ISSN: 2690-9189

Case Report

International Journal of Orthopaedics Research

Eden Hybinette Procedure for Reconstruction of Shoulder Instability with Loss of Anterior Glenoid Bone Stock in an Epileptic Patient: A Case Report

Andrés De La Espriella Rosales[1] and **Estefania Mckinley**[2*]

[1]*MD, Orthopedic Surgeon. Subspecialist in Shoulder and Sports Traumatology. Kaizen Medical Care. Barranquilla, Colombia.*

[2]*MD, Kaizen Medical Care. Barranquilla, Colombia.*

***Corresponding author**
Estefania Mckinley, MD. Kaizen Medical Care. Barranquilla, Colombia.

Submitted: 19 May 2020; **Accepted**: 01 Jun 2020; **Published**: 10 Jun 2020

Abstract

Shoulder instability is a relevant incidence injury in trauma, occasionally associated with glenoid bone loss in patients with epilepsy. There have been few articles describing specific operative treatments for this type of lesion and in this group of patients. This case report shows the successful surgical approach used in an epileptic patient with multiple right shoulder dislocations that happened mainly during seizures, through a Eden Hybinette technique where an iliac crest auto graft was used. The patient has been followed-up in a year of postoperative, with no new episodes of right shoulder luxation, no pain complaints and good range of shoulder motion without daily life or work-up limitations. Different surgical methods for these patients have been reported including soft tissue repair operations as well as skeletal reconstructions with bone block therapies, being Eden-Hybinette one of these techniques. This work portrays that this surgery is a valid option, at same time being both safe and that can be reproducible, as it allows an adequate position of the graft in the glenoid defect, potentially diminishing the risk of neurovascular and myotendinous injuries; but, most importantly reducing the shoulder luxation recurrences in patients with uncontrolled epilepsy and given them a chance of a good quality of life.

Level of evidence: Level V, case report, treatment study

Keywords: Bone Block Procedure, Bone Graft, Epilepsy, Glenoid Loss, Shoulder Instability

Introduction

The glenohumeral articulation has the greatest motion range in comparison with any joint in the body, making it easily susceptible to instability [1]. This wide motion is a consequence of minimally restrictive bony architecture, with static and dynamic restraints at extreme arches of motion [2]. Shoulder instability is defined as the loss of capability of the bony structures and soft tissues in this joint of providing satisfactory restraints in order to maintain the humeral head centered about the glenoid [3, 4]. These injuries can happen either anteriorly, posteriorly, or inferiorly; nevertheless, anterior dislocations are the most frequent, with rates as high as 96% reported [5]. Epidemiologically speaking, the incidence rate of shoulder dislocations range between 23.9 and 26.9 per 100,000 person-years, with young male patients representing the demographic most at risk for such an injury [6]. In general, 50% of the patients aged from 30 to 40 years who suffer a primary anterior dislocation will not keep experiencing instability or subluxation symptoms in the long term, however, those younger patients, engaged in high demand athletic activity, male sex, and those who incurred a bony injury to the glenoid or humerus are at a greater risk for recurrent instability [7-9].

Another significant etiology of shoulder instability and dislocation are epileptic seizures [10]. The incidence of shoulder dislocation during a seizure is approximately 0.6%, though this may be underestimated because many go undetected [11]. Recurrent instability is frequent and occurs soon after the first luxation, with anterior and posterior instability occurring equally [12]. The cause of this recurrence might be associated with the significant bone loss from the glenoid and humeral head that is found in most of these patients [13]. A "glenoid rim lesion" means either a bone erosion due to persistent instability or an acute fracture [14]. Chronic tonic-clonic seizures predispose to glenoid bone damage through repetitive high contact bone-on-bone trauma [15].

Treatment options for recurrent shoulder instability with glenoid bone loss in patients with epilepsy vary and include a wide range of soft tissue therapies such as Bankart repair and Putti-Platt procedure as well as bone augmentation strategies such as coracoid transfer, Eden-Hybinette procedure, glenoid neck/humeral osteotomy and arthrodesis [10]. Despite various technically satisfactory procedures, some patients manifest persistent instability and are unable to cope with the symptoms that affect

their quality of life [15]. Subsequently to surgery, the recurrence rate in the epileptic population is higher than in nonepileptic groups (69% vs. 10%) [16]. This happens generally due to poor adherence with anticonvulsant therapy, ongoing seizure activity, important bone loss from humeral head and the glenoid, and the young age at which surgery is undertaken [17].

In this study, the aim is to present a case report of a patient with previous comorbidity of epilepsy associated to recurrent bilateral shoulder instability, right shoulder being more symptomatic, as well as with significant glenoid bone loss in this shoulder. The indicated treatment for this patient was an Eden Hybinette procedure with a graft from patient's ipsilateral iliac crest.

