Bipolar Clavicle Fracture in Elderly: A Rare Case Report

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Learning Point of the Article:

A missed diagnosis of a bipolar clavicle fracture, especially the medial component, might lead to non-union or malunion, chronic pain, reduced shoulder function, neurovascular complications, post-traumatic arthritis, and cosmetic deformity. Hence, early recognition and optimal management are key to achieving better outcomes.

Abstract

Introduction: Clavicle fractures are more common, accounts for about 2.6–4% of all fractures in adults. Of these, 69-82% are midshaft clavicle fractures, followed by lateral clavicle fractures, which accounts for 21–28% and medial clavicle fractures, which are the rarest one accounts for about 2–3%. Bipolar clavicle fractures are defined as lateral and medial end clavicle fractures, accounts for only 2–8% of all clavicle fractures.

Case Report: We present the case of a 61-year-old female, came with right shoulder pain and swelling following an alleged history of a fall. Initially managed as a lateral end clavicle fracture, further radiological evaluation revealed a bipolar clavicle fracture. Patient managed operatively with open reduction and internal fixation using locking plates and screws.

Discussion: A bipolar clavicle fracture is the result of direct trauma to the shoulder region, commonly following road traffic accidents. In elderly patients with osteoporotic bone, it has been reported to occur with trivial trauma. Due to the rarity of bipolar clavicle fracture, it's often missed initially. Proper clinicoradiological evaluation with the aid of computed tomography scan is necessary. With the scarcity of proper treatment guidelines, bipolar clavicle fractures are mostly treated operatively.

Conclusion: Bipolar clavicle fractures are rare but require timely intervention for optimal recovery. Dual plating provides rigid fixation and favorable outcomes.

Keywords: Bipolar clavicle fracture, open reduction , internal fixation.

Introduction

The clavicle is the first bone to begin ossification during embryologic development. It connects the axial skeleton to the appendicular skeleton. It's a relatively thin bone, widest at its medial and lateral expansions, where it articulates with the sternum and acromion, respectively.

One of the most often fractured bones in the human body is the clavicle. It can be as a result of direct contact or force transmission from falling onto an outstretched hand. Clavicular fracture accounts for around 2.6–4% of all fractures in adults [1]. Of these fractures, 69–82% are mid-shaft fractures, 21–28% are lateral clavicle fractures, and 2–3% are medial clavicle fractures [1,2,3,4]. Segmental clavicular fracture is a rare injury, which generally refers to a concomitant ipsilateral distal and midshaft clavicle fracture [5]. Bipolar clavicle fracture is even rarer, which involves the lateral and medial end clavicle, accounts for only

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Figure 1: Clinical picture of patient at presentation.

2–8% of all clavicle fractures [6,7]. Owing to the rarity of bipolar clavicle fractures, well-defined treatment guidelines for their management have not yet been established.

Case Report

A 61-year-old female was admitted with a history of a slip and fall, presented with pain and swelling over her right shoulder (Fig. 1). Clinical examination revealed gross swelling over the clavicle, tenderness along the right clavicle, and a restricted range of motion with no neurological deficit. Initially, thought of a lateral end clavicle fracture, stabilization was done by strapping, which aggravated the patient's symptom and increased prominence over the medial end of the clavicle. Radiographic reassessment showed a medial and lateral end clavicle fracture (Fig. 2). To assess any joint involvement, a computed tomography (CT) scan was done, which showed a comminuted, mildly displaced intraarticular fracture in the medial 1/3rd of the right clavicle and displaced oblique fractures in the lateral 1/3rd of the right clavicle with an intact acromioclavicular joint and sternoclavicular joint (Fig. 3).

Figure 2: Pre-operative X-rays showing a bipolar clavicle fracture.

Figure 3: Computed tomography scan, three-dimensional reconstruction of a bipolar clavicle fracture.

