# Surgical Treatment of Clavicle Fractures at B & B Hospital: A 7 Years' Experience

**Manoj P Kushwaha, MBBS, (FCPS); Ram K Barakoti, MBBS, MS; Bibek Banskota, MRCS,MS; Ishor Pradhan, MBBS, MS; Ashok K Banskota, MD, FACS**

Department of Orthopedics, B & B Hospital, Gwarko, Lalitpur, Nepal

Hospital and Rehabilitation Center for Disabled Children (HRDC), Janagal, Kavre, Nepal

**Address for Correspondence:**

Manoj P Kushwaha, MBBS, (FCPS)

Department of Orthopedics, B & B Hospital, Gwarko, Lalitpur, Nepal

Hospital and Rehabilitation Center for Disabled Children (HRDC), Janagal, Kavre, Nepal

**Email:** mapsmanoj10@gmail.com

**Received,** 17 November, 2017

**Accepted,** 3 December, 2017

Clavicular fractures are common injuries, accounting for 2.6% of all fractures. Most common site of injury is middle third and least common is medial third. Distal clavicular fracture due to its unstable nature due to different groups of muscle acting on that region, needs operative fixation. The purpose of fixation is to avoid the deforming forces acting on the fragments which can be done with flexible or rigid fixation.

This study was designed with an objective to share our experience of managing the clavicular fracture.

This is a retrospective and descriptive study. This study was conducted in department of Orthopaedics and Trauma at B and B Hospital, Gwarko, Lalitpur, Nepal. Data were collected from June 2010 to May 2017. Patients presented in OPD is not included in this study.

In last 7 years, total 1923 patients were presented in our hospital with either form of clavicle fracture. 1023 cases were discharged from ER departed with conservative treatment plan. Remaining 887 patient underwent surgical treatment.

Conservative treatment still holds high value in managing clavicle fracture but due to high rate of non-union and re-surgery, surgical treatment is becoming treatment of choice in certain type of clavicle fractures.

**Keywords:** clavicle fractures, complications, conservative, surgery, union.

Clavicle is only long bone which lies horizontal. It is the most superficial bone in human body, perhaps this why it has high rate of fracture and accounts nearly 2%–5% of all injuries and 44% of shoulder Girdle injuries.[1]

Clavicle fractures are often managed conservatively with good outcomes and low complications rate. Our center is one of the tertiary center in Nepal and receives a fair amount of patients from throughout the country. We reviewed records of around 2000 patient presented to our hospital (OPD patients are excluded-treated conservatively and followed up on OPD basis) and found some interesting facts.

**Materials and Methods**

It was a retrospective study, all the patients with clavicle fractures admitted at B & B Hospital between 2010 and 2017 were included in the study. Informed consent was taken in curtained case which was used as an illustration in this report. The study was limited to the patients of clavicle fracture admitted at B & B Hospital.

**Results**

Of the 887 patients with clavicle fracture, 80% were male. Left side was involved among 50% of the patients, followed by right side i.e. 49% and 1% had bilateral clavicle fracture. Average age was 35 years (19-82 yrs). About 32% of patient with clavicle fractures had associated injuries. 80% of the study participants had clavicle fracture at middle third, followed by lateral third-19%- and medial -1%. Management included conservative treatment-25%, recon plate 39%, locking plate 10 % and TBW 6 %. Complications included non-union 17 (2%), delayed union 11 (1%), implant failure 7 (0.79%), infection 6 (0.68%), re-fracture 3 (0.34%), malunion 2 (0.23%). Road traffic accident was the most common cause of injury (85%). The Disabilities of Arm Shoulder and Hand (DASH) score for the operative group was 11, with a 90% union rate.

Among the conservatively managed group, 25% went on non-union. The mean DASH Score was 21.

**Discussion**

Clavicle fractures are very common injuries in adults (2-5%) and children (10-15%).[1] Despite of various treatment options available, standard treatment method is debatable.