Case Presentation

A 22-year old man with previous history of epilepsy partially controlled, treated with Levetiracetam and Valproic Acid suffered a right shoulder trauma after a fall secondary to a grand mal seizure. In his background history, he referred multiple cases of bilateral anterior shoulder luxation, approximately 20 incidents in life. During the last month, he had 4 cases of instability of the right shoulder. At that time, he consulted to the emergency service due to intense pain and functional limitation of the right shoulder. In physical examination, deformity in right shoulder was evidenced with arm positioned in adduction, humeral head in anteroinferior region and shoulder's arches of movement limited due to pain, without neurovascular deficit. A closed reduction of the shoulder luxation was realized in the emergency department without complications, and a shoulder sling was indicated. In the follow-up appointment, few weeks after shoulder joint reduction, the patient restated a new case of dislocation. Given this patient's history of recurrent shoulder instability, predominantly right during the last month, he was considered a candidate for surgical management: Eden Hybinette procedure. A computerized tomography, a magnetic resonance imaging and a 3D reconstruction image were done preoperatively; both showed loss of anterior glenoid bone stock (Figure 1). The anterior glenoid bone loss was reconstructed using a graft from patient's iliac crest in a two phased procedure (consult surgical technique below).

Figure 1A: Axial CT imaging

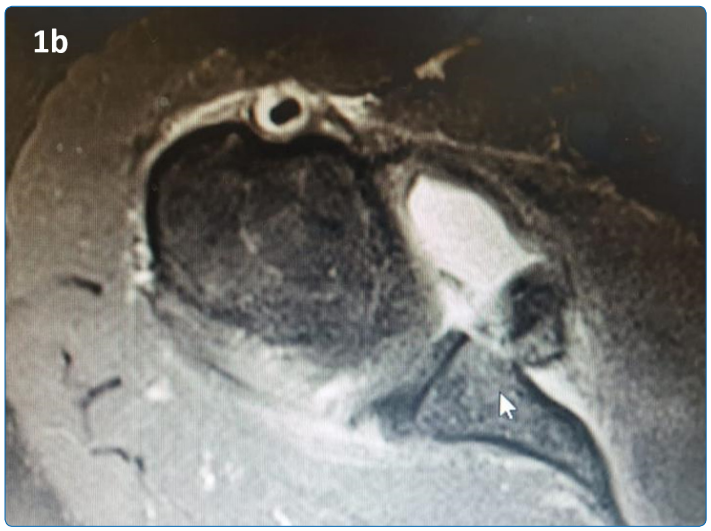

Figure 1B: Axial MRI imaging

Figure 1C: 3D reconstruction demonstrating anterior glenoid bone stock loss (approximately >30% defect)

Surgical Technique

First phase: Once under general anesthesia, patient was positioned in dorsal decubitus. Previous procedure of asepsis and antisepsis was realized in homolateral iliac crest, preparing it within sterile surgical drapes. A 6 cm incision was made in the region of the right iliac crest as well as further dissection by planes more than 2 cm from the anterior superior iliac spine, protecting the sensitive branches of the femoral nerve: intermediate femoral cutaneous nerve and the medial femoral cutaneous nerve. Dissection was continued until the visualization of iliac crest (Figure 2A). An osteotomy of the pelvis of approximately 3 cm x 5 cm x 3 cm was performed using square saw of 8 mm and the tricortical bone piece was removed (Figure 2B). Then, 2 units of bone wax were placed in the donor region and a fasciocutaneous flap closure for bone deficit coverage was done, always verifying good distal perfusion. Lastly, the wound was covered with gauze.

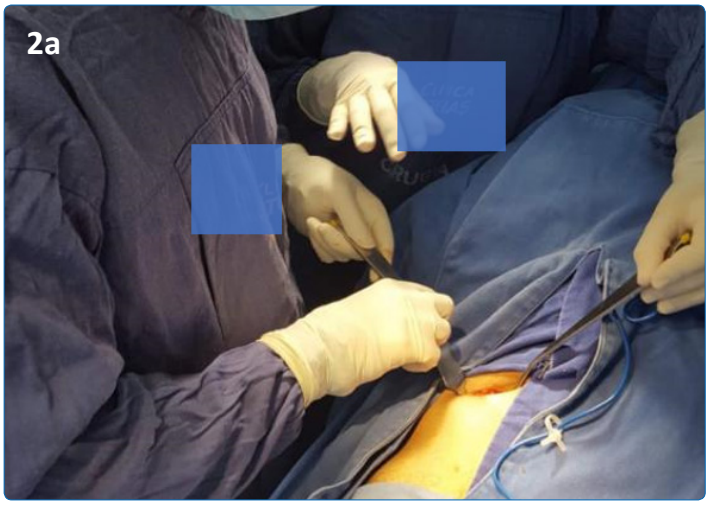

Figure 2A: Intraoperative photograph of a. the incision and dissection of the right iliac crest region made

