Case report

Rehabilitation of a conservatively managed clavicular fracture

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ABSTRACT

The collarbone, or wishbone, is a thin, S-shaped bone about 6 inches (15 cm) long and serves as a support between the shoulder blade and the sternum (sternum). Clavicle fractures occur as a result of injury or trauma. The most common site of fracture is the junction between the two curvatures of the bone, which is the weakest point. The displacement post fracture is most common in clavicular fracture because the attachment of the muscle sternocleidomastoid pulls the Sternal head upwards and the pectoral muscle pulls the distal clavicle downwards. After a distal clavicle fracture, radiographic nonunion has been identified in 10% to 44% of patients. Most of clavicular fractures are managed non-surgically by physical therapy which consists of a rehabilitation program without hampering the fracture healing, the rehabilitation consists of pain reduction, improving strength and range of motion of the shoulder, Scapular and neck muscles and postural correction exercises in addition to a brace to support the upper limb as the clavicle is the bone connecting the Axilla to the shoulder girdle. And the patient is started with medical management which usually consist of analgesics. 62 year old male patient with left clavicle fracture was diagnosed on x-ray after a hit from a bullock cart. Following this incident the patient underwent a prompt series of physical rehabilitation which included strengthening exercises, thoracic expansion exercises, breathing exercises. The case report suggests that a physiotherapy treatment procedure led to the improvement of functional goals progressively and significantly.

Keywords: Clavicle Fracture, Physiotherapy Rehabilitation, Strength Training

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INTRODUCTION

The collarbone, or wishbone, is a thin, S-shaped bone about 6 inches (15 cm) long and serves as a support between the shoulder blade and the sternum (sternum). It is one of the most common fractures seen in adults and in children. The mid shaft fracture is one of clavicle is the common which may be due to fall on Out stretched hand or direct blow on the bone, the mid shaft clavicle fracture is usually managed non-surgically but they have high risk of malunion [1]. Clavicular fracture represented 2.6% of all fractures and 44% of those associated with shoulder girdle, the prevalence of clavicular fracture reduces as the age advances [2]. The evaluation is started by history, physical examination, and the findings are confirmed by a radiology report, for identifying the type and location of fracture. The clavicular fracture are classified by Allman into group I (mid shaft), II (lateral), III (medial). Based on this classification and the type of fracture the management is planned [3]. The usual treatment for clavicular fracture consist of sling or a figure
of 8 dressing used for several weeks [4]. The risk factors for non-union include initial fracture displacement, comminution, shortening and older age [5]. Despite the high frequency of the occurrence of the fracture, the choice of proper treatment is still a challenge for the orthopedic surgeon. In most cases, the direct blow occurs from the lateral side toward the medial side of the bone [6]. The most common site for a fracture is the intersection between two curves of the bone [7], which is the weakest point. This results in the sternocleidomastoid muscle excellently raising the medial aspect, which may lead to a perforation of the covered skin.

The complications of clavicle fracture include radiographic and symptomatic malunion and shoulder deformity, non-union and infections in the bone. Radiographic nonunion after distal clavicle fracture has been reported in 10% to 44% of patients. An outstretched arm or direct trauma to the shoulder are the pathophysiology mechanisms of injury. Pathophysiology: The middle third section of the clavicle is where 75-80% of all clavicle fractures occur.

The thinnest portion of the bone is the junction of the outer and middle thirds, which is the only region not covered or strengthened by muscle and ligamentous attachments. As a result, it is vulnerable to fracture, especially in the hands. Conditions that are related: Related injuries are uncommon, but they may involve a scapular fracture on the ipsilateral side. Dissociation of the scapula and thorax is common. It should be considered when fracture fragments are substantially displaced or expanded. Fractured ribs can sometimes also be associated with clavicle fracture. Pneumothorax, a blood damage to the brain, injury to the head that is closed are other common conditions that occur after clavicle fracture. Typically, patients with clavicle fractures have well-localized pain over the fracture site. Usually, the affected extremity is kept close to the body. When an injury occurs, patients can hear a snapping or cracking sound. This case report describes fracture of left clavicle in a 62 year old male patient who underwent physical rehabilitation at AVBRH Sawangi (M), Wardha, India.

**Case Presentation**

A 62 year old male got hit by a bullock cart on the left clavicle while working in the farm on January 5, 2021. He was brought to the casualty by his relative on bike with complaints of pain and swelling on left shoulder. The blood pressure was found to be 160/100 mmHg. Chest compression was negative. After consultation of an orthopedist, X-ray was done and it revealed fracture of the mid-shaft of left clavicle (fig 1). Patient was advised for a nonsurgical treatment and was forwarded to the physiotherapy department for the healing and union of the broken bone. The patient was also given a figure of eight bandage or sling for the reduction in movements of the shoulder during both day and night time.

**Clinical findings**

On observation: Patient was in supine position with both upper extremities by the side, elbow extended and lower limb externally rotated with knee extended and ankle plantar flexed. Patient was wearing figure of 8 slings. Swelling on the mid shaft of clavicle.