The patient underwent open reduction and internal fixation under general anesthesia. The patient was placed in a modified beach chair position during the procedure. No single clavicular plate was available that could fix the bipolar clavicle fracture, so planned fixation with two separate plates. A 5 cm incision was made over the medial third of the clavicle (Fig. 4), the fracture was reduced, and it was fixed with a 3-hole opposite side lateral clavicular locking compression plate (LCP) (3.5 mm–2.7 mm system). Subsequently, a 7 cm lateral clavicular incision was made, and the fracture was reduced and fixed with a 4-hole right lateral clavicular LCP (Fig. 5). To avoid stress raisers, plates

were fixed at different planes. Early mobilization was initiated post-operatively. Arm abduction was restricted to <90°. For 12 weeks, weight-bearing activities were avoided. Weekly follow-up was advised for the initial 6 weeks, followed by 3 weeks of follow-up till 3 months, subsequently at 6 months interval (Fig. 6 & 7). The 6-week post-operative X-ray showed signs of fracture healing and a maintained anatomical reduction. The 1-year follow -up X-ray showed a united fracture. Outcome was assessed using the Disability of the Arm, Shoulder, and Hand score.

Discussion

Bipolar clavicle fractures are a rare but complex form of clavicular injury, characterized by fractures occurring at both the medial and lateral ends of the clavicle. It presents unique challenges due to the instability of both ends. Unlike more common midshaft clavicle fractures, which account for the majority of clavicular injuries, bipolar fractures are often associated with high-energy trauma, such as motor vehicle accidents, falls from height, or contact sports. These fractures can significantly impact shoulder function due to the involvement of both the bone and adjacent neurovascular structures, making them a challenging clinical scenario.

The mechanism of injury leading to a bipolar clavicle fracture is poorly understood [8,9]. Bipolar fractures have been reported to occur with trivial trauma in elderly patients with osteoporotic bone [8,9,10]. A clavicle fracture may present with various signs and symptoms based on the location of the fracture. May include pain, tenderness around the fracture site, and occasionally ecchymosis and skin tenting due to the displaced segment [5,6]. Bipolar fractures might be missed, as visualization around the medial clavicle on plain radiographs might be difficult because of the overlying structures in the chest. In such cases, CT imaging with three-dimensional reconstructions might be crucial for diagnosis [6]. Fixation of medial clavicular fracture is challenging, modified beach chair position and adequate fluoroscopy avoids major injuries. Being unstable injury, bipolar fractures are at an increased risk of non-union, and operative management is preferred for better outcomes [2]. Probability of non-union is positively correlated with age and degree of displacement of fracture fragments [11]. Non-union of a clavicle fracture may lead to functional deficit, pain, and other complications. Due to the lack of standardized management guidelines for bipolar clavicle fractures, the

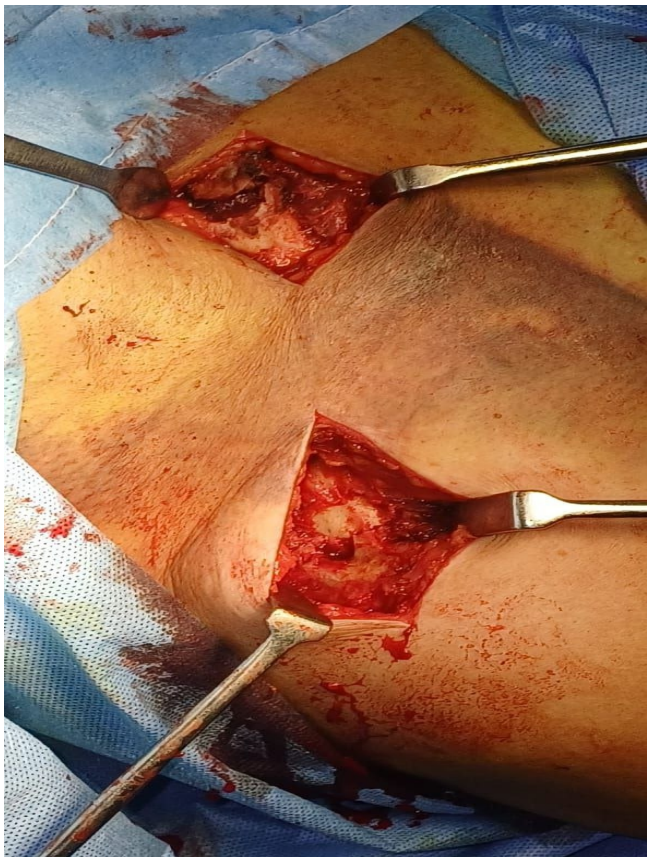

Figure 4: Exposure of fracture site, lateral and medial incision over fracture site.