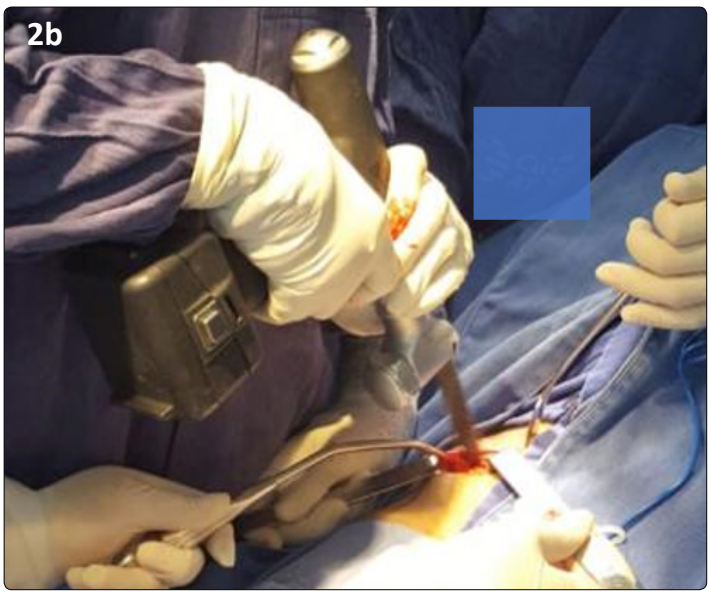

Figure 2B: The pelvis osteotomy performed in order to achieve the iliac crest bone graft

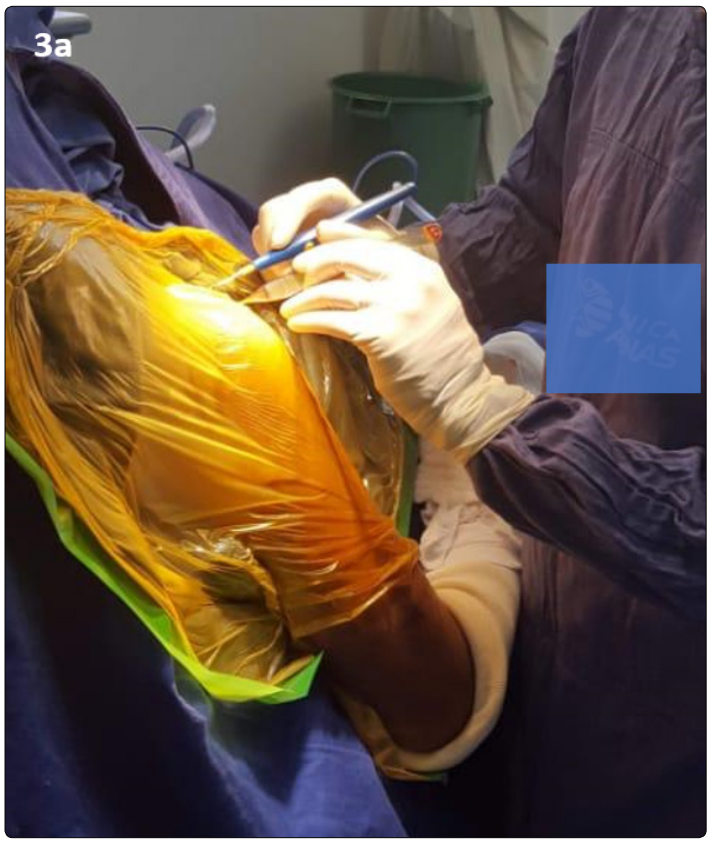

Figure 3A: Intraoperative photograph of the surgical approach of shoulder's dissection and

Figure 3B: Intraoperative photograph the preparation of the graft with the indicated measures of glenoid deficit

Second phase: Under the same general anesthesia, patient was positioned in beach chair position as well as asepsis and antisepsis were realized in right upper extremity, with posterior colocation of sterile surgical drapes. An 8 cm incision was made in the anterior region of the right shoulder, subsequently dissecting by planes until reaching and visualizing the articular capsule (Figure 3A). Afterwards, the arthrotomy and partial disinsertion of the upper third of the subscapular tendon was performed. A fukuda retractor was inserted, making it possible to evidence the anterior glenoid region with severe bone stock of 35% approximately as well as bone fragments in remodeling process and pseudoarthrosis (Figure 4A). Then, the scapular osteotomy was made, and glenoid bone remains were extracted. With micro saw and curette, the debridement of anterior glenoid region was elaborated. The iliac crest auto graft previously obtained was prepared with the indicated measures of glenoid deficit (Figure 3B) and the arthroplasty was performed by interposition with bone graft fixed with 2 cancellous screws of 3.75 mm x 32 mm through to 2 nail guides in parallel (Figure 4A). Satisfactory stability, compression and coverage of the bone defect was accomplished. A large osteochondral lesion was observed in the anterior region of the glenoid associated with a reverse Hill Sachs fracture. Consequently, abrasion chondroplasty was performed as well as a metal anchor of 3.5 mm was placed in the lesser tubercle in order to reinsert the partial tenotomy of the subscapular muscle. Moreover, anterior glenoid capsulorrhaphy was done; medial and inferior glenohumeral ligaments were sutured and subscapular tenorrhaphy was realized with anchor sutures previously placed with adequate coverage of Hill Sachs injury. Finally, closure by planes was achieved, followed by covering the wound with gauze, verifying distal blood flow. Afterwards, the shoulder was immobilized with an airplane abduction sling.

