



## Bipolar dislocation of clavicle in a poly trauma patient DEEPAK WILLIAM

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**Abstract :** Simultaneous dislocation or subluxation of both ends of the clavicle is rare. There is no consensus in the literature regarding the treatment for bipolar dislocations of the clavicle. Our case a 14 year old polytrauma patient suffered bipolar dislocation of the right clavicle. The sternoclavicular joint showed an anterior dislocation, the acromioclavicular joint showed a grade II dislocation according to Rockwood. The patient had several additional injuries especially chest injury, renal and liver laceration. The medial and the lateral end of the clavicle were open reduced and fixed. At 1 year follow up his DASH scores was 0.9, with good functional recovery. Hence an operative management for bipolar dislocation of the clavicle is a good treatment alternative in young patients, with good functional outcome.

**Keyword :** Bipolar clavicular dislocation

### INTRODUCTION :

Simultaneous dislocation or subluxation of both ends of the clavicle is rare. The first reported case was published by Porral in 1831(1). Floating clavicle or bipolar dislocation results from major trauma, which produces deforming force on the lateral aspect of shoulder or a severe pressure on the shoulder together with the torsion of the trunk (2). However, increased rates of redislocation, after conservative treatment has led to surgical stabilization as the preferred modality. Open reduction and internal fixation (ORIF) gradually became the choice of treatment for floating clavicle because it ensured better stability and earlier recovery. We report a case with bipolar dislocation of clavicle in a poly trauma patient, which was successfully treated by open reduction and internal fixation. A 14 year old boy presented to the hospital following a high speed automobile collision in Feb 2013, when the two-wheeler on which he was a pillion rider collided with a bus. Primary survey showed that he had a chest, an abdominal injury and a closed injury to his right forearm. He was tachypneic, tachycardic and hypotensive. His initial management included fluid resuscitation with IV fluids and blood and right chest tube insertion after which his vitals stabilized. Secondary survey revealed a deformity of the right clavicle (Fig 1). On examination of the clavicle it was found to be mobile in all planes. On the examination of the

acromioclavicular region, the lateral end of the clavicle could be found posteriorly displaced when compared to the opposite side. The clavicle at its medial end was subluxed anteriorly and could be felt to be more prominent than the contralateral side. Active movements at the shoulder were restricted. His peripheral pulses were not palpable, however the capillary refill was less than 2 seconds. The pulses could be picked up on a hand held Doppler.

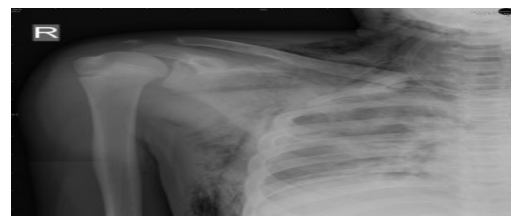


Fig 1. X ray of the chest and shoulder showing bipolar dislocation of the right clavicle.

Radiographs of the chest and shoulder, showed antero-superior dislocation of the medial end of the right clavicle along with widening of the acromio-clavicular joint. Radiographs of the forearm showed a closed right distal radius and ulna fracture. CT angiogram showed a short segment discontinuity in the right axillary artery with reformation of the distal vasculature. CT abdomen showed hepatic injury and right renal injury, minimal hemoperitoneum. CT thorax showed minimal right pleural effusion, with pneumo-mediastinum, minimal pneumothorax and multiple rib fractures. He was admitted in the surgical intensive care unit for monitoring and was put on non-invasive ventilation for his lung injuries. He was managed conservatively for the above mentioned injuries. About a week after the incident once the patient was stable, taking in to consideration the age of the patient, requirement of high physical activity and the intrinsic instability of the right clavicle, a decision for operative treatment of the clavicle dislocation was made.

### SURGICAL METHOD

The patient underwent open reduction of the acromioclavicular and the sternoclavicular joints under general anesthesia in beach chair position. The sterno-clavicular joint was exposed through

an 8 cm horizontal incision. The medial end of the clavicle was found to be subluxed antero-superiorly. It was fixed with a 4 holed 2.5 mm distal radius locking plate with bicortical screws on the clavicle and 3 locking unicortical screws applied through the "T" end of the plate on to the sternum. The lateral end of the clavicle was exposed through a 5 cm bikini strap incision and was found to be displaced posteriorly. It was reduced and stabilized with the help of two threaded K wires which transfixed the acromio-clavicular joint. (Fig 2) At three weeks follow up the threaded K wires were exited. At final follow up of 1 year he had a good functional outcome with a DASH score of 0.9 and a full range of movement at the shoulder. (Fig 3, 4 and 5).

