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Case Report

Dual plate fixation for combined mid-clavicle fracture and acromioclavicular joint injury: a case report

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ABSTRACT

This case report presents a rare injury involving a combined mid-clavicle fracture and acromioclavicular (AC) joint injury. While conservative management is typically recommended for Rockwood's grade I and II AC joint injuries, surgical intervention is commonly advised for grade IV, V, and VI injuries. However, there is limited literature addressing the management of mid-clavicle fractures in conjunction with ipsilateral AC joint injuries.

Keywords: Acromioclavicular joint, Sternoclavicular joint, Mid-clavicle fracture, AC joint injury, Fixation methods, Dual plate fixation, Surgical intervention

INTRODUCTION

Shoulder girdle injuries following motor vehicle accidents are quite common and many injuries involve clavicle, proximal humerus and acromioclavicular joint have been associated with high velocity accidents, though association of midshaft clavicle fracture with ipsilateral acromioclavicular joint injury is rare.[1] Usually, lateral third clavicle fractures are seen in association with acromioclavicular joint injuries.

The case we are discussing in this paper which is middle third clavicle fracture associated with acromioclavicular joint disruption is quite uncommon and no more than 30 cases were reported in literature. Despite the injury is rare, numerous fixation methods were mentioned in literature and all were showing good outcomes without finding any superiority of one method over the other. In this paper we will be discussing a fixation method using clavicular hook plate and anterior plating of clavicle, that was used to manage our case and the outcome is analyzed.

CASE REPORT

29 years old male patient, right hand dominant who is a mountain-bike rider, medically fit and healthy, sustained a trauma to his right shoulder and right side of his chest wall while riding his mountain-bike as he was riding down a hill. He was evaluated as per adult trauma life support protocol. On examination of right shoulder, moderate swelling was noted along the right clavicle region with prominent lateral end of clavicle. Patient had marked tenderness over right mid clavicle region, acromioclavicular joint associated with marked restriction of range of motion with intact neurovascular examination of upper extremities.

Investigations revealed that the patient had right clavicle middle third fracture associated with ipsilateral Rockwood and Wilkins classification grade 3 acromioclavicular joint disruption shown in (Figure 1). In addition to his right shoulder injury, further imaging was done showing right second and third ribs fractures and transverse processes

fractures at C7, T1 and T2 vertebrae and which were decided to be managed conservatively. He underwent surgical fixation of clavicle fracture using pre-contoured anterior clavicle plate and a hook plate was used to fix the AC joint (Figure 2) injury under general anesthesia in beach chair position.

Figure 1 (A, B): AP and "Zanca" view plain radiograph of the right clavicle showing clavicle middle third fracture associated with ipsilateral acromioclavicular joint disruption.

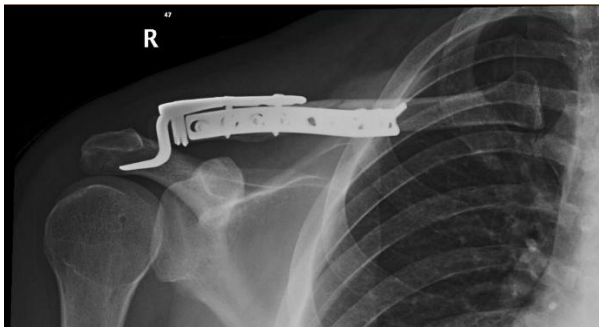

Figure 2: AP view plain radiograph of the right clavicle following open reduction and internal fixation with anterior clavicle plate and a hook plate.

The patient was discharged on the first post operative day and was regularly followed up in the clinic. Postoperatively he was given a sling support for the upper limb for 4 weeks and encouraged to do pendulum exercises and active elbow movements from day one onwards. He was allowed to do light activities for 4 weeks with instructions to avoid overhead activities and sports.

During follow ups the fracture of clavicle healed well and the hook plate was removed at 6 months (Figure 3). He was found to have excellent shoulder function and the reduction of AC joint alignment was maintained at 6 months and at 9 months follow-ups.

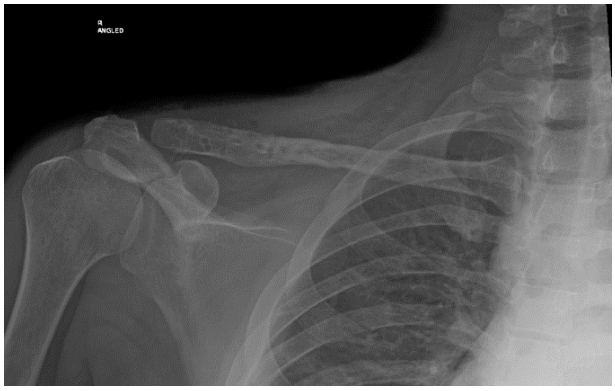

Figure 3: AP view plain radiograph of the right clavicle following anterior clavicle plate and a hook plate removal.