After the surgery, the shoulder remained immobilized with the sling for 4 weeks. Movement exercises for the elbow, wrist and hand were allowed immediately with passive mobility for the operated shoulder from the second postoperative week. At four weeks from the procedure, physiotherapy was based on isometric exercises for deltoid muscle as well as rotation cuff elongation and strengthening. Rehabilitation continued for next four months, until the patient gained complete shoulder range of motion (Figure 5). The patient did not present intraoperative or postoperative complications. The follow-up computerized tomography at 6 months from the surgery evidenced the bone graft completely incorporated and in an adequate position, fixation and alignment (Figure 6). Our patient is now 1 year from the surgery with a Constant Score of 93 [18].

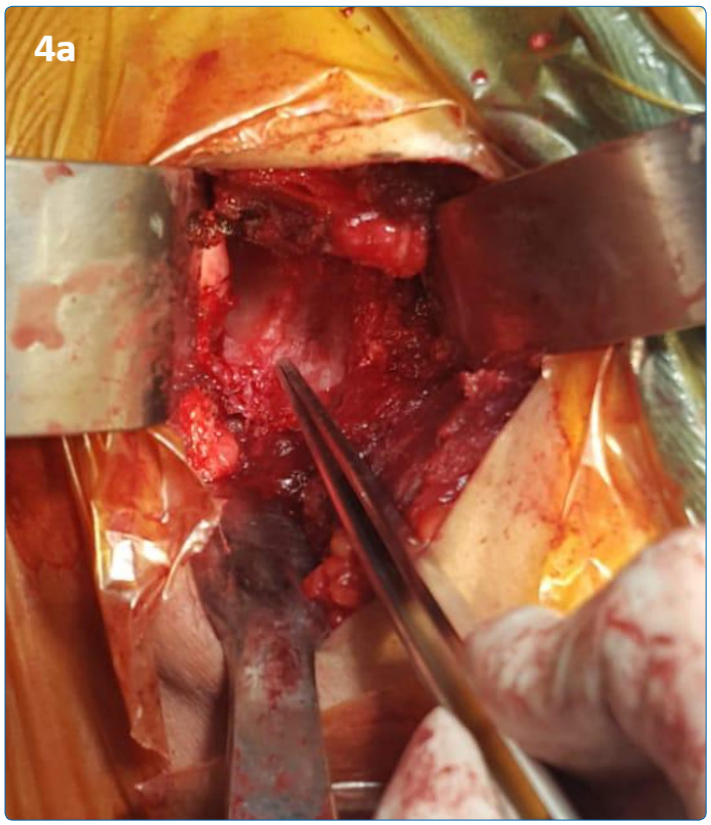

Figure 4A: Intraoperative photograph of the anterior glenoid region with severe bone stock of 35% approximately