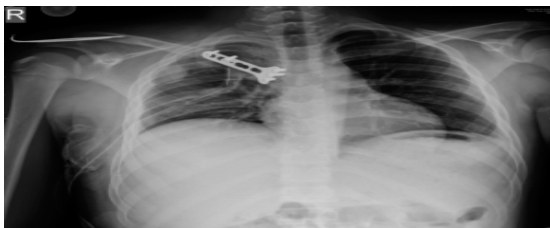


Fig 2. Showing the post op x ray.



Fig 3. Showing the x ray of the right clavicle at 1-year follow up.

#### DISCUSSION

Bipolar dislocation is rare condition (4,5) as it requires significant trauma inflicted in a particular manner to reproduce it. Anatomy of the acromioclavicular joint has been well described (6). It is a diarthrodial joint with a complete or a partial meniscus. The acromioclavicular ligaments are thin and are reinforced by the deltoid and trapezius muscles. The conoid ligament medially and the trapezoid laterally connect the clavicle to the coracoid process by strong stabilizers of the acromioclavicular joint. The predominant mechanism of injury causing acromioclavicular separation is a downward blow to the acromion, which tears the coracoclavicular and acromioclavicular ligaments and leads to a superior displacement of the distal pole of the clavicle (6). The displacement (that is, the widening of the acromioclavicular joint space) can be seen on an anteroposterior radiograph like in our case. A CT scan can confirm the diagnosis by confirming the posterior displacement of the clavicle from the acromion (8). The sternoclavicular joint connects the large medial end of the clavicle with the sternal site of articulation. The joint is stabilized by fibrocartilaginous disc, as well as by the rhomboid ligament between the clavicle and the first rib, the capsular ligaments anteriorly and posteriorly between the clavicle and the manubrium, and the interclavicular ligament superiorly.

The displacement here is a dislocation of the sternoclavicular joint which may be anterior or posterior (6). The mechanism of injury in sternoclavicular dislocation can be either direct or indirect. The least common mechanism is a direct blow on the anterior aspect of the medial end of the clavicle, causing it to dislocate posterior to the manubrium. A medially directed force on the lateral aspect of the shoulder can result in the more common anterior or superior dislocation of the medial end of the clavicle (5,7,8). A bipolar dislocation is probably a result of the above two mechanisms with the major deforming force directed at the lateral end of the clavicle. Several methods have been described in the treatment of clavicle dislocations, which include - braces, slings, ligament repair and shoulder spica. Because of the rarity of

simultaneous dislocation of both poles of the clavicle, evidence is scarce on the preferred mode of treatment (9). A review of the literature showed several reports of non operative treatment with good functional outcome though they had residual deformity and subluxed/dislocated joints (10). Gearen et al. treated bipolar clavicular dislocation in a young patient with a shoulder – Spica (9). He was initially managed on a spica and then with a brace and though the clavicle was not reduced patient did not show any disability at 12 months. Cook and Horowitz reported a similar case of a patient with a bipolar clavicular dislocation and a grade II acromioclavicular separation with good functional recovery at one year follow up, who was treated non- operatively (2). Beckman followed up 16 cases of patients who had bipolar dislocation of the clavicle who were treated by closed manipulation. 10 out of 16 patients obtained a good functional result (15). Various operative methods have been described for surgical stabilization which include tension band wiring at both ends of the clavicle (13), K wire fixation of both the AC and SC joints (16), transarticular K wire for the sternoclavicular joint, and tension band wiring for the acromioclavicular joint (2). Surgical reduction and fixation of both AC and SC joint seem to be the choice of most surgeons who have encountered the lesion in the young patient.

The use of K wires in sternoclavicular joint remains controversial, as they provide relatively inadequate stabilization with higher rates of redislocation or subluxation. More seriously, the migration and rupture of K wires, could lead to severe complications (11,12). Therefore, more reliable internal fixation is required in the case of sternoclavicular joint dislocation and Schemitsch et al used plates instead of K wires to fix the dislocation of sternoclavicular joint.(17) It was decided to fix the medial end of the clavicle with a locking plate so as to provide stable fixation and to protect the vital structures below the medial end of the clavicle. The distal radius locking plate was preferred for a number of reasons.

- 1) The low profile of the plate making it less prominent on the sub cutaneous clavicle.
- 2) The "T" end of the plate was under contoured so as to buttress the medial end of the clavicle and prevent it from subluxing anteriorly while the shaft of the clavicle was held with bicortical screws.
- 3) Unicortical locking screws from the "T" end of the plate on to the sternum provided adequate stability with out damaging the vital structures behind the sternum

In the current case, a 14 year old poly trauma patient suffered bipolar dislocation of the right clavicle and was successfully treated operatively with good functional outcome at 1 year follow up (Fig 4,5)



Fig 4. Patient showing the range of movement at the right shoulder joint.



Fig 5. Patient showing good overhead abduction at the right shoulder.

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