

# THE COMPLICATIONS OF DIAPHYSEAL FRACTURES OF HUMERUS TREATED BY DYNAMIC COMPRESSION PLATE

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## ABSTRACT

**Background:** Humerus fractures constitute about 3 to 5% of all fractures of which majority can be managed by traditional care but some of them will need surgery. The objective of this study was to determine the demographics, modes of injury and complications of diaphyseal fractures of humerus treated by dynamic compression plate.

**Material & Methods:** This cross-sectional study was carried out in Orthopaedics Department, Dow OJHA Hospital and Civil Hospital, Karachi, Pakistan from July 2014 to June 2016. Fifty nine patients having closed diaphyseal humeral shaft fractures were selected through consecutive sampling Demographic variables were gender, age groups, & mode of injury. Research variable was types of complications. All the variables, being categorical were analyzed through frequency and relative frequency. Data was analyzed by using SPSS statistical package version 18.

**Results:** Out of 59 patients, 41 (69.49%) were males and 18 (30.51%) females with male to female ratio of 2.27:1. Age groups from 20-30 included 19 (32.20%) cases, 31-40 years 26 (44.06%) cases and 41-50 years 14 (23.72%) cases. In our study, 38 (64.40%) patients were of injury following road traffic accident, 11 (18.64%) patients were having history of assault and 10 (16.94%) cases were of injury due to fall. The complications seen in this study were infection in 2 (3.38%) cases, iatrogenic palsy of the radial nerve in 5 (8.47%) cases, non-union in 2 (3.38%) cases, delayed union in 2 (3.38%) cases, mal-union in 1 (1.69%) cases & stiffness of shoulder joint in 3 (5.08%) cases.

**Conclusion:** Road traffic accidents are the most common cause of diaphyseal humeral shaft fractures in males between 31-40 years of age. Iatrogenic palsy of radial nerve is a common complication of dynamic compression plate as surgical treatment of humeral shaft fractures.

**KEYWORDS:** Diaphyseal; Complications; Fracture; Patients; Injuries.

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## INTRODUCTION

Humerus fractures constitute about 3 to 5% of all fractures of which majority can be managed by traditional care but some of them will need surgery.<sup>1</sup> Open reduction and internal fixation with plating is generally accepted as the best method of treatment for displaced diaphyseal fractures of

the humerus in the adult, with advantages of stable fixation, direct visualization, protection of the radial nerve, and sparing of the adjacent shoulder and elbow joint from injury.<sup>1</sup> Fixation techniques based on compression principles have a lower incidence of non-union and are found to accelerate healing, with less joint stiffness. Musculoskeletal injuries, including fractures and dislocations are the foundation of a special orthopaedic surgery<sup>1</sup>. The aim of any fracture treatment is to restore the function of injured limb as early as possible.<sup>2</sup> The humeral diaphysis fractures are approximately 3% of all fractures.<sup>3-5</sup>

Humeral shaft fractures are the result of direct and indirect trauma. Fall, a car accident, and a direct load on the arm or severe contraction of muscles can cause fracture of the humerus shaft. Humeral diaphyseal fracture usually heal with close methods but when non-union develops then it needs surgical

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intervention in the form of plating and bone grafting, intramedullary nailing (open or close and simple or interlocking nails) and external fixators (circular or one plane fixator).<sup>6</sup> There is growing interest in treating even simple humeral shaft fractures by dynamic compression plate fixation in order to avoid complications and to allow earlier mobilization and rapid return to work.<sup>7</sup> The usual operative methods involve the use of dynamic compression plate or interlocking nail. Plate and screw fixation has traditionally been the preferred method and remain the gold standard for surgical management. Compression plates are most popular devices for achieving fracture stabilization. The objective of this study was to determine the demographics, modes of injury and complications of diaphyseal fractures of humerus treated by dynamic compression plate.

