

# A study of outcome of fracture proximal humerus in adults treated with proximal humerus locking plate at tertiary health care center

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## Abstract

**Background:** Humerus fractures have a substantial impact on personal function and well-being and are one of the leading causes of excessive mortality among the elderly. **Aims and Objectives:** To study outcomes of fracture proximal humerus in adults treated with proximal humerus locking plate at tertiary health care center. **Methodology:** This was a cross-sectional study carried out in the patients of proximal humerus fracture at the department of Orthopedics of a tertiary health care center during the one-year period i.e. June 2015 to June 2016. During the one-year period there were 61 patients included into the study after written and explained consent. All patients undergone proximal humerus locking plate operations as per the standard operating protocols and procedures. All the necessary data like Age of the patients, sex, Outcome and any associated complications were noted. The data was presented in the percentages and in tabular form. **Result:** In our study we have seen that The majority of the patients were in the age group of >60 were 40.98%, followed by 50-60 were 27.87%, 40-50 were 19.67%, 30-40 were 8.20%, 20-30-3.28%. The majority of the patients were Female i.e. 68%, followed by Male were 32%. The majority of the patients were improved 80%, 20% were associated with complications like Avascular necrosis in 10%, Screw cutout occurred in 7%, Revision surgery required in 3%. **Conclusion :** It can be concluded from our study that the most common age of fracture was >60 the majority of the patients were females most of the patients improved ; Locking plate fixation was a good surgical option for the management of proximal humerus fractures except with some complications like Avascular necrosis, Screw cutout occurred, Revision surgery required etc.

**Key Words:** fracture proximal humerus, Proximal humerus locking plate, Avascular necrosis of Femur.

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## INTRODUCTION

Humerus fractures have a substantial impact on personal function and well-being and are one of the leading causes of excessive mortality among the elderly<sup>1-3</sup>. A humerus fracture is often caused by a fall directly on the shoulder

or arm<sup>4</sup>, and the proximal part of the humerus fracture is commonly encountered in patients with osteoporosis. Published epidemiologic studies have reported widely diverse incidence rates of humerus fracture<sup>5-7</sup>. Approximately 20% of proximal humerus fractures require surgical intervention, and these surgically treated fractures are often 3- or 4-part fractures.<sup>8</sup> The goals of surgery for proximal humeral fractures should involve minimal soft tissue dissection and achieving anatomic reduction of the head complex with sufficient stability to allow for early shoulder mobilization. Surgical options include percutaneous Kirschner wires, T-plates, angled plates, cloverleaf plates, intramedullary nails, tension band wires, and primary prosthesis.<sup>9</sup> Locking plates are being increasingly used by surgeons for these fractures, especially in patients with poor bone stock. This article describes the bone quality of the proximal humerus and

the various treatment options, in particular locking plate fixation. BONE QUALITY OF THE PROXIMAL HUMERUS The cancellous bone mass in the proximal humerus reduces with age, and the trabecular network is limited in older patients.<sup>10</sup> This is due to decreased osteoblastic activity and occurs up to the ninth decade.<sup>11</sup> This overall decrease in bone mass leads to a reduction in trabecular thickness and trabecular connectivity. Tingart *et al*<sup>12</sup> compared the cortical thickness of the proximal humerus diaphysis with the bone mineral density (BMD) of the proximal humerus and found that a low BMD was highly predictive if the sum of the cortical thickness of the medial and lateral diaphysis cortices was 4 mm.

**MATERIAL AND METHODS**

This was a cross-sectional study carried out in the patients of proximal humerus fracture at the department of Orthopedics of a tertiary health care center during the one-year period i.e. June 2015 to June 2016. During the one-year period there were 61 patients included into the study after written and explained consent. All patients undergone proximal humerus locking plate operations as per the standard operating protocols and procedures. All the necessary data like Age of the patients, sex, Outcome and any associated complications were noted. The data was presented in the percentages and in tabular form.