Figure 5: Fracture reduced and fixed with 3 and 4 hole lateral clavicular plate over medial and lateral, respectively.

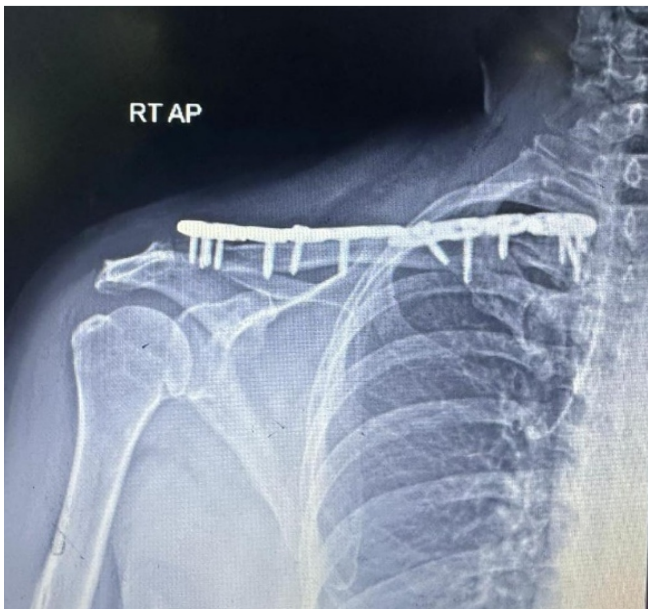

Figure 6: Post-operative X-ray, showing reduced bipolar clavicle fracture.

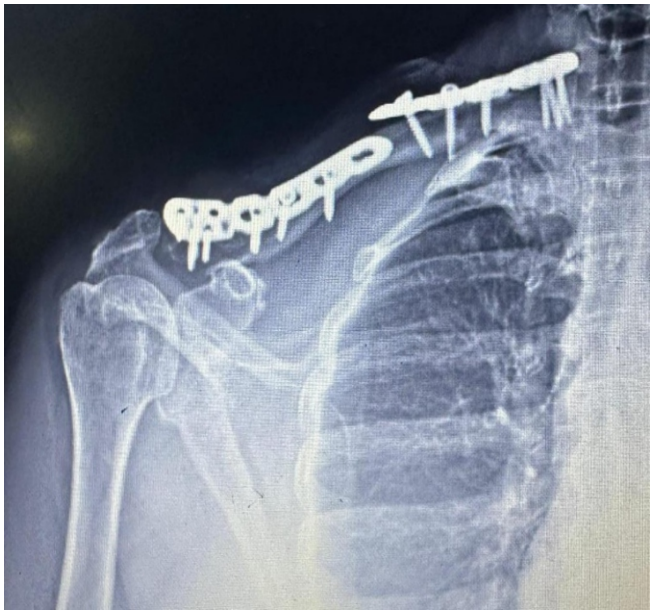

Figure 7: Post-operative X-ray, showing reduced bipolar clavicle fracture.

majority of reported cases have undergone operative treatment.

Conclusion

Bipolar clavicle fractures, though rare, present a significant challenge in orthopedic practice due to their complexity and potential for long-term functional impairment. Early recognition of these fractures is crucial for guiding treatment strategies. While non-operative management may suffice for less severe cases, surgical intervention is often necessary to restore clavicular alignment, stabilize the fracture, and prevent complications, such as malunion or non-union. Advances in surgical techniques, have improved outcomes, but careful patient selection and individualized treatment plans remain vital. Ongoing research into optimal management strategies and rehabilitation protocols will further refine the approach to this challenging injury.

Clinical Message

Bipolar clavicle fractures are complex injuries requiring careful evaluation and individualized management. Surgical intervention is often necessary to restore function and prevent complications, such as non-union or malunion. Early recognition and accurate imaging are key to achieving optimal outcomes.

Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given the consent for his/ her images and other clinical information to be reported in the journal. The patient understands that his/ her names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Conflict of interest: Nil **Source of support:** None

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