Analysis of the data showed, male are more prone to clavicle fracture (80%), which may be attributed to high level of activities of male in our society. Similar study done in 1994 by Nordqvist A et al showed male predominance for clavicle fracture.[2]

Incidence of Right and left clavicle fracture was almost equal (50% vs 49%) however bilateral clavicle fracture can be observed in around 1 % of victims. Clavicle fracture can be classified according to Allman[3] on the basis of anatomical location in middle, medial and lateral 3rd fracture. In our study

80% of patients had clavicle fracture at middle third, followed by lateral third-19%- and medial -1%. Furthermore lateral 3rd clavicle fracture is classified by Neer, Robinson on the basis of CC (Coraco-clavicular) and AC (acromio-clavicular) ligaments status.[4]

Treatment of clavicle fracture depend upon various factor: age of the patient, type of lesion and function demand. Most of the clavicle fracture were managed conservatively. Common indication for conservative management of clavicle fracture were: Non-displaced middle third clavicle fracture, Stable fractures groups (type I, III and V), Anterior displaced medial third fracture. There fracture were managed with either figure of 8 brace or broad arm sling as there was no difference in outcome, which was a long ago proved by Stanley and Norrish in 1988.[5]

**Figure 1** is an example of mid clavicle fracture managed conservatively in broad arm sling with complete union (both clinical and anatomical) after 6 months with complete regain of the function showing in **Figure 2** without any noticed physical deformity.

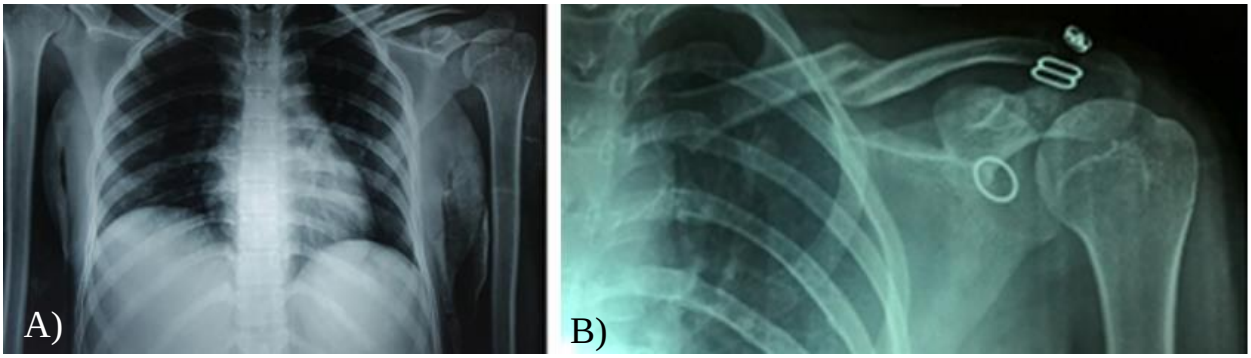


*Figure 1: A) chest x ray of 18 years female, a case of Road Traffic accident with mid clavicle fracture of left side. Patient was treated with broad arm sling. B) After 6 months fracture healed completely without any noticeable deformity.*

*Figure 2: Complete union and ROM (printed with permission)*

With the better understanding of the biomechanics and role of the clavicle the indications for surgical management changed and the indications are as below.

Widely displaced Middle 3rd clavicle fracture, Comminuted fracture, displaced fracture with Skin tenting High intensity trauma, Overlap >2cm,High demand patients (Professional athletes),Type II and IV distal end clavicle fracture., Bilateral clavicle fractures, Floating shoulder, Neurovascular injury. In our study we found that about 25% admitted cases we were able to manage conservatively. Strategies of management are shown in the pie chart below in **Figure 3**.