**RESULTS**

**Table 1:** Distribution of the patients as per the age

Age	No.	Percentage (%)
20-30	2	3.28
30-40	5	8.20
40-50	12	19.67
50-60	17	27.87
>60	25	40.98
<b>Total</b>	<b>61</b>	<b>100.00</b>

The majority of the patients were in the age group of >60 were 40.98%, followed by 50-60 were 27.87%, 40-50 were 19.67%, 30-40 were 8.20%, 20-30-3.28%.

**Table 2:** Distribution of the patients as per the Sex

Sex	No.	Percentage (%)
Male	20	32
Female	41	68
<b>Total</b>	<b>61</b>	<b>100</b>

The majority of the patients were Female i.e. 68%, followed by Male were 32%.

**Table 3:** Distribution of the patients as per the Outcome

Outcome	No.	Percentage (%)
Improved	49	80
Associated with Complications	12	20
Avascular necrosis	6	10
Screw cutout	4	7
Revision surgery	2	3
<b>Total</b>	<b>61</b>	<b>100</b>

The majority of the patients were improved 80%, 20% were associated with complications like Avascular necrosis in 10%, Screw cutout occurred in 7%, Revision surgery required in 3%.

**DISCUSSION**

The conservative management for displaced or unstable fracture patterns has not been favorable, resulting in persistent pain, stiffness, and dysfunction.<sup>13,14</sup> Three- and 4-part fractures of the proximal humerus often warrant operative intervention.<sup>15</sup> Various surgical treatment options exist, such as percutaneous K-wires, T-plates, angled plates, cloverleaf plates, intramedullary nails, tension band wires, primary prosthesis, and locking plate fixation.<sup>16</sup> Locking plates are widely used in the fixation of proximal humerus fractures.<sup>17,18</sup> These plates were developed to provide angular stability and achieve a favorable screw–bone interface, especially in osteoporotic bone. The plate incorporates multiple locking screws in convergent and divergent directions to improve pullout strength and fixation strength.<sup>19</sup> This creates a fixed angled device that acts as a single unit that captures a volume of bone. It is positioned on the lateral cortex of the proximal humerus to provide intrinsic stability to an anatomically reduced proximal humerus fracture. Medial buttress plates would compromise the blood supply to the humeral head.<sup>20</sup> In our study we have seen that The majority of the patients were in the age group of >60 were 40.98%, followed by 50-60 were 27.87%, 40-50 were 19.67%, 30-40 were 8.20%, 20-30-3.28%. The majority of the patients were Female i.e. 68%, followed by Male were 32%. The majority of the patients were improved 80%, 20% were associated with complications like Avascular necrosis in 10%, Screw cutout occurred in 7%, Revision surgery required in 3%. These findings are similar to Neil G. Burke *et al*<sup>21</sup> they found that Locking plate fixation was associated with a high complication rate, such as avascular necrosis (7.9%), screw cutout (11.6%), and revision surgery (13.7%). These complications are frequently due to the varus deformation of the humeral head. Otherwise Locking plate fixation was a good surgical option for the management of proximal humerus fractures.

**CONCLUSION**

It can be concluded from our study that the most common age of fracture was >60 the majority of the patients were females most of the patients improved ; Locking plate fixation was a good surgical option for the management of proximal humerus fractures except with some complications like Avascular necrosis, Screw cutout occurred, Revision surgery required etc.

