

## Original Research Article

# Management of closed shaft of humerus fractures in non admitted adult patients in a tertiary care hospital

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### ABSTRACT

**Background:** Fracture shaft humerus is among the most common of fractures. Proximal fractures are more common in elderly and are commonly attributed to low-energy falls, they make up to 5% of all fractures and 25% of humerus fractures, middle fractures about 60% and distal fractures contribute to the remaining fractures. Fractures shaft of humerus account for approximately 3% of all fractures encountered by the orthopedic surgeons.

**Methods:** From November 2017 to October 2018 sixty-two fractures of humeral shaft presented at Emergency Orthopedic Department in Government Medical College Jammu, 30 fractures considered suitable for the study. All these patients were treated conservatively by using the Coaptation 'U' shaped slab discharged the next day and evaluation done both clinically and radiologically every two weeks.

**Results:** This study showed that the angulation deformities were considerably reduced by the use of U slab and the POP cast. Smoking appeared to have negative effect on the rate of union.

**Conclusions:** Conservative treatment is one of the most effective methods of treatment. Operative treatment should be limited as much as possible to specific indications given below.

**Keywords:** Humeral shaft fractures, Conservative treatment, Tertiary care hospital, Adult patients

### INTRODUCTION

Proximal fractures are more common in elderly and are commonly attributed to low-energy falls, they make up to 5% of all fractures and 25% of humerus fractures, middle fractures about 60% and distal fractures contribute to the remaining fractures. Fractures shaft of humerus account for approximately 3% of all fractures encountered by the orthopedic surgeons (Christensen, 1967).<sup>1</sup> Treatment of these injuries continues to evolve as advances are made in both operative and non-operative management. There is a wide range of good options available for their treatment and controversy over the best methods for different situations (Chapman, 2003).<sup>2</sup>

Conservative treatment consists of adequate analgesia and a period of immobilization. Early physiotherapy commencing within two weeks from injury has been associated with better functional outcome than prolonged immobilization (Lefevre-Colau MM 2007).<sup>3</sup> Conservative treatment has shown very good results in most of humeral shaft fractures. Upper limb Anatomy need to be understood properly before deciding among the operative versus non-operative options.

Goals of humeral shaft fracture management are to establish union with an acceptable humeral alignment and put back the patients to their prior level of function. Many methods have been described for the treatment of humeral shaft fractures (Epps and Grant, 1991).<sup>4</sup>

The closed treatment methods available include:

- Hanging arm cast.
- Coaptation or U-shaped brachial splint.
- Velpeau dressing.
- Abduction humeral splint/shoulder spica cast.
- Skeletal traction.
- Functional brace.

With each of these different treatment modalities good to excellent results have been reported, functional fracture bracing has become the most common treatment for closed humeral shaft fractures (Ward et al., 1992).<sup>5</sup>

**METHODS**

During the period from Nov 2017 to Oct. 2018 sixty-two fractures of humeral shaft were treated in orthopedic emergency of Govt. Medical College Jammu. 30

fractures considered suitable for the study, those excluded are shown in the Table 1.

**Table 1: Cases excluded from the study.**

Cases	No. of patient
Fractures in patient under 18 year	8
Open fractures	2
Pathological fractures	1
Incomplete follow up	7
Insufficient clinical data	4
Other methods of treatment used	4
Complicated by neurovascular deficit	6
<b>Total</b>	<b>32</b>

There were 6 (20%) male and 24 (80%) female. The age of the patients rang from 18-80 year. A fracture of the humeral shaft was defined as a fracture occurring below the surgical neck and above the epicondyles.