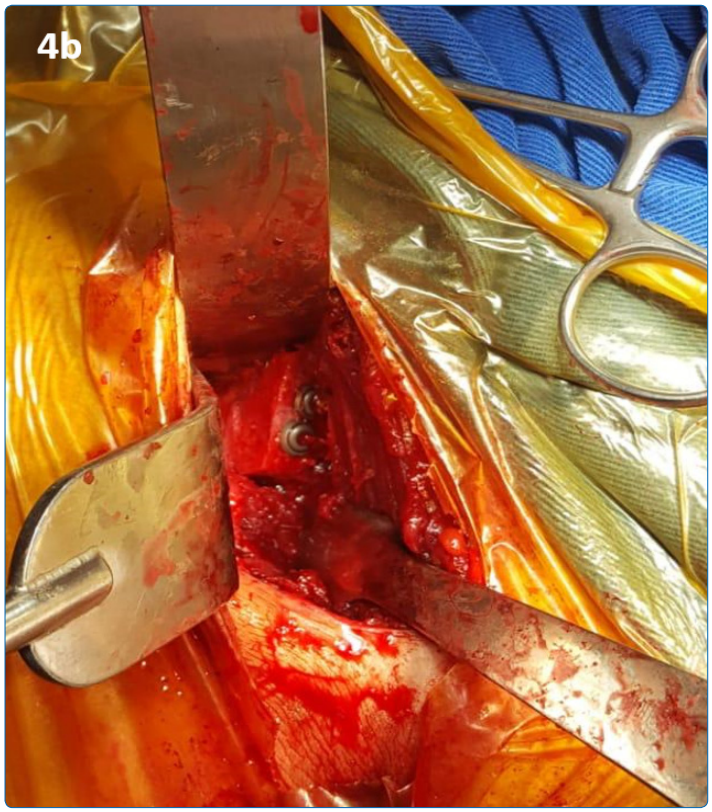

Figure 4B: After the arthroplasty was performed by interposition with bone graft

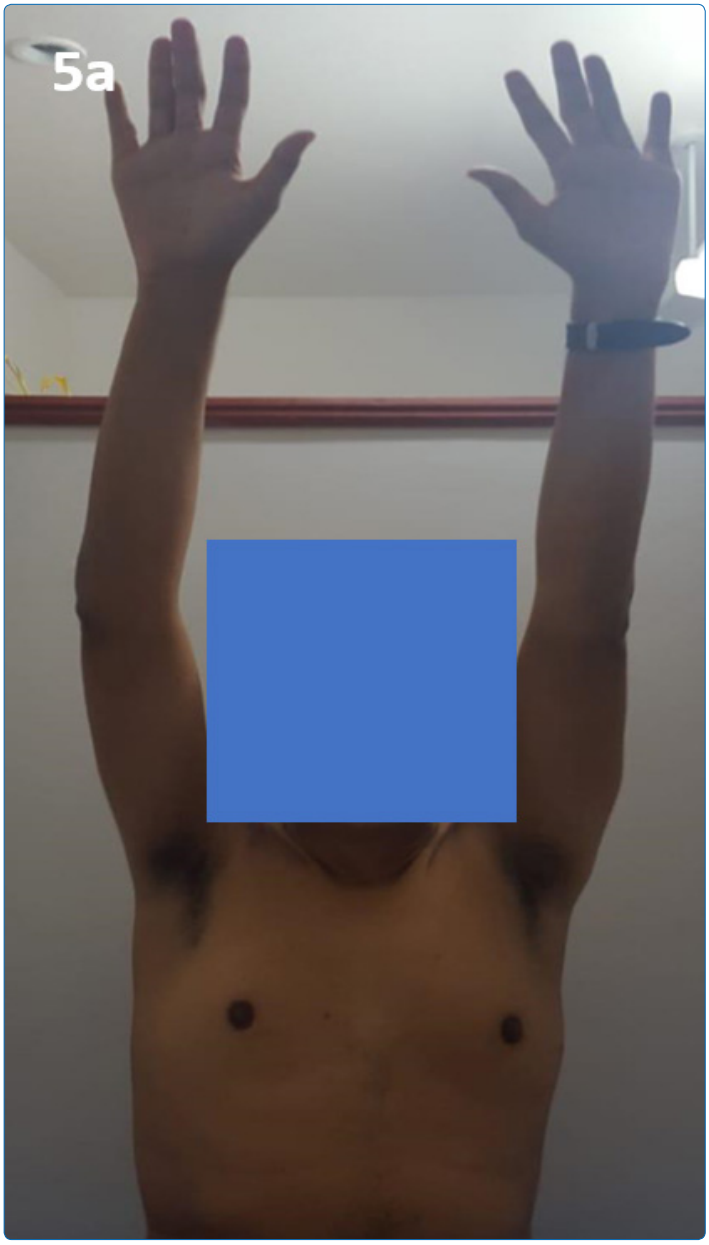

Figure 5A: Shoulder elevation

Figure 5B: internal rotation

Figure 5B: external rotation at 4 months postoperative

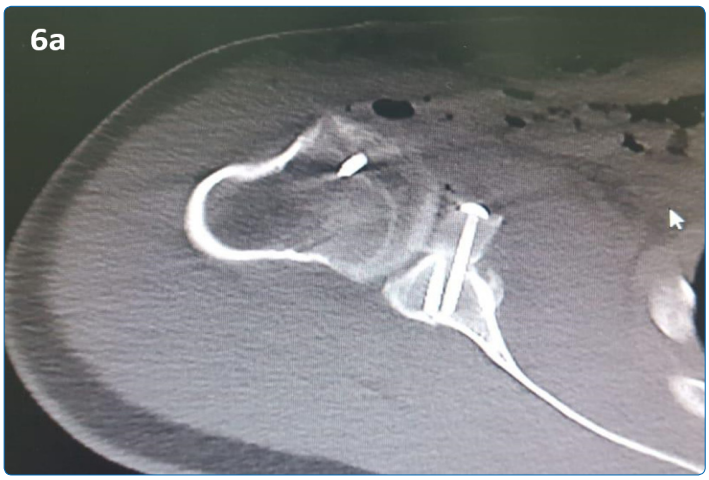

Figure 6A: Axial CT imaging

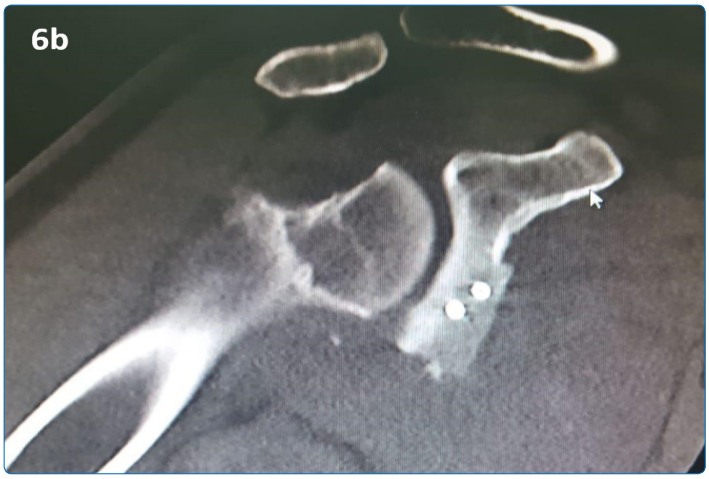

Figure 6B: Coronal CT imaging

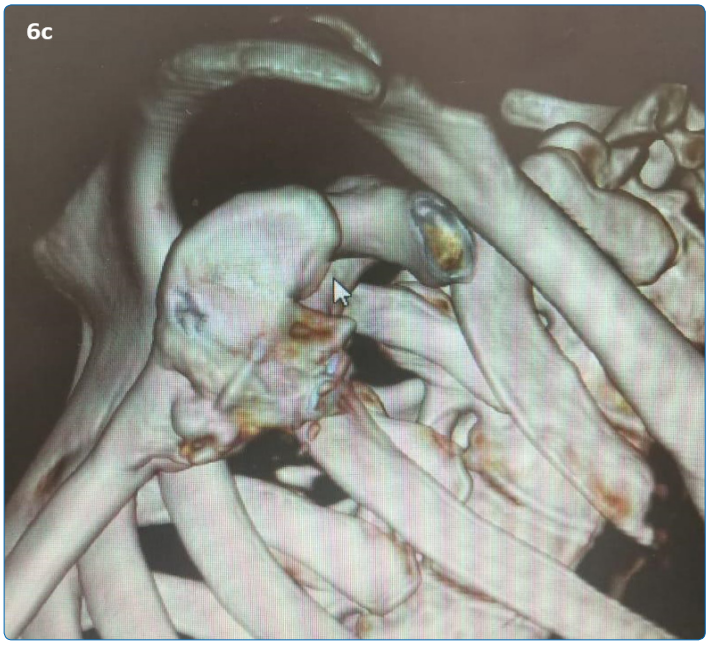

Figure 6C: 3D reconstruction demonstrating the bone graft completely incorporated and in an adequate position, fixation and alignment

Discussion

This case report portrays that the Eden Hybinette surgery, using crest iliac auto graft for the anterior glenoid bone stock in a patient with epilepsy and recurrent shoulder instability, is a satisfactory technique option, at same time being both safe and that can be reproducible. In our patient's case, he did not suffer new recurrences of glenohumeral dislocation after a year of monitoring, as well as he returned to his daily and work life without limitations, with a prospective plan of performing same surgery for left shoulder.

Treatment of recurrent shoulder instability in epileptic patients involves adequate seizure control, assessment of bone loss, and lesion-specific treatment, for which a multidisciplinary team (orthopedic surgeon, physiotherapist and neurologist) is essential [19]. The initial management recommended for shoulder instability are conservative orthopedic therapies, nevertheless, when the shoulder dislocation happens recurrently, it becomes an indication for surgery [20, 21]. Preoperative assessment by a neurologist will ensure that anticonvulsive therapy is optimized either to eliminate or to reduce the frequency of seizures [10].

Different surgical techniques have been described in cases of recurrent shoulder instability; however, seizure-related instability is infrequently found, and few studies have examined the value of bone block and soft tissue procedures in this population of patients [22, 23]. Some approaches for shoulder instability with glenoid bone loss include soft tissue surgeries such as Bankart repair and Putti-Platt procedure, either arthroscopically or open surgery, as well as bone augmentation therapies such as coracoid transfer, Eden-Hybinette procedure, glenoid neck/humeral osteotomy and arthrodesis [10, 24]. The colocation of a bone graft in the anterior glenoid bone defect increases the surface area of the glenoid improving its stability [25]. The most durable operation strategy with the least redislocation rate should be chosen in epileptic patients due to the difficulty of controlling high rates of repeated seizures [19].