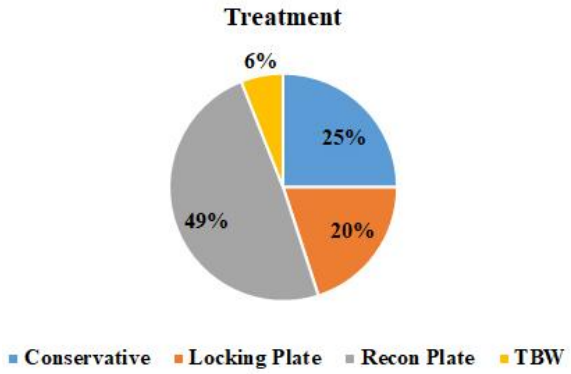


*Figure 3: Pie chart showing management strategies of clavicle fractures.*

These are some case examples. In **Figure 4** a case of Road Traffic Accident and patient sustained injury over the right clavicle, which was widely displaced and marked skin tenting. Patient was managed with open reduction and plate fixation.

Another interesting case of Road traffic accident of 34 year old made with bilateral middle shaft of the clavicles fracture (**Figure 5**), who was also managed surgically with recon plate fixation.

Most of the time lateral 3rd clavicle fracture type II and IV considered for surgical management as these fractures are highly unstable due to pull of different groups of muscles on it.

Controversy persist in management of middle 3rd of clavicle fracture. We considered surgical management for those patient who met above criteria for mid clavicle fracture and this has been supported by even a multicenter RCT comparing operative and no operative treatment of displaced mid shaft clavicle fracture Published in American journal of bone and joint in 2017 with level of evidence 1 showed: rate of nonunion (11% vs<1%) higher in conservatively managed individuals hence it increases the secondary surgical intervention by 11%,so ORIF is safe and reliable intervention with superior functional outcomes and should be considered for patients who sustained displaced mid shaft clavicle fracture.[6]

As clavicle adds beauty to a person -a visible ugly scar is a scary condition for both the patient and treating surgeons and another devastating condition is infection so one should keep in priority while managing these cases surgically.

Complications with clavicle fracture treatment are not uncommon (Figure 7). In our study we found that nonunion is the most common complication (2%) which is comparable to others results (1 to 15%), followed by delayed union (1.21%). [7]

*Figure 4: A case of fall injury with injury over right clavicle. In picture we can appreciate skin tenting, x ray showing wide displacement of the fracture ends. Patient was treated with open reduction and internal fixation with recon plate.*

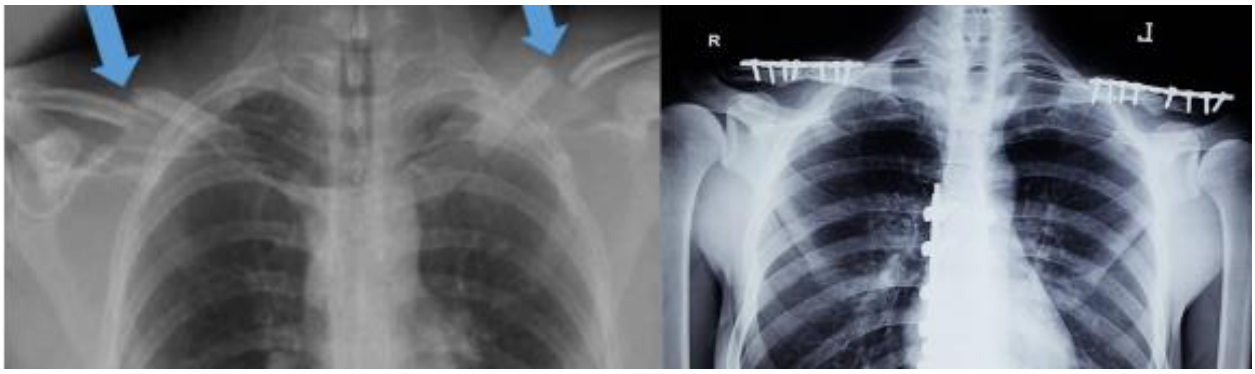


*Figure 5: A case of 36years male, victim of road traffic injury with bilateral clavicle fracture. Patient underwent surgical management.*

