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Case report

Bipolar injury of the clavicle: A case report

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Abstract

Introduction: Bipolar dislocation of the clavicle is an uncommon injury that is a simultaneous dislocation of the ipsilateral acromioclavicular joint and sternoclavicular joint. This injury is rare with fewer than fifty documented cases.

Case report: We have reported the case of a forty-three-year-old bike trauma with posterior dislocation of the acromioclavicular joint and fracture of the medial part of the clavicle. Considering the young age of the patient and his requirement for high physical activity, we opted for the operative treatment. First, the patient was operated on with open reduction and stabilization of the acromioclavicular joint with 2 k. wires. So, thanks to conservative treatment at the medial fractures we had a good result.

Conclusion: In light of current evidence, no important advice can be made about the treatment of bipolar clavicle fractures. We assume that the restoration of the anatomy of the acromioclavicular and sternoclavicular joints should be the aim of the treatment for this rare injury. Nevertheless, the treatment of a bipolar clavicle injury depends on different factors: injury pattern, age of the patient, daily activities, and comorbidity.

Introduction

The bipolar injury of the clavicle includes dislocation of both ends of the clavicle, dislocation of the sternoclavicular joint with a distal clavicle fracture, dislocation of the acromioclavicular joint with a medial clavicle fracture, and segmental fracture of the clavicle [1].

There isn't a standard treatment for this kind of injury, as it is rare and there is a lack of literature on management and outcomes [2]. In general, the most common kinds of treatment are: non-operative and operative with a reduction and stabilization of both extremities of the clavicula with a plate and screws.

This study is willing to describe an alternative surgical approach for a patient with bipolar clavicle injuries. We have achieved the anatomical reduction and stabilization only of the lateral extremity of the clavicle with K-wire thus exploiting the consequent excellent reduction of the medial side which was therefore not treated with open surgery. The goal is to obtain an excellent final result using a less aggressive surgical approach with easily removable synthesis tools.

Case Report

A forty-three-year-old man was involved in a bike accident. He had multiple contusions and a bipolar dislocation of the left clavicle (posterior dislocation of the acromioclavicular joint and fracture of the distal portion of clavicula with anterior dislocation).

In the primary center, he received first aid.

The physical examination showed no evidence of neurologic or vascular deficits. The lateral end of the clavicle was tender and palpable in a posteriorly displaced position. The medial part was swollen and painful.

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After the x-ray (Figure 1) it was suggested to wear a BSO brace for 7 days and then repeat the x-ray.

After 3 weeks the patient came to our Hospital. Here the patient was examined by a senior surgeon and after a new physical (similar to a previous) CT scan was prescribed. The CT scan showed an unacceptable reduction of lateral dislocation and medial fracture (Figure 2).

Surgical treatment was then offered to the patient. After a curvilinear incision centered on the lateral portion of the clavicle of approximately 8 cm the acromion clavicle joint was freed from scar tissue and then stabilized with two 2.4mm K wires (Figure 3).

The medial fracture of the clavicula was treatment-conservative (Figure 4).

After the operation, the patient's left shoulder was put in a sling for his comfort, and the radiographs showed a stable fixation and an accurate reduction of the lateral part of the left clavicle and a minimal dislocation of the medial part.

Postoperative follow-up was unremarkable and so, one day after the operation the patient was discharged.

The K wires were removed 6 weeks after the surgery and then the patient started rehabilitation with no limitation to the range of motion and weight bearing.

NRS and constant scores were used for the results. 3 weeks after the injury, before surgery, NRS was 8 and constant was 46.

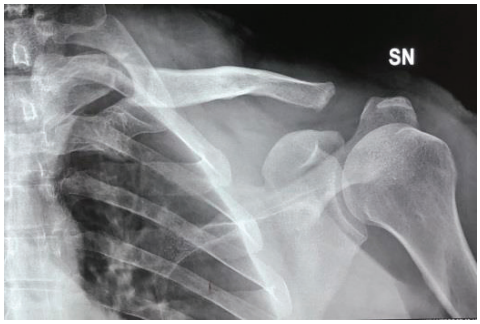

Figure 1: After x-ray it was suggested to wear BSO brace for 7 days and then repeat x-ray.

