Original article

The effectiveness of the Latarjet procedure for shoulder instability in patients with epilepsy

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A B S T R A C T

Introduction: Powerful contractions during epileptic seizures may cause shoulder dislocation and instability. The aim of the study is to evaluate the functional and radiographic results of the Latarjet procedure for anterior shoulder dislocation in patients with epilepsy and compare the functional results of these patients with the results of patients without epilepsy.

Hypothesis: Is latarjet procedure effective in epileptic patients as non-epileptic patients with anterior shoulder instability?

Material and method: Eleven shoulders of 9 patients with epileptic seizures causing anterior shoulder instability were evaluated retrospectively. All patients had a Latarjet procedure after neurologic evaluation and treatment arrangement. Epileptic seizures after the operation and shoulder dislocation after a seizure were investigated. For functional evaluation, ROWE, ASES and Constant scores were utilized whereas standard X-ray views were used for radiologic evaluation. The results of epileptic patients with Latarjet procedure were compared with non-epileptic patients (53 patients, 54 shoulders) for anterior shoulder instability.

Results: Three (33%) of the 9 epileptic patients had recurrent seizures after Latarjet procedure, whereas 1 of the 11 shoulders (9%) had dislocation after an epileptic seizure. Functional scores were found to be significantly improved in epileptic (P < 0.001) and non-epileptic patients (P < 0.001). No significant differences for functional results were found between epileptic and non-epileptic patients after Latarjet procedure for anterior instability (P > 0.05). One shoulder of 11 in the patients with epilepsy group (9%) and one shoulder of the 54 shoulders non-epileptic patients group (1.8%) had a redislocation. The rate of postoperative redislocation was significantly higher in patients with epilepsy (P = 0.008).

Discussion: Epileptic patients have a high rate of recurrent seizures even with proper medical treatment. Significant functional improvements and shoulder stability may be achieved after Latarjet procedure in epileptic patients. These functional results were comparable with those of non-epileptic patients with Latarjet procedure for anterior shoulder instability.

Level of evidence: III (case-control study).

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1. Introduction

Epilepsy is a chronic disease characterized by recurrent episodes of seizures, and from an orthopedic perspective, shoulder instability after a dislocation is the major problem in epilepsy. Despite medical treatment, seizures cannot be controlled in 30% of patients, and musculoskeletal pathologies may develop [1,2]. The incidence of shoulder dislocation during an epileptic seizure is indicated to be approximately 0.6% [3]. Although epileptic seizures thought to be related with posterior shoulder dislocations due to uncontrolled muscle contractions [4]; the incidence of anterior shoulder dislocation after an epileptic seizure is not rare [5]. In a study on 26 patients with epilepsy, Buhler and Gerber found 50% anterior and 50% posterior dislocations [6].

There are various alternative surgical treatment methods in the treatment of shoulder instability. The arthroscopic Bankart repair, which is a soft tissue procedure only, and the Latarjet procedure, which is a bony reconstruction using autogenous coracoid transfer, are the most commonly used procedures among these. The treatment of shoulder instability in patients with epilepsy is more complex and specialized because epileptic seizures tend to recur...
in some patients, and repeated seizures lead to recurrent dislocations, failure of treatment, and unsatisfactory functional results [7]. Thangarajah and Lambert report a 69% recurrence rate after surgery for shoulder instability in patients with epilepsy [8].

The purpose of this study is to evaluate the functional and radiographic results of the Latarjet procedure for anterior shoulder dislocation in patients with epilepsy and compare the functional results of these patients with the results of patients without epilepsy. The hypothesis was that the Latarjet procedure is as effective in non-epileptic patients as epileptic patients.

2. Material and method

This is a retrospective study evaluating 65 shoulders of 62 patients (20 females, 42 males) with a minimum follow-up of 24 months who had a Latarjet procedure for shoulder instability between 2005 and 2015. Mean age was 31.2. Patients were divided into two groups: patients with epileptic seizures (group 1) and non-epileptic patients (group 2). Recurrent epileptic seizures were the cause of instability in 11 of 65 shoulders (10 of 62 patients) (Table 1). Mean age in patients with epilepsy (3 females, 6 males) was 31.3 whereas the onset age of epileptic seizures was 15. Preoperatively, the medical treatments of patients with epilepsy were determined in consultation with the neurology department. Same surgical technique was applied to all patients regardless of presence epileptic seizures.