**Figure 1 (A-F): Standard Method of application of U-slab with achievement of acceptable reduction.**

The application method of the ‘U’ shaped coaptation slab was standard. The patient was seated on a stool or table with backrest, leaning to the injured side to expose the axilla. Keeping the elbow at 90 degree flexion and assistant holding it a single layer of cotton from the

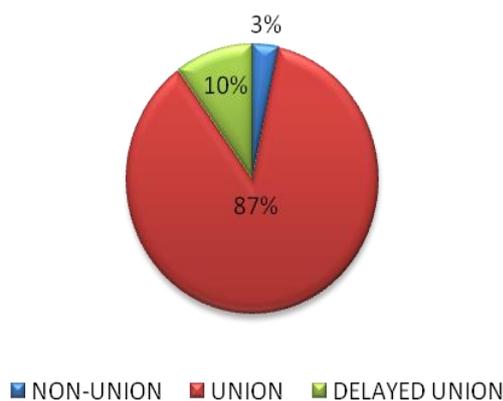
shoulder to four inches distal to the elbow was applied. The arm was encased in six inch, eight layers slab that passed from the midclavicular region around the shoulder, down the arm, under the elbow and up the medial aspect of the arm just below the axilla. Roll

bandage was used to retain the slab and to mold it to the contours of the arm (Figure 1 A-F). No anesthesia was used and the treatment was on outpatient basis.

All patients were assessed the following day for the proper fitting plaster, position of the limb, neurovascular status was checked and the humeral shaft radiologically examined. Then the patients were discharged and followed at regular intervals till union.

**RESULTS**

In our study 26 fractures (86.7%) had complete union without any complications. No correlation was found between sex, or type of fracture and the effect of manipulation and the rate of union. Three fractures in chronic smoker male patients more than 30 year progress to delayed union and the fracture took 16 weeks to get safe union clinically and radiologically. So the incidence of delayed union was 10%. One fracture in a chronic smoker male patient progress to non union with fracture line visible even at 20 weeks after cast application. So the incidence of nonunion was 3.33% (Figure 2).



**Figure 2: Distribution according to rate of union.**

Function: (Table 2): Grading was done using Hunter Scale (Hunter, 1982).<sup>6</sup> In assessing the function 18 fractures (60%) had grade V function and 9 fractures (30%) had grade IV function. Only 3 fractures (10%) had grade III function especially the shoulder joint and elbow joint (H/O Smoking was present in all of them).

**Table 2: Distribution of patients according to functional grade.**

Grade	No. of Patient	Percentage (%)
I	0	-
II	0	-
III	3	10
IV	9	30
V	18	60

**DISCUSSION**

Appreciable results can be obtained with nonoperative treatment of patients with humeral shaft fractures.<sup>7</sup> Our treatment considerably improved the fracture in view of deformities of angulation. The U slab and the POP cast act as a dynamic rather than a static splint, correcting angulation to less than 30° in coronal plane and less than 20° in sagittal plane. All our fractures except one resulted in union with three fractures taking more than usual time for union, our study showed the same results as shown by previous study by Winfield et al and Zagorski et al.<sup>7,8</sup>

In a study Balfour et al reported 42 patients with a humeral shaft fracture treated with a functional brace. Forty-one fractures (97%) united. The time to union averaged 54 days. Varus deformity averaged 9°. Deformity in the anteroposterior plane averaged 6.2°. Thirty-eight patients (90%) had full motion of the shoulder and elbow 4 months after fracture.<sup>9</sup>

In our study we observed that achieving Perfect anatomical reduction was not found to be necessary for best functional outcome, this lends support to what Kennermann noted as good functional results in the presence of residual coronal and sagittal plane angulation, providing the deformity did not exceed 30°. <sup>10</sup> Heim et al and associates in their study reported 127 patients with humeral shaft fractures also stabilized using plates and screws. Patient age averaged 51 years. Nineteen patients had associated radial nerve palsy; an additional four patients developed palsies after fracture manipulation. Of the 127 patients, 102 were available for follow-up 1 year after fracture. Eighty-nine patients (85%) had full functional recovery of their upper extremity. Two patients had postoperative radial nerve palsy, four developed a postoperative infection, five had early fixation failure and two developed a nonunion.<sup>11</sup>