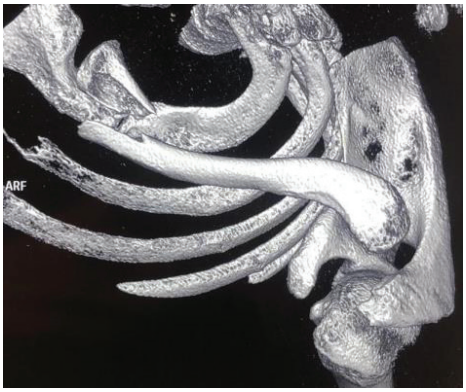

Figure 2: The CT scan showed a unacceptable reduction of lateral dislocation and medial fracture.

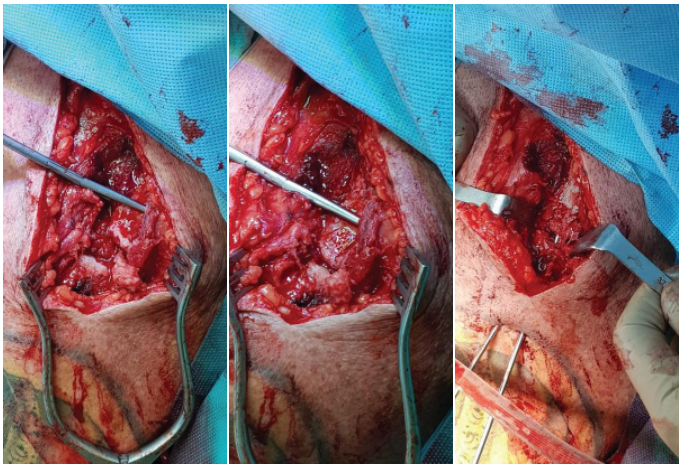

Figure 3: After a curvilinear incision centered on the lateral portion of the clavicle of approximately 8 cm the acromion clavicle joint was freed from scar tissue and then stabilized with two 2.4 mm K wires.

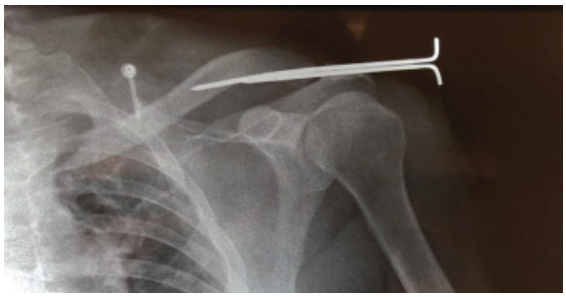

Figure 4: The medial fracture of clavicula was treatment conservative.

At the 3-month follow-up, we recorded meaningful pain relief with an NRS of 1-2 and a good active range of motion. The constant score was 70. The x-ray showed no dislocation of the acromioclavicular joint and signs of consolidation at the medial fracture.

At the one-year follow-up, his pain level was 0 at NRS score and we reported a complete restoration of range of motion. The constant score was 96 (Figure 5, Table 1).

X-Ray showed complete consolidation of the fracture, but large postero-lateral calcification (Figure 6).

Discussion

The bipolar dislocation of the clavicle is a rare condition. This type of injury occurs as the clavicle rotates around its midpoint, with the result in a posterior dislocation of the acromioclavicular joint and anterior dislocation of the sternoclavicular joint. Dislocation at both ends of the clavicle is the most common result of a major trauma where there is either an aggressive force pressing the shoulders together combined with torsion of the trunk [3] or a deforming force on the lateral aspect of the shoulder.

Maruyama, et al. indicated that the first rib plays a vital role in the pathophysiology of this injury, as it acts as a pivot rotational point for the clavicle [4-6].

The first time this injury was documented was in 1831 by

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Figure 5: At the one-year follow-up his pain level was 0 at NRS score and we reported a complete restoration of range of motion. The constant score was 96.

Table 1:

	NRS	CONSTANT
BEFORE SURGERY	8	46
3 MONTHS AFTER SURGERY	1-2	70
1 YEAR AFTER SURGERY	0	96

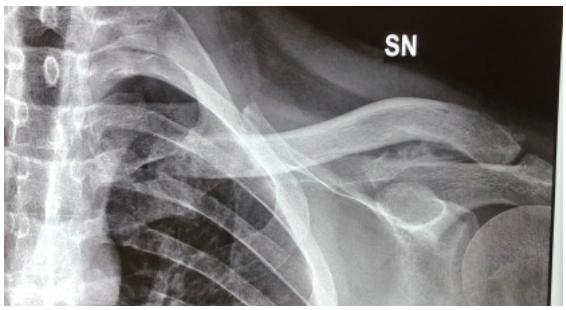

Figure 6: X-Ray showed complete consolidation of the fracture, but large postero-lateral calcification.