In 1995, Hutchinson et al displayed their outcomes in epileptic patients after bone-buttress operations. They reported the results of 15 surgeries in 13 patients with an average age of 29 years at the time of the surgical procedure. All patients were treated with a bone support to the anterior glenoid fashioned from either femoral head allograft or iliac crest auto graft. Ten dislocations occurred during seizures, while three were traumatic and two without obvious cause [22]. After 32 months mean follow-up, they reported excellent clinical results in terms of the Constant score (average 91 points) with no re-dislocations, though eight patients continued to have seizures. Additionally, no arthritic changes of the shoulder joint radiologically were detected [18, 22].

Similarly, in 2002 Buhler and Gerber published a series of cases of 17 anterior shoulder dislocations in epileptic patients with a mean follow-up of 10 years. Of the total of patients, only 2 were treated nonoperatively, soft tissue surgery was performed in 6 patients (3 Putti-Platt repairs, 2 Bankart repairs, and 1 capsular shift), derotational osteotomy of the humeral head was performed in 2

patients, and a bone-block procedure was performed in 7 patients (3 Eden-Lange-Hybinette, 2 allografts with Bankart repair, 1 bone block with a Bankart repair, and 1 Bristow procedure). They showed the rate of recurrence is given as 47% after soft tissue surgery performed for anterior instability in 13 patients with epilepsy (17 shoulders), meanwhile, the rate is down to 8% using bone reconstruction in these patients [10].

In a study with a mean follow-up of 8 years done in 2012, Raiss et al noted the outcomes of Latarjet surgery in 12 epileptic patients with recurrent anterior shoulder dislocation (14 shoulders) with mean aged 31, resulting in repeated seizures in 6 patients (43%) and redislocation in all of these 6 patients. All patients suffered their first dislocation during a seizure. Because of this high rate of recurrent dislocation in patients with epilepsy, the authors concluded that the Latarjet procedure should only be performed in a selected group of patients in whom seizures are under control. Their overall rate of recurrence was 47% [23].

In one of the biggest case series in literature of shoulder instability in epileptic patients (31 patients, total 36 shoulders), published in 2015, extensive bone loss due to the high energy seizures was described given that 86% of cases with anterior instability had bone defects, in either the humeral head or glenoid rim. In this 15-year experience series, reporting the results of 23 soft tissue and 13 bone procedures in patients with epilepsy, Thangarajah et al. indicated that there is a higher rate of redislocation with soft tissue repair (71%), in comparison with a significantly reduced rate (28%) with bone approaches, where the surgical techniques used were bone block in 11 patients (9 coracoid transfers and 2 iliac crest bone grafts) and 2 allograft to fill a humeral head bone defect. In the bone augmentation group that persisted with recurrent instability, no cases of broken graft or hardware were observed, and all cases were associated with continued postoperative seizures. In this way, skeletal stabilization was related with a significantly lower rate of recurrence ($P = 0.004$) than soft tissue repair alone [15]. This conclusion agrees with other studies that emphasize the importance of skeletal reconstruction [10, 22].

Considering the above-mentioned studies and our case report history and evolution, the use a bone graft from patient's iliac crest in a Eden Hybinette as a bone augmentation strategy is a satisfactory therapeutically option for epileptic patients with shoulder instability associated to glenoid bone stock loss. Our case led to good functional results with no recurrence of shoulder instability despite patient's several seizures as well as hardly any limitation of shoulder motion. Even though, literature among glenoid bone loss and recurrent shoulder instability in epileptic patients is limited and mainly from descriptive studies based on experience, it resumes in better advantages in skeletal reconstruction over soft tissue repair. Moreover, there are no studies where the effectiveness of bone-lock operations in these patients are compared, for example between Latarjet and Eden Hybinette. Despite this, in Raiss et al series they suggest that due to the elevated rate of recurrence of shoulder instability in seizure-uncontrolled epileptic patients after Latarjet surgery, this procedure should only be performed in a selected group of patients in whom seizures are regulated [23], leaving to question if other surgical approaches such as Eden Hybinette might be the best treatment solution for these patients.

Conclusion

Shoulder dislocations are a very important reason for consulting the emergency department, being epileptic seizures, a relevant cause of shoulder instability associated with glenoid bone loss. The indicated treatment for these recurrences is surgical. Even though literature on this topic is limited, there is a debate between soft tissue techniques and bone augmentation therapies. Our patient's case enlight the route for considering the Eden Hybinette procedure as a valid option for epileptic patients with glenoid bone defect and shoulder luxation recurrences. Additionally, most of the case series discussed support this theory due to the results with none, or reduced rate of redislocation posterior to this type of operation in comparison with other approaches. Further investigations should be enforced in order to establish the optimum pathway for these injuries in epileptic patients.