**Table 3: Indications of ORIF in fractured shaft humerus.**

<b>Open fracture.</b>
<b>Associated vascular injury.</b>
<b>Floating elbow.</b>
<b>Bilateral humerus fractures.</b>
<b>Humerus fracture in polytrauma patient.</b>
<b>Failure of conservative treatment.</b>
<b>Radial nerve dysfunction after fracture manipulation.</b>
<b>Pathological fracture.</b>
<b>Nonunion.</b>
<b>Unacceptable malunion.</b>

Our study has proven that conservative treatment has much less complications in comparison with operative treatment and the results are supported by Stern et al. through their study results in 1984.<sup>12</sup> Stern and colleagues in their study reported 70 humeral shaft fractures

stabilized with several types of intramedullary devices between 1970 and 1981. Complications developed in 47 (67%) of the fractures; 45 (64%) required at least one additional operative procedure.<sup>12</sup> Therefore we should not operate on fractures of the shaft unless there is clear indication (Table 3).

Chronic heavy smoking appears to have negative effect on fracture healing in shaft Humerus fractures as in our study all the patients who were chronic smokers I.e. more than 20 cigarettes daily since last 20 years presented with delayed union(10%) or non-union(3%). This is a well known fact that smoking delays soft tissue healing and fracture healing as already proven in their study by Giannoudis and Jerjes.<sup>13</sup>

## CONCLUSION

Conservative treatment is the most effective way of treatment and the operative treatment can have adverse effect on the outcome in case of bad judgment and should be limited as much as possible to these indications (Table 3). From this study we also conclude that smoking has a negative effect on fracture healing as all the patients who presented with non-union and delayed union were chronic smokers.

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## REFERENCES

1. Christensen S. Humeral shaft fractures: Operative and conservative treatment. Acta Chir. Scand. 1967;133:455-60.
2. Chapman MW. Fractures and dislocations of the Shoulder Girdle and Humerus. In: Chapman's Orthopedic Surgery. JB Lippincott, Philadelphia. 2003;13:1004-12.
3. Lefevre-Colau MM, Babinet A, Fayad F, Fermanian J, Anract P, Roren A, et al. Immediate mobilization compared with conventional immobilization for the impacted nonoperatively treated proximal humeral fracture. A randomized controlled trial. J Bone Joint Surg Am. 2007;89:2582-90.
4. Epps CH Jr, Grant RE. Fractures of the Shaft of the Humerus. In: Rockwood and Green's Fractures in Adults. JB Lippincott, Philadelphia.1991;8:843-69.
5. Ward EF, Savoie FH, Hughes JL. Fractures of the Diaphyseal Humerus. In: Skeletal Trauma, Browner, B.D., J.B. Jupiter, A.M. Levine and P.G. Trafton (Eds.). WB Saunders, Philadelphia. 1992;9:1177-200.
6. Hunter SG. The closed treatment of fractures of the humeral shaft. Clin Orthop. 1982;164:192-8.
7. Winfield J, Miller H, AD L. Evaluation of the "hanging cast" as a method of treating fractures of the humerus. Am J Surg. 1942;55:228-49.
8. Zagorski JB, Latta LL, Zych GA, Finnieston AR. Diaphyseal fractures of the humerus:treatment with prefabricated braces. J Bone Joint Surg Am. 1988;70:607-10.
9. Balfour GW, Mooney V, Ashby ME. Diaphyseal fractures of the humerus treated with a ready-made fracture brace. J Bone Joint Surg. 1982;64:11-3.
10. Kenermann, L. Fractures of the humeral shaft. J Bone Joint Surg. 1966;48:105-11.
11. Heim, D., F. Herkert and P. Hess. Surgical treatment of humeral shaft fractures-the Basel experience. J Trauma. 1993;35:226-32.
12. Stern PJ, Mattingly DA, Pomery DL, Zenni EJ Jr, Kreig JK. Intramedullary fixation of humeral shaft fractures. J Bone Joint Surg. 1984;66:639-46.
13. Jerjes W. Poster #165. Presented at: Orthopaedic Trauma Association Annual Meeting; 2014: 16-18.

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