2.1. Surgical technique

The procedure was performed under general anesthesia, and the patients were placed in a beach chair position on a radiolucent table that allowed intraoperative fluoroscopic imaging. The skin and the subcutaneous tissue were dissected using an approximately 5 cm anterior axillary incision that started over the coracoid. The cephalic vein was protected and retracted laterally. The deltoide and the pectoralis major muscles were retracted, allowing the coracoid and the conjoined tendon to be identified. The coracoacromial ligament, which attaches to the lateral part of the coracoid, was cut. The pectoralis minor muscle was released from its bony attachment surface on the medial side of the coracoid, revealing the elbow part, which connects the vertical and horizontal parts of the coracoid. The coracoid was cut with an oscillating saw at an appropriate level anterior to the insertions of the coracoacromial ligaments, thereby protecting these ligaments. Then, the subscapularis tendon was detached in a split fashion at its lower one-third, and the capsule was identified. The capsule was opened medially, and the humeral head was retracted posteriorly using a Fukuda retractor. Anterior and inferior surface of the glenoid was exposed. Using a rasp or a bur, the surface of the defect was decorticated down to bleeding bone. The inferior surface of the coracid graft was flattened using a thin saw, and it was rotated in its long vertical axis. Following the initial temporary K-wire fixation to the defect in the glenoid, the coracoid was fixed using two 4 mm cannulated cancellous screws. After the graft is fixed and a fluoroscopic image is taken, the capsule and the subscapularis were repaired, and the operation was completed.

For functional evaluation, at final follow-up, ASES, Rowe, and Constant scores were utilized. While groups compared were compared before and after the operation within themselves, a comparison also was made between the groups. Radiographic evaluation of graft union was done using computed tomography (CT).

Patients with epilepsy were questioned regarding any seizures after the operation, and if they had seizures, they were asked whether they had any problems with their shoulders during the episodes.

2.2. Statistics

All the statistical analysis was performed using the SPSS statistics software program. Preoperative demographic data of the groups, including age, number of dislocations, presence of bony lesions were compared with Student t-test. Pre- and postoperative functional results were compared using the Wilcoxon test, whereas the comparison of results between the two groups were done using Student’s t-test. Chi² test was used to determine the statistical difference between groups for graft union.

3. Results

Patients with epileptic seizures (group 1) and non-epileptic patients (group 2) did not have a statistically significant difference in terms of preoperative demographic data (Table 1).

The patients were postoperatively followed up for a mean of 39.2 months (24 to 132 months). The patients were interviewed to determine if they had a redislocation after the operation, and one patient in each group reported a redislocation. One shoulder of 11 in the patients with epilepsy group (9%) and one shoulder of the 54 shoulders non-epileptic patients group (1.8%) had a redislocation. The rate of postoperative redislocation was significantly higher in patients with epilepsy (P=0.008).

When each group is compared within itself regarding the preoperative status of patients, both the group of patients with epileptic seizures (group 1) and the group of non-epileptic patients (group 2) showed a statistically significant improvement in function:

- group 1 ASES score: preoperative 49.1, postoperative 91.7, P<0.001;
- group 1 Rowe score: preoperative 20.4, postoperative 93.6, P<0.001;
- Constant score: preoperative 56, postoperative 91, P<0.001;
- group 2 ASES score: preoperative 57, postoperative 93.1, P<0.001;
- group 2 Rowe score: preoperative 25.3, postoperative 94.4, P<0.001;
- Constant score: preoperative 55.7, postoperative 91.7, P<0.001.

At final follow-up, functional scores were not significantly different between the groups of patients with epileptic seizures and non-epileptic patients (ASES score group 1: 91.7, group 2: 93.1, P=0.858; Constant score group 1: 91, group 2: 91.8, P=0.982; Rowe score group 1: 93.6 group 2: 94.4, P=0.513) (Fig. 1).

Three patients (33%) reported that they had another seizure in the postoperative period. One patient had seizures in the early postoperative period (<6 weeks), and these seizures led to screw breakage, which required a revision procedure. This procedure was revised using iliac bone graft (Figs. 2–5). Two patients who had seizures after the period of graft union (>6 weeks) did not have a redislocation (Figs. 6 and 7).

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Comparison preoperative demographics data between epileptic and non-epileptic patients.</th>
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<tbody>
<tr>
<td></td>
<td>Patients with epilepsy (n=9)</td>
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<tr>
<td>Mean age</td>
<td>31.3</td>
</tr>
<tr>
<td>Numbers of dislocations</td>
<td>17.3</td>
</tr>
<tr>
<td>Bony lesions (shoulders)</td>
<td>9 (81%)</td>
</tr>
<tr>
<td>Preop. ROWE score</td>
<td>20.4</td>
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</table>
Radiographic evaluation using computed tomography showed graft nonunion in one patient (11%) in the group of patients with epilepsy and in two patients (3.7%) in the group of patients without epilepsy ($P=0.063$).