References

1. Lyle E, Ryan MK (2018) Traumatic Instability: Treatment Options and Considerations for Recurrent Posttraumatic Instability. Sports Med Arthrosc Rev 26: 102-112.
2. Halder AM, Itoi E, An KN (2000) Anatomy and biomechanics of the shoulder. Orthop Clin North Am 31: 159-176.
3. Stefko JM, Tibone JE, Cawley PW, ElAttrache NE, McMahon PJ (1997) Strain of the anterior band of the inferior glenohumeral ligament during capsule failure. J Shoulder Elb Surg 6: 473-479.
4. Nobuyuki Yamamoto, Takayuki Muraki, John W Sperling, Scott P Steinmann, Robert H Cofield, et al. (2010) Stabilizing mechanism in bone-grafting of a large glenoid defect. J Bone Joint Surg Am 92: 2059-2066.
5. McLaughlin HL (1952) Posterior dislocation of the shoulder. J Bone Joint Surg Am 24: 584-590.
6. Zacchilli MA, Owens BD (2010) Epidemiology of shoulder dislocations presenting to emergency departments in the United States. J Bone Joint Surg Am 92: 542-549.
7. Lennart Hovelius, Anders Olofsson, Björn Sandström, Bengt Göran Augustini, Lars Krantz, et al. (2008) Nonoperative treatment of primary anterior shoulder dislocation in patients forty years of age and younger: a prospective twenty-five-year follow-up. J Bone Joint Surg Am 90: 945-952.
8. Calvo E, Granizo JJ, Fernandez Yruegas D (2005) Criteria for arthroscopic treatment of anterior instability of the shoulder: a prospective study. J Bone Joint Surg Br 87: 677-683.
9. Rhee YG, Cho NS, Cho SH (2009) Traumatic anterior dislocation of the shoulder: factors affecting the progress of the traumatic anterior dislocation. Clin Orthop Surg 1: 188-193.
10. Buhler M, Gerber C (2002) Shoulder instability related to epileptic seizures. J Shoulder Elbow Surg 11: 339-344.

11. Schulz TJ, Jacobs B, Patterson RL Jr (1969) Unrecognized dislocations of the shoulder. J Trauma 9: 1009-1023.

12. Robinson CM, Seah M, Akhtar MA (2011) the epidemiology, risk of recurrence, and functional outcome after an acute traumatic posterior dislocation of the shoulder. J Bone Joint Surg Am 93: 1605-1613.

13. Provencher MT, Bhatia S, Ghodadra NS, Grumet RC, Bach BR Jr, et al. (2010) Recurrent shoulder instability: current concepts for evaluation and management of glenoid bone loss. J Bone Joint Surg Am 92: 133-151.

14. Bigliani LU, Newton PM, Steinmann SP, Connor PM, McIlveen SJ (1998) Glenoid rim lesions associated with recurrent anterior dislocation of the shoulder. Am J Sports Med 26: 41-45.

15. Thangarajah T, Lambert S (2015) the management of recurrent shoulder instability in patients with epilepsy: a 15-year experience. J Shoulder Elbow Surg 24: 1723-1727.

16. Kim SH, Ha KI, Kim SH (2002) Bankart repair in traumatic anterior shoulder instability: open versus arthroscopic technique. Arthroscopy 18: 755-763.

17. Brophy RH, Marx RG (2009) the treatment of traumatic anterior instability of the shoulder: nonoperative and surgical treatment. Arthroscopy 25: 298-304.

18. Constant CR, Murley AH. A clinical method of functional assessment of the shoulder. Clin Orthop Relat Res 1987; 214:160-164.

19. Thangarajah T, Lambert S (2016) Management of recurrent shoulder instability in patients with epilepsy. Shoulder Elbow Surg 2016. Aug 25: 1376-1384.

20. Matthew T Provencher, Lance E LeClere, Scott King, Lucas S McDonald, Rachel M Frank, et al. (2011) Posterior instability of the shoulder: Diagnosis and management. Am J Sports Med 39: 874-886.

21. Hawkins RJ, Koppert G, Johnston G (1984) Recurrent posterior instability (subluxation) of the shoulder. J Bone Joint Surg [Am] 66: 169-174

22. Hutchinson JW, Neumann L, Wallace WA (1995) Bone buttress operation for recurrent anterior shoulder dislocation in epilepsy. J Bone Joint Surg Br 77: 928-932.

23. Raiss P, Lin A, Mizuno N, Melis B, Walch G (2012) Results of the Latarjet procedure for recurrent anterior dislocation of the shoulder in patients. J Bone Joint Surg Br 94: 1260-1264.

24. Bigliani LU, Pollock RG, McIlveen SJ, Endrizzi DP, Flatow EL (1995) Shift of the posteroinferior aspect of the capsule for recurrent posterior glenohumeral instability. J Bone Joint Surg [Am] 77: 1011-1020.

25. Pollock RG, Bigliani LU (1993) recurrent posterior shoulder instability: diagnosis and treatment. Clin Orthop 291: 85-96.