Table 1: Rockwood classification of acromioclavicular injuries.

Type	Major injuries	Radiographic appearance
i	Sprain of acromioclavicular ligaments	Normal
ii	Disruption of acromioclavicular ligaments; incomplete sprain of coracoclavicular ligaments	May be slightly widened, with clavicle subluxated slightly superiorly
iii	Disruption of acromioclavicular and coracoclavicular ligaments	Scapula and acromion displaced inferiorly from clavicle
iv	Similar to type iii with clavicle displaced posteriorly	May be normal or slightly widened on anteroposterior radiograph: axillary lateral radiograph shows posterior displacement
v	Disruption of acromioclavicular and coracoclavicular ligaments: major detachment of deltoid and trapezius muscles from distal end of clavicle	Inferior displacement of arm away from clavicle: coracoclavicular interspace is 100% to 300% wider than in normal shoulder
vi	Disruption of acromioclavicular and coracoclavicular ligaments: major detachment of trapezius and deltoid from clavicle; clavicle displaced under coracoid process and posterior to conjoined tendons	Clavicle displaced inferiorly to coracoid process

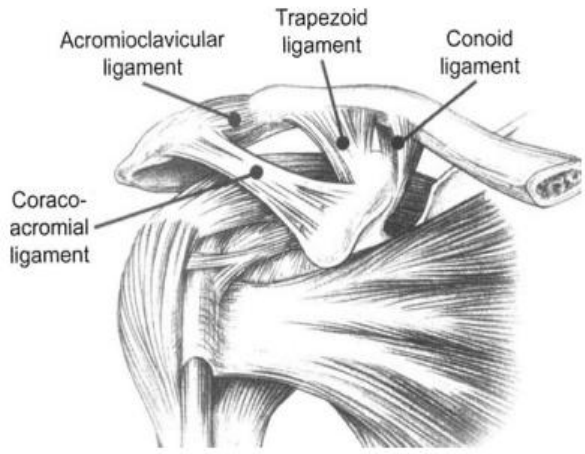

Figure 4: Anatomy of the acromioclavicular joint and its stabilizing ligaments.

DISCUSSION

Acromioclavicular joint (AC) and sternoclavicular joints connect axial skeleton with upper limb.[1] Regarding their treatment, most literature has supported conservative management for Rockwood's grade I and II injuries, whereas there is a general consensus that grade IV, V, and VI injuries are best treated with surgery.[2,3]

The superior, inferior, anterior and posterior acromioclavicular ligaments along with the coracoclavicular ligaments and the muscle attachments provide stability to the AC joint (Figure 4). Mid-clavicle fracture in association with ipsilateral acromioclavicular joint injury is relatively uncommon, but although it's a rare injury many fixation methods were described in the literature, and it is worth mentioning that there are a variety of options for acromioclavicular joint injury whilst for clavicle fractures usually, a clavicle plate which is superior plate or anterior plate is preferred or intramedullary flexible nail.[5]

Acromioclavicular joint fixation methods that were described in the literature included dog bone button fixation, screw fixation, tight rope fixation, reconstruction of coracoclavicular ligaments with allograft tendon, Kirschner wires fixation, Ultra Pro composite mesh and the clavicular hook plate and all were showing good results which eventually gives the choice to the surgeon based on his experience and his preference to choose fixation method.[4,6,7]

In our case dual plate including anterior clavicle plate and a hook plate was the management of choice after obtaining consensus of the orthopedic consultants. Though initially the patient had to restrict the range of motion of the operated shoulder due to the hook plate, but patient could achieve full range of motion post operatively. This case report shows that even though other minimally invasive surgical options exist, dual plating is found to have excellent functional outcome and can be considered as one of the treatment options in such cases.[8]

CONCLUSION

This case report demonstrates that dual plate fixation can yield excellent functional outcomes and may be considered as a viable treatment option in similar cases, despite the availability of other minimally invasive surgical alternatives. Further research and comparative studies are required to establish the superiority of dual plate fixation over other methods for combined mid-clavicle fractures and AC joint injuries. Nonetheless, this report contributes to the existing body of knowledge by highlighting the successful use of dual plating in this complex injury scenario.

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