*Figure 6: Showing some complications of the surgical management. Picture on left showing ugly scar, picture on middle and right side showing one of the devastating complication- osteomyelitis of the clavicle.*

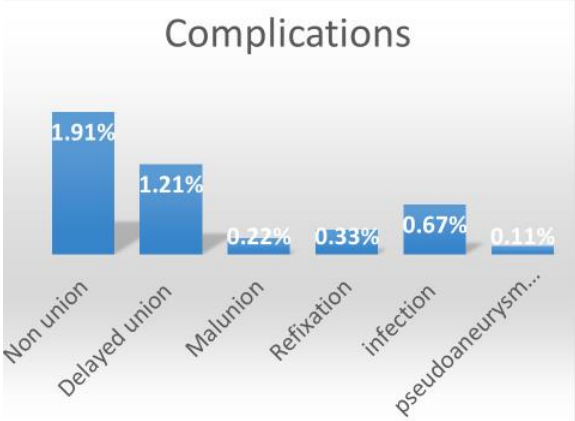


*Figure 7: Above bar diagram shows our complication rate. The most common complication we found was no-union.*

Infection in case of clavicle fixation is one of the devastating situation in orthopedic for both surgeon and patient (**Figure 6).** In a recent randomized trial, the rate of infection is approximately 5% .[8]

One of the rare complication though possible is traumatic pseudo aneurysm of the subclavian artery **(Figure 7)**. We reported one case of subclavian artery pseudoaneurym in a case of clavicle fracture treated conservatively in a 60 years old male patient. Bleeding from the pseudoaneurysm can be potentially limb –or-life threatening. [9,10]

## Conclusion

Majority of fractures heal with non-operative treatment with prompt return of near normal function, poor prognostic signs increase with displacement of fragments, increasing comminution with numbers of fracture. Young active patients with completely displaced mid shaft fracture have superior results with primary fixation. Lateral end clavicle fracture is still a challenge to manage due to high rate of complications.

## References

1. Rahul Bhattacharyya, Prem Ruben Jayaram, Robin Holliday, Paul Jenkins, Iain Anthony and Lech Rymaszewski , The virtual fracture clinic: Reducing unnecessary review of clavicle fractures 2017;48:3.
2. Nordqvist A, Petersson C. The incidence of fractures of the clavicle. Clin Orthop Relat Res. 1994;127-32.
3. Allman FL Jr. Fractures and ligamentous injuries of the clavicle and its articulation. J Bone Joint Surg Am. 1967;49:774-84.
4. Robinson CM. Fractures of the clavicle in the adult. Epidemiology and classification. J Bone Joint Surg Br. 1998;80:476-84.
5. Stanley D, Norris SH. Recovery following fractures of the clavicle treated conservatively. Injury. 1988;19:162-4.
6. Ahrens PM, Garlick NI, Barber J,Tims EM the Clavicle Trial: A Multicenter Randomized Controlled Trial Comparing Operative with Nonoperative Treatment of Displaced Midshaft Clavicle Fractures. J Bone Joint Surg Am. 2017; 99:1345-54.
7. Khan LA, Bradnock TJ, Scott C, Robinson CM. Fractures of the clavicle. J Bone Joint Surg Am. 2009;91:447-60.
8. Canadian Orthopaedic Trauma Society. Nonoperative treatment compared with plate fixation of displaced midshaft clavicular fractures. A multicenter randomized clinical trial. J Bone Joint Surg Am. 2007;89:1-10.

9. Serrano JA, Rodriguez P, Serrano P, Carpintero P, Acute subclavian artery pseudoaneurysm after closed fracture of the clavicle. Acta Orthopedica Belgica, 2003.

10. hansky B, Murray E, Minami K, Korfer R, Delayed brachial plexus paralysis due to subclavian pseudoaneurysm after clavicular fracture . Eur J cardiothorac Surg 1993;7;497-8.