latarjet procedure involves a transferring the distal portion of the coracoid with the attached conjoint tendon to the anterior glenoid to increase shoulder stability and prevent future dislocations.

Numerous recent studies have been performed to evaluate the success of the Latarjet procedure for recurrent anterior instability in patients without SDs.^{1,3,7,8,17} However, less is known about its

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success in the setting of recurrent anterior instability secondary to seizures.^{4,9,11} At this time, there is no consensus on the ideal surgical procedure to prevent recurrent anterior instability in patients with SDs. High failure rates have been shown with isolated soft tissue procedures in patients with SDs with anterior instability. These results suggest that bony reconstruction is the optimal choice for obtaining clinical stability.^{2,15} The goal of a Latarjet procedure in patients with an SD is to decrease the likelihood of recurrent shoulder dislocations resulting from postoperative seizures by improving the stability of the shoulder during daily activity. Studies looking at the success of the Latarjet procedure in patients with SDs have relatively small sample sizes.^{2,11,15} One study⁴ has been performed comparing the effectiveness of Latarjet in SD and non-SD patients. This study showed similar functional results between the groups; however, patients with an SD had a higher rate of redislocation at 9%.⁴

Given the lack of literature on isolated Latarjet procedures in patients with an SD, the purpose of this study was to determine whether the Latarjet procedure is effective in treating SD patients with recurrent anterior shoulder instability. Secondary measures were to identify any surgeon related factors that may affect outcomes if present. The authors hypothesized that despite the increased risk factors in this unique patient population, Latarjet would result in successful outcomes with decreased recurrent shoulder dislocations.

Materials and methods

Study data were obtained through a retrospective chart review after Institutional Review Board (IRB) approval (#19-0788). The chart review included consecutive patients undergoing the Latarjet procedure from 2013 to 2017 by one of 4 sports medicine or shoulder and elbow fellowship-trained surgeons at a tertiary referral center for anterior shoulder instability to include those with and without SD. A minimum 2 years of clinical follow-up was necessary to be included. Final patient inclusion criteria were all patients with prior anterior shoulder instability with documented subcritical bone loss, SD, and having undergone a primary Latarjet procedure for the indication of anterior shoulder instability for significant anterior bone loss. Subcritical bone loss was determined as 13.5% per Shaha et al.¹⁴ Pertinent exclusion criteria included concomitant shoulder pathology (ie, superior labrum anterior posterior tear, rotator cuff tears, evidence of shoulder fracture), no significant bone loss, multidirectional instability, and a prior shoulder arthroplasty. All patients underwent preoperative CT scan with additional 3-D reconstruction which was used to measure glenoid bone loss via the circle-line method.¹⁰ All patients underwent a similar standardized rehabilitation protocol after surgery which consisted of abduction sling wear for 6 weeks focusing on gradual restoration of passive range of motion, followed by gradual restoration of active range of motion. Strength exercises are initiated at the 8 week mark after restoration of motion and continues until cleared for activity. Clearance back to full activity usually occurs between months 4 and 6.

All patients undergoing the Latarjet procedure over the study period were identified. Patients were then divided into two groups: patients diagnosed with an SD (SD group), and patients without a history of seizure (control group). Demographic data, indications for surgery, imaging findings, details on SD, surgical details, and postoperative outcomes were collected. Surgeon-specific factors were then analyzed including screw material (stainless steel vs. titanium), screw type (cannulated vs. solid), and screw diameter (mm) to determine any effects on recurrent dislocation rates. The incidence of complications, recurrent instability, redislocation, revision surgery, and repeat seizure(s) were also examined. The

time and leading cause of failure (redislocation during a seizure or from a new traumatic event) were assessed.

Statistical analyses

Descriptive statistics are presented. Bivariate and multivariate analyses were performed using ordinal logistic regression models and binary logistic regression models were used to model categorical variables. Multivariate models predicting the likelihood of recurrence for patients with SD controlled for postoperative seizures, screw diameter, screw type, and screw material to address their potential confounding nature. Odds ratio (OR) for the effect of recurrent seizures postoperatively on the risk of dislocation recurrence was also calculated. The significance level was set at $P < .05$. Statistical analyses were performed in R Studio Software Version 1.1.456¹³ using the MASS¹⁶ and arm packages.⁵

Results

A total of 53 patients met the inclusion criteria for this study. This included 9 SD patients with 10 surgically treated shoulders and 44 non-SD patients that underwent the Latarjet procedure for treatment of anterior shoulder instability. The mean follow-up time was 3.4 years (range, 2.2–4.8) in the SD group, whereas the mean follow-up time was 3.8 years (range, 2.1 to 5.6) in the non-SD group. Baseline demographic data are shown in [Table I](#).