Porral [7]. Beckman reported 16 cases in 1924 [8] and since 1982 more cases have been reported [9]. Here we report two cases of open reduction and internal fixation using the Balser (hook) plate stabilization method in 2 women (aged 42 and 49) with good results.

Arenas, et al. [10], Benabdallah [11], Echo, et al. [12] and Scapinelli [3], had excellent results through surgical intervention. Sanders, et al. [13] reported six patients with a bipolar injury who were initially treated with conservative methods. Two aged patients had successful nonoperative treatments. Four young men required surgical treatment after suffering from constant pain. Following surgical reconstruction, these patients had positive results including full range of motion and pain- free return to normal activity [13].

In the 26 cases presented by Okano, et al. the best results were obtained with surgical treatment.

Gearen, et al. [9] treated bipolar clavicular dislocation in a young patient: they first reduced the clavicle by manipulation, then in order to maintain the reduction of the clavicle at the acromioclavicular joint, they used a shoulder-spica cast. Even though the unstable reduction could not be maintained, they reported a good functional result. Then, Cook and Horowit [14], reported the case of a patient with a bipolar clavicular dislocation with a grade II acromioclavicular separation. They were treated non-operatively with closed reduction. Some days after the treatment the clavicle dislocated, but this was unreported. Anyway, several months later follow-up, both clavicular joints were stable with deformity.

The fracture of the medial end of the clavicle (isolated or associated with a lesion of the lateral end) represents a rare injury and there isn't much information available on their traits or treatment outcomes. In a recent review Asadollahi and Bucknill [15], even with the limitations related to the study (low-quality evidence is present in the primary body of literature from which the material was taken), concluded that these fractures heal effectively when treated non-operatively, with a high union rate and overall "excellent" functional prognosis (low quality of evidence). In the surgical fixation of an acute medial clavicle fracture, there have been no reports of any significant intraoperative complications. Furthermore, the fixation of the medial end of the clavicle is potentially complex because the small size of the medial fragment makes it difficult to achieve adequate fixation and proximity to vital structures increases the potential risk of catastrophic intraoperative complications during fixation.

For the reconstruction of acromioclavicular joints generally in type III to V (according to Rockwood classification) a surgical reconstruction is required. Given the presence of persistent pain that reduces function and overall quality of life, numerous surgical procedures have been used to stabilize the AC joint over the past few decades, including isolated ligament and/or tendon transfers, distal clavicle resection (with or without ligament reconstruction), double-endo button techniques, and primary joint fixation with screws, plates, suture wires, suture-based anchors, and pins. There is still debate over the best operating method, and there is no accepted gold standard. A recent technique that deserves to be mentioned is a tight rope. This technique in acute injuries offers potential benefits like preservation of normal joint function, minimal scarring, faster recovery time, and a reduction in the risk of coracoid fracture.

In light of current evidence, we can make no strong recommendation about the treatment of bipolar clavicle

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fractures. Literature has stated that operative treatment should be performed in isolated medial and lateral clavicle fractures. We recommend that displaced bipolar clavicle fractures are to be treated operatively. However, the treatment of a bipolar clavicle fracture depends on different factors: the age of the patient, daily activities, and comorbidity.

Generally speaking, the optimal goal of treatment is the anatomic restoration of the clavicle and its articulations, especially in younger, healthy, active individuals, and should result in a superior outcome.

The pattern of the lesion is the most important factor in order to choose the treatment because the non-operative treatment of isolated, non-displaced, or minimally displaced, medial clavicle fractures generates limited pain and excellent functional outcomes [16]. On the contrary, posterior displacement of the acromioclavicular joint is incompatible with a good long-term result.

Previous conservative treatments are related to redislocation dysfunction, deformity, and pain.

The severe clinical deformity and poor function seen in our patients who were initially treated nonoperatively underpin an operative approach [17].

Conclusion

In this case report, we suggest a less invasive treatment for bipolar clavicle injuries. We treat these lesions with open reduction and stabilization with 2 K wire only the lateral end of the clavicle while the medial end was treated non-operative. This was possible because the open reduction of acromioclavicular dislocation indirectly reduced the medial fractures. The choice of a rigid synthesis rather than tight rope was due to the fact that the injury was 3 weeks earlier and not acute.

This kind of treatment allowed a complete and quick restoration of the function.

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