## REFERENCES

1. Piirtola M, Vahlberg T, Lopponen M, Raiha I, Isoaho R, Kivela SL. Fractures as predictors of excess mortality in the aged: a population-based study with a 12-year follow-up. *Eur J Epidemiol* 2008; 23:747–55.
2. Johnell O, Kanis JA, Oden A, Sernbo I, Redlund-Johnell I, Pettersson C, et al. Mortality after osteoporotic fractures. *Osteoporos Int* 2004; 15:38 – 42.
3. Olsson C, Nordquist A, Petersson CJ. Long-term outcome of a proximal humerus fracture predicted after 1 year: a 13-year prospective population-based follow-up study of 47 patients. *Acta Orthop* 2005; 76:397– 402.
4. Chu SP, Kelsey JL, Keegan TH, Sternfeld B, Prill M, Quesenberry CP, et al. Risk factors for proximal humerus fracture. *Am J Epidemiol* 2004; 160:360 –7.
5. Igbigbi PS, Manda K. Epidemiology of humeral fractures in Malawi. *Int Orthop* 2004; 28:338 – 41.
6. Tytherleigh-Strong G, Walls N, McQueen MM. The epidemiology of humeral shaft fractures. *J Bone Joint Surg Br* 1998; 80:249 –53.
7. Mast JW, Spiegel PG, Harvey JP Jr, Harrison C. Fractures of the humeral shaft: a retrospective study of 240 adult fractures. *Clin Orthop Relat Res* 1975; 112:254 – 62.
8. Liew AS, Johnson JA, Patterson SD, King GJ, Chess DG. Effect of screw placement on fixation in the humeral head. *J Shoulder Elbow Surg.* 2000; 9(5):423-426.
9. Lever JP, Aksenov SA, Zdero R, Ahn H, McKee MD, Schemitsch EH. Biomechanical analysis of plate osteosynthesis systems for proximal humerus fractures. *J Orthop Trauma.* 2008; 22(1):23-29.
10. Hepp P, Lill H, Bail H, et al. Where should implants be anchored in the humeral head? *Clin Orthop Relat Res.* 2003; (415):139-147.
11. Delling G. Age-dependent bone changes (author's transl) [in German]. *Klin Wochenschr.* 1974; 52(7):318-325.
12. Tingart MJ, Apreleva M, von Stechow D, Zurakowski D, Warner JJ. The cortical thickness of the proximal humeral diaphysis predicts bone mineral density of the proximal humerus. *J Bone Joint Surg Br.* 2003; 85(4):611-617
13. Liew AS, Johnson JA, Patterson SD, King GJ, Chess DG. Effect of screw placement on fixation in the humeral head. *J Shoulder Elbow Surg.* 2000; 9(5):423-426.
14. Lever JP, Aksenov SA, Zdero R, Ahn H, McKee MD, Schemitsch EH. Biomechanical analysis of plate osteosynthesis systems for proximal humerus fractures. *J Orthop Trauma.* 2008; 22(1):23-29.
15. Misra A, Kapur R, Maffulli N. Complex proximal humeral fractures in adults—a systematic review of management. *Injury.* 2001; 32(5):363-372.
16. Stableforth PG. Four-part fractures of the neck of the humerus. *J Bone Joint Surg Br.* 1984; 66(1):104-108
17. Konrad G, Bayer J, Hepp P, et al. Open reduction and internal fixation of proximal humeral fractures with use of the locking proximal humerus plate. Surgical technique. *J Bone Joint Surg Am.* 2010; 92(suppl 1 pt 1):85-95
18. Brunner F, Sommer C, Bahrs C, et al. Open reduction and internal fixation of proximal humerus fractures using a proximal humeral locked plate: a prospective multicenter analysis. *J Orthop Trauma.* 2009; 23(3):163-172
19. Thanasis C, Kontakis G, Angoules A, Limb D, Giannoudis P. Treatment of proximal humerus fractures with locking plates: a systematic review [published online ahead of print September 12, 2009]. *J Shoulder Elbow Surg.* 2009; 18(6):837-844.
20. Brooks CH, Revell WJ, Heatley FW. Vascularity of the humeral head after proximal humeral fractures. An anatomical cadaver study. *J Bone Joint Surg Br.* 1993; 75(1):132-136.
21. Neil G. Burke, Jim Kennedy. Locking Plate Fixation for Proximal Humerus Fractures. *ORTHOPEDICS | ORTHOSuperSite.com.* 2012;35(2):250-254.doi: 10.3928/01477447-20120123-41

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