In the non-SD group, 1 of 44 (2.3%) had a recurrent dislocation and underwent revision surgery. This patient had sustained >5 preoperative shoulder dislocations before undergoing the Latarjet procedure and had 19% bone loss measured before his Latarjet procedure. He had also failed a previous arthroscopic Bankart procedure before the Latarjet as well. He was eventually revised with a distal tibial allograft bony augmentation procedure after his failed Latarjet procedure. One additional non-SD patient (2.3%) experienced a postoperative axillary nerve palsy which resolved by 3 months postoperatively.

During the follow-up period, 4 of 9 (44.4%) patients with an SD (5/10, 50% shoulders) had a recurrent seizure postoperatively. Of those 4 patients, three patients sustained a recurrent dislocation of the operative shoulder(s), including one patient who had undergone bilateral Latarjet procedures that dislocated both shoulders from a single seizure event. Recurrent dislocations ranged from 12 weeks postoperatively to 17 months postoperatively. All patients who sustained a recurrent dislocation had previously sustained >5 preoperative shoulder dislocations before undergoing the Latarjet procedure. As shown in [Table II](#), 100% of the recurrent dislocations resulted from recurrent seizure postoperatively, which caused screw fracture (patient numbers: 5, 9L and 9R) or screw bending (patient number 2). The 5 patients who had not sustained a seizure postoperatively remain with their shoulder stable.

The likelihood of recurrence after the Latarjet procedure for anterior shoulder instability in patients with SD was significantly increased with continued seizures in the postoperative period. Persistent seizures in the postoperative period were the single cause of recurrent instability in our series. Having a seizure in the postoperative period increased patients risk of having a recurrent dislocation independent of screw size, type, and diameter by 39.9 times (OR, 39.9, $P = .04$, [Table III](#)).

Bivariate and multivariate regression models predicting the likelihood of recurrence for patients with an SD are presented in [Supplementary Table S1](#). The likelihood of recurrence after the Latarjet procedure for anterior shoulder instability in patients with an SD was not significantly influenced by surgeon-chosen factors including screw type, material, or diameter ($P > .05$ for each, respectively). Similarly, the combined effects of these factors did

Table I
Baseline demographic data

Demographic	Seizure disorder group	Non–seizure disorder group
Number of patients (shoulders)	9 (10)	44 (44)
Age, years	29.2 (20-37)	30.3 (18-52)
Male: Female	8:1	38:6
BMI, kg/m ²	26.8 (22.5-42)	25.6 (16.5-39.1)
>5 Preoperative shoulder dislocations, N (%)	7 (77.8)	30 (68.2)

Continuous data are presented as mean (range), whereas categorical data are presented as N (%).

Table II
Efficacy of Latarjet procedure in patients with seizure disorder based on surgical details

Pt No.	Glenoid bone loss, (%)	Screw type	Screw material	Screw Diameter, mm	Postoperative seizure	Recurrence	Recurrence requiring revision
1	29	Cannulated	Titanium	4			
2	25	Solid	Steel	2.7	Yes	Yes	Yes
3	15	Solid	Steel	2.7			
4	30	Cannulated	Titanium	4			
5	23	Cannulated	Titanium	4	Yes	Yes	Yes
6	15	Cannulated	Titanium	4			
7	15	Solid	Steel	3.5	Yes	No	
8	13	Cannulated	Titanium	4			
9L	21	Cannulated	Titanium	4	Yes	Yes	Seizures*
9R	22	Cannulated	Titanium	4	Yes	Yes	Seizures*

Seizures*, needs a revision surgery, but seizures are not under control. Pt No, patient number; GBL, glenoid bone loss percentage.

Table III
Recurrent seizures postoperatively and likelihood of shoulder dislocation recurrence in patients with seizure disorder

Postoperative seizure, n	Recurrence, n		Total, n	OR	P value
	Yes	No			
Yes	4	1	5	39.9	.04
No	0	5	5		
Total	4	6	10		

OR = odds ratio of recurrent seizures on dislocation rates.

not significantly influence the likelihood of recurrence in these patients (Supplementary Table S1).

Discussion

The main finding of this study was that SD by itself significantly increases the risk of having a recurrent shoulder dislocation after undergoing the Latarjet procedure for anterior shoulder instability. This is evidenced by the significantly increased likelihood of recurrence associated with continued seizures in the postoperative period. We found a repeat seizure rate of 50% (5/10) and 80% (4/5) of patients who had a seizure in the postoperative period sustained a repeat dislocation. However, in the absence of a seizure, the Latarjet procedure is effective in restoring shoulder stability comparable with that of patients without SD. No recurrent dislocations were reported in any patients that did not sustain a seizure in the postoperative period. Even in the patients that did have seizure recurrence postoperatively, no dislocations were reported by any other mechanism (ie, trauma, fall, daily activities, etc.).