On palpation: grade 3 Tenderness was present over the clavicle region.

Tightness: Bilateral mild pectoral tightness as his shoulder was not touching the bed in supine lying.

Range of Motion: left shoulder all Ranges was painful and limited all other joint range was full and functional (Table 1).

**Table 1: Pre Rehab Range of Motion**

<table>
<thead>
<tr>
<th>Joint</th>
<th>Movement</th>
<th>Left</th>
<th>Right</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shoulder</td>
<td>Flexion</td>
<td>0-40</td>
<td>0-160</td>
</tr>
<tr>
<td></td>
<td>Extension</td>
<td>0-15</td>
<td>0-20</td>
</tr>
<tr>
<td></td>
<td>Abduction</td>
<td>0-30</td>
<td>0-170</td>
</tr>
</tbody>
</table>

**MMT**

Bilateral lower limb strength 5/5.

Right upper limb strength 5/5.
Table 2: Pre Rehab Manual Muscle testing for left Upper limb

<table>
<thead>
<tr>
<th>Joint</th>
<th>Muscle</th>
<th>Left</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shoulder</td>
<td>Flexors</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Extensors</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Abduction</td>
<td>3</td>
</tr>
<tr>
<td>Elbow</td>
<td>Flexors</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Extensors</td>
<td>4</td>
</tr>
<tr>
<td>Wrist</td>
<td>Flexors</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Extensors</td>
<td>5</td>
</tr>
</tbody>
</table>

Table 3: Timeline

<table>
<thead>
<tr>
<th>Date of trauma</th>
<th>Diagnosed with fracture</th>
<th>Referred to physical Therapy</th>
</tr>
</thead>
<tbody>
<tr>
<td>4/1/21</td>
<td>5/1/21</td>
<td>6/1/21</td>
</tr>
</tbody>
</table>

Management

Patient education: Education regarding the fracture and importance of exercise was given to the patient and relative, donning and doffing of the sling was taught to the patient. No effort will be made to minimize the fracture by the orthopedic, who will use a figure-of-eight bandage. The figure-of-eight bandage will be worn for four weeks, with participants returning every week to check and change the immobilizations. As a result, the dominant arm will be able to move about and basic tasks will be permitted (writing, flexing the shoulder and other activities). Non-operative management: Sling immobilization with gentle ROM exercises at 2-4 weeks and strengthening at 6-10 weeks.

Pain management: This is done by using hot fermentation for 10 minutes, twice a day. Further management is in Table 4. ROM Comparison Pre and post rehab in Table 5. Strength Comparison pre and post treatment is in table 6.

DISCUSSION

A study was done on long term outcome of initially conservatively treated midshaft clavicle fracture. The study showed that the patient with >= 100% require operative management because of failure of invasive treatment [8]. A Randomized controlled trail was done to compare open reduction and plate fixation versus non operative treatment for displaced midshaft clavicular fracture. The results reveal that open reduction with internal fixation is expensive and associated with implant related complications, which are absent in non-operative treatment. They conclude that non operative treatment is more feasible choice for treating midshaft clavicular fracture [9]. Michael Catapano performed a systematic analysis on haling, pain, and function after a midshaft clavicular fracture, which revealed that no studies explicitly investigate the impact of immobilization and functional recovery on clinical results in midshaft clavicular fractures [10].

A study was done to find out the effect of plating for midshaft clavicular fracture and its impact on quality of life and functional outcome. They conclude that operative treatment played a significant positive role in midshaft clavicular fracture assessed using functional outcomes for quality of life [11]. A study was done by Karibasappa A G and Srinath S.R to find out the effectiveness of surgical versus conservative treatment for managing displaced midshaft clavicular fracture, they concluded that the group which received open reduction internal fixation with osteosynthesis showed good results as compared to the other group which received non-surgical treatment. We find out that conservative treatment along with physical therapy rehabilitation such as statics exercises, pendular exercise, wand exercises were useful in improving the Range of Motion of the joint. Pain was managed by application of cold fermentation directly over the surgical site, and posture correction exercise were taught such as scapular sets to prevent shoulder protraction, scapular muscle strengthening was taught as it is important for glenohumeral joint. A figure of 8 bandage was given to the patient to prevent mal-union and development of faulty posture. Figure of eight bandage is the one where bandage turns cross each other like number 8. It provides fixation to the joint and maintains stability.

CONCLUSION

We conclude that non-operative treatment along with physical therapy showed better results in non-operatively managed clavicular fracture. Planning and intervention resulted into improving the functional goals progressively. Pain reduction, Range of Motion improvement, improving strength of shoulder musculature and scapular muscles, postural correction exercise, and use of figure of 8 brace ameliorated the disabilities and showed progress in the patient’s condition.
Informed consent
Patient was informed about the study and informed consent was taken from the patient.

Competing interests
The authors declare that they have no conflict of interest.

Authors' contributions
All Author's contribute equally.

Acknowledgement
All author made best contribution for the concept, assessment and evaluation, data acquisition and analysis and interpretation of the data.

REFERENCES