4. Discussion

The hypothesis of this study was that the Latarjet procedure is as effective in epileptic patients as in non-epileptic patients and it is rejected in one way while being confirmed in another. It is rejected because the redislocation rate in epileptic patients after Latarjet procedure was found to be significantly higher compared to non-epileptic patients. In accordance with the literature, although a small number of patients, all of whom had Latarjet procedure, were included in our study, there was one (9%) redislocation out of eleven shoulders (9 patients). In a study with a mean follow-up of 8 years in 14 shoulders (12 patients), reporting the results of the Latarjet procedure in patients with epilepsy, Raiss et al. [9] note repeated seizures in 6 patients (43%) and redislocation in all of these 6 patients. Due to this high rate of redislocation in patients with epilepsy, the authors conclude that the Latarjet procedure should...
Fig. 4. On postop. day 2, he had an epileptic seizure resulting in an anterior dislocation of the operated shoulder which resulted in implant failure.

Fig. 5. Postoperative X-ray (a) and BT scan (b) show revision procedure using an iliac bone graft.

only be performed in a selected group of patients in whom seizures are under control. In nine patients with a mean follow-up of 45.2 months, a repeated seizure rate of 3/9 (33%) was observed, and this high rate is consistent with the literature.

Nevertheless, redislocation was observed in one shoulder (9%), and both occurred within 6 weeks of the operation, which is the period before coracoid union was achieved and when the load was resisted by the screws entirely. Neither redislocation nor graft or screw failure was observed in two patients who had seizures after coracoid graft union. Despite the small number of cases, this suggests that the reliability of the Latarjet procedure increases in patients with epilepsy after graft union takes place. This is an unrevealed issue in the literature since the redislocation time and its relation with the graft union is not mentioned in the published studies.

Prevention of seizures in the postoperative period is possibly the most important part of the treatment. Although the treatment of epilepsy is carefully planned by neurologists, the rate of seizures after surgical treatment is high in patients with epilepsy. Thangarajah et al. [8], in their study of 33 patients treated over a period of 15 years, report that 27 (82%) of 33 shoulder instability patients with epilepsy had repeated seizures after the procedure. In our series with 45.2 months of follow-up, 3 (33%) of the 9 patients had repeated seizures postoperatively although they were followed up by neurologists who were specialized in epilepsy treatment. The most durable surgical treatment method with the least redislocation rate should be selected in patients with epilepsy, because it is difficult to control high rates of repeated seizures despite all efforts [10]. In one of the largest case series in the literature, reporting the results of 24 soft tissue and 25 bone procedures
(total 49 shoulders, 36 patients) in patients with epilepsy, Thangarajah et al. [8] showed that there is a high rate of recurrence with soft tissue repair (71%), whereas a significantly lower rate (28%) is associated with bone procedures. In a study by Buhler and Gerber [6], the rate of redislocation is given as 47% after soft tissue surgery performed for anterior instability in 13 patients (17 shoulders) with epilepsy; however, the rate is down to 8% after revision surgery using bone reconstruction in these patients. The best results with a bony procedure (using coracoid or iliac wing autograft) performed for anterior instability is given by Hutchinson et al. [11]. In their study, the authors report no redislocation at a mean follow-up of 32 months in 13 shoulders of 13 patients with epilepsy.

The hypothesis of the study is also confirmed in one way that the functional results of epileptic patients after Latarjet procedure was found similar in non-epileptic patients after the same surgical procedure. This makes this study original since there are no studies comparing epileptic patients with non-epileptic patients within the same case series. Successful functional results have been reported with the Latarjet procedure for anterior instability, however, this study shows that although there is a higher rate of redislocation in patients with epilepsy, there is no difference in functional results between the groups. Radiographic assessment of graft union does not show a difference between the groups, either.

There are some weaknesses in our study. First, it is a retrospective study. Having a small number of patients and a relatively short follow-up period can be considered as other weaknesses. However, utilization of a standard surgical procedure, along with a similar rehabilitation program, for all patients, and comparison of homogenous patient groups with similar characteristics are the strengths of our study. Our study is different from other studies in the literature because it compares the functional and radiographic results

**Fig. 6.** A 35-year-old male, preoperative X-ray (a) CT scan (b) show a large osseous Bankart lesion and Hill–Sacks lesion.

**Fig. 7.** Six months after the surgery, he had epileptic seizures again, which did not result in recurrent dislocation X-ray (a) and CT scan (b) showed graft union.
of the Latarjet procedure between the groups of patients with and without epilepsy.

5. Conclusion

In conclusion, prevention of seizures takes priority in the treatment of anterior shoulder instability in patients with epilepsy; however, the rate of repeated seizures is high even when the patients are followed up by neurologists specialized in epilepsy. After Latarjet procedure, functional results are similar to those achieved in patients without epilepsy although the rate of redislocation is higher in patients with epilepsy when compared to patients without epilepsy. After the Latarjet procedure, the risk of redislocation and graft failure is high if the patient has a seizure before the graft union occurs. The procedure appears to be more reliable once graft union has been achieved.

Disclosure of interest

The authors declare that they have no competing interest.

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