## MATERIAL AND METHODS

This cross-sectional study was carried out in Orthopaedics Department, Dow OJHA Hospital and Civil Hospital, Karachi, Pakistan from July 2014 to June 2016. Fifty nine patients having closed diaphyseal humeral shaft fractures were selected through consecutive sampling. Exclusion criteria was patients of open fractures, associated with severe chest or abdominal injuries, pathological fractures and malunited fractures with neurological deficit and closed diaphyseal humeral shaft fractures more than two weeks old. This study was done on the basis of clinical examination and X-rays findings. All patients underwent base line investigation and all the fractures were treated by operative procedure of dynamic compression plate. Follow up of all these patients was done. First four visits were after every week, then alternate week up to 3rd month and monthly visits were up to 6 month to assess any complication. Demographic variables were gender, age groups, mode of injury. Research variable was types of complications. The attributes of gender were; male and female. Age groups were; 20 to 30 years, 31 to 40 years and 41 to 50 years. Mode of injury had three attributes; injury due to fall, injury following road traffic accident & history of assault and the attributes of types of complications were; infection, iatrogenic palsy of the radial nerve, non-union, delayed union, mal-union and stiffness of shoulder joint. All the variables, being categorical were analyzed through frequency and relative frequency. Data was analyzed by using SPSS statistical package version 18.

## RESULTS

Out of 59 patients, 41 (69.49%) were males and 18 (30.51%) females with male to female ratio of 2.27:1. Age groups from 20-30 included 19 (32.20%) cases, 31-40 years 26 (44.06%) cases and 41-50 years 14 (23.72%) cases. In our study, 38 (64.40%) patients were of injury following road traffic accident, 11 (18.64%) patients were having history of assault

and 10 (16.94%) cases were of injury due to fall.

The complications seen in this study were infection in 2 (3.38%) cases, iatrogenic palsy of the radial nerve in 5 (8.47%) cases, non-union in 2

**Table 1: Gender of patients of closed diaphyseal humerus shaft fractures (N=59).**

Gender	Frequency	Relative frequency (%)
Male	41	69.49
Female	18	30.51
Total	59	100

**Table 2: Age groups of patients of closed diaphyseal humerus shaft fractures (N=59).**

S.No.	Age groups (Years)	Frequency	Relative frequency (%)
1	20-30	19	32.22
2	31-40	26	44.06
3	41-50	14	23.72
Total		59	100

**Table 3: Mode of injury in patients of closed diaphyseal humerus shaft fractures (N=59).**

S.No.	Mode of injury	Frequency	Relative frequency (%)
1	Injury due to fall	10	16.96
2	Injury following RTA	38	64.00
3	History of assault	11	19.04
Total		59	100

**Table 4: Complications of patients of closed diaphyseal humerus shaft fractures (N=59).**

S.No.	Complications	Frequency	Relative frequency (%)
1	Infection	2	3.38
2	Iatrogenic palsy of the radial nerve	5	8.47
3	Non-union	2	3.38
4	Delayed union	2	3.38
5	Mal-union	1	1.69
6	Stiffness of shoulder joint	3	5.08

(3.38%) cases, delayed union in 2 (3.38%) cases, mal-union in 1 (1.69%) cases, stiffness of shoulder joint in 3 (5.08%) cases. (Table 1)

## DISCUSSION

In this study there is male preponderance which is comparable to many studies. Males are more involved in outdoor activities, and young people are more enthusiastic about life and are usually careless drivers.<sup>8-10</sup>

The present study showed the mode of humeral shaft fractures as 38 (64.40%) cases of injury following road traffic accident while history of assault cases were 11 (18.64%) cases and 10 (16.94%) cases were of injury due to fall. These findings are comparable with a study by Memon<sup>11</sup> with 37 (63.7%) cases of closed diaphyseal humeral shaft fractures following road traffic accidents, and 21 (36.2%) cases of domestic fall. In the study carried out by Sitati and Kingori J.,<sup>12</sup> out of 37 fractures of shaft of humerus, 31 (73.8%) were secondary to road traffic accident (RTA) while the remaining were due to falling from height 4 (9.5%) cases and assault 2 (4.7%) cases.

In the present study we had 2(3.38%) cases of infection. However, frequency of wound infection given by Bell et al<sup>14,25</sup> in a series of 33 patients treated with dynamic compression plate was 1 (3%) case of infection.

In our study non-union was seen in 2 (3.38%) cases and delayed union in 2 (3.38%) cases. The incidence of non-union and delayed union reported in the literature is between 0-8%.<sup>15-20</sup> Salick<sup>21</sup> reported in his study of 87 humeral shaft fractures treated by plating regarding delayed union in 2 cases (3.38%).

## CONCLUSION

Road traffic accidents are the most common cause of diaphyseal humeral shaft fractures in males between 31-40 years of age. Iatrogenic palsy of radial nerve is a common complication of dynamic compression plate as surgical treatment of humeral shaft fractures.

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**CONFLICT OF INTEREST**

Authors declare no conflict of interest.

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**AUTHORS' CONTRIBUTION**

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