All of the failures in the SD group failed due to recurrent seizures. Only one patient in our cohort who continued to have seizures postoperatively did not have a recurrent dislocation. Of the 3 patients (4 shoulders) with recurrence due to seizures, one patient failed due to recurrent seizures 3.5 months

postoperatively, one failed 4.5 months postoperatively, and one patient who had the Latarjet procedure performed bilaterally had both shoulders fail from the same seizure event. Each shoulder was 2- and 2.5-years postoperative, respectively. Only one patient with a recurrent seizure postoperative did not have a recurrent dislocation. Of the patients with no documented seizures postoperatively, all 5 patients had no evidence of recurrent dislocations.

Previously published reports show varying rates of recurrent shoulder dislocations in patients with SDs after the Latarjet procedure from 5 to 43%.^{4,9,11} Raiss et al¹¹ reported on 12 patients (14 shoulders) and recorded a recurrent dislocation rate of 43%. In their series, they found a 71% (10/14 shoulders) recurrent seizure rate, where 6 of those 10 shoulders (60%) redislocated. Ersen et al⁴ reported on 9 patients (11 shoulders) and found only a 9% recurrent dislocation rate. In their series, they had only a 33% (3/9) postoperative seizure rate. Khater et al⁹ reported on a patient with SD secondary to tramadol abuse/overdose. In their series of 57 patients (62 shoulders), 5% (3/57) of patients had a recurrent dislocation. They had a 9% (5/57) recurrent seizure rate, all of which were attributed to a relapse in their addiction. Similarly, patients who were able to control their seizures by not relapsing in their addiction did not sustain a recurrent dislocation.

In all of these reports, including the data presented here in this study, the overarching theme in patients with SDs is that control of their seizures should be their primary goal both preoperatively and postoperatively. This information is extremely important to both the surgeon and the patient when undergoing preoperative counseling. It is imperative that surgeons use this information to advise patients on their risks for recurrent dislocation as well as emphasize the need to stay vigilant in treating their SD even after the procedure. Failure to control their seizures postoperatively leads to a significant risk of redislocation, in our cohort specifically, that led to a 39.9 times higher likelihood of clinical failure. This evidence can help surgeons and patients determine not only appropriate timing for surgery (ie, when seizures are controlled), but also emphasize the importance to the patient that they must continue

to control their seizures postoperatively if they want to have a lasting positive outcome. It is encouraging that the only mechanism found to cause a repeat dislocation in this case series was recurrent seizures. The Latarjet procedure appears to be effective in controlling shoulder stability in their absence.

A significant strength of our study is that multiple surgeons from a tertiary referral center in the United States were included. Because of this, our data should be applicable to the general orthopedic population to help guide treatment strategy, treatment outcomes, but most importantly treatment expectations in regard to patients' SD. The limitations of our study should also be noted, including the retrospective nature and small cohort size for the SD group. However, our cohort size is in line with previously published case series. We did not find surgeon-specific factors that can lead to decreased recurrence rates between screw material (stainless steel vs. titanium), screw type (solid vs. cannulated), or screw size (diameter, mm), likely due to our low number of patients in the SD group. Further studies would hopefully be able to draw from multiple centers to help determine if surgeon factors can help decrease the recurrence risk in this difficult patient population. Seizure disorder along with anterior shoulder instability with significant bone loss necessitating the Latarjet procedure is, fortunately, rare. A prospective, randomized, controlled trial in this specific patient population would be difficult to complete due to this factor.

Conclusions

Latarjet is a successful operation for recurrent anterior shoulder instability in patients without an SD. While it can still be successful in patients with SD, there is a high rate of recurrent instability with seizures, and adequate control of seizures both preoperatively and postoperatively is paramount to prevent recurrent instability. Patients with an SD can be advised that if their seizures can remain controlled, they have a high likelihood of clinical success equal to that of patients without an SD.

Disclaimer

Armando F. Vidal, MD, consults for Smith and Nephew and Stryker, unrelated to the submitted work. Jonathan T. Bravman, MD, consults for Smith and Nephew and DJO Global, unrelated to the submitted work. This author receives royalties from Shukla Medical, unrelated to the submitted work. The other authors have no disclosures.

Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.jseint.2020.09.020>.

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