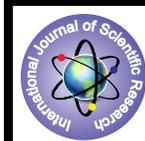


## Anteromedial Plating of Humerus—A Safe Approach



### Medical Science

**KEYWORDS :** Humerus shaft fractures, Anteromedial plating, Radial nerve palsy.

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### ABSTRACT

*Background:* Humeral shaft fractures accounts for approximately 3% of all the fractures. The causes mainly includes fall from height, road traffic accidents, assault and sometimes pathological. The plate osteosynthesis is the gold standard for the treatment of humeral shaft fractures. Here in this study we evaluated the anteromedial plate osteosynthesis of humerus with respect to the incidence of iatrogenic radial nerve palsies, the mean operation time required to perform the surgery, and also time taken for fracture to unite . *Methods:* A retrospective study was conducted at Department of Orthopaedics, Viswabharathi Medical College, Kurnool, Andhra Pradesh from July 2012 to July 2015 with a total of 30 patients were included in the study were operated with anteromedial plate osteosynthesis..

*Results:* Among 30 patients 20 were males and 10 were females. Majority of the patients were with the history of road traffic accidents ..The mean operating time of anteromedial osteosynthesis was 55.5+5.00minutes. The incidence of iatrogenic radial nerve palsy is nil with that of anteromedial plate osteosynthesis.

### INTRODUCTION;

Humeral shaft fractures account for approximately 3% of all fractures. [1] Over 60% of fractures were in the middle third of the humeral shaft 30% were in proximal, and 10% in the distal third. [3] There is a bimodal distribution peaking in the 3rd and 7th decade and the largest peak for male is in 3rd decade. [1] It is generally agreed that most of humeral shaft fractures are treated best non operatively, although there are primary and secondary indications for surgical intervention. Surgical management includes plate osteosynthesis, intra medullary nailing or external fixation. Plate osteosynthesis remains the gold standard for the operative fixation of humeral shaft fractures despite advances in implant technology. It is associated with high Union rates. [6] It is generally accepted that the best surface of a long bone for plate placement is the tension surface and theoretically this is the posterior surface of the humerus, however many authors have reported excellent results for plate osteosynthesis using an anterolateral approach and placing plate anterolateral surface of humeral shaft both situation are technically demanding and require extensive surgical dissection with risk of injury to radial nerve. The incidence of primary radial nerve palsy accounts for 11.8% [7] while iatrogenic radial nerve injury is upto 5.1 % , [8] when plates are placed on anterolateral or posterior surface of humerus. The entire length of humeral shaft can be approached through anterolateral approach described by Henry without need of visualisation of radial nerve. The placement of plate on anterolateral surface involves potential risk to the nerve during the retraction of soft tissue or, by implant itself, especially when it placed over the middle to distal third shaft. The goal of treatment of humeral shaft fractures is to establish Union with an acceptable humeral alignment and to restore the patient pre injury level of function. [6] The aim of our study was to find out the incidence of iatrogenic radial palsies when performing anteromedial plate osteosynthesis of humeral shaft fractures through an anterolateral approach, to measure the mean operation time necessary to perform surgery and also the average time taken for fracture union anteromedial plate osteosynthesis of humeral shaft fractures.

**MATERIALS AND METHODS;** This retrospective study was conducted at the department of Orthopaedics in Viswabharathi Medical College, Kurnool, Andhra Pradesh from July 2013 to July 2015. Records of consecutive patients with acute middle 3rd humeral fractures treated by anteromedial osteosynthesis with anterolateral approach were included in study. Patients less than 18 years, preoperative radial nerve palsy, pathological fracture, patients with associated injuries in same limb were excluded from study.

**SURGICAL PROCEDURE ;** Patient was anaesthetized and placed in supine position. The lateral border of biceps tendon was palpated and the skin incision made along the lateral border of biceps. Biceps muscle retracted medially & brachialis muscle split at internervous plane i.e., medial 2/3 supplied by musculocutaneous nerve & lateral 1/3 supplied by radial nerve , to expose the fracture site. The medial border of humerus was exposed subperiosteally. After reducing the fracture, locking compression plates

(20 patients) (shown in Figure 1) and dynamic compression plates (10 patients) were fixed with appropriate screws and wound closed in layers. Shoulder range of motion and elbow exercises were started on first postoperative day. Radiographs were assessed at 6 weeks, 12 weeks, 3 months and 6 months for fracture union. (Figure 2).



**FIGURE 1 ANTEROMEDIAL PLACEMENT OF PLATE**



**Shaft of humerus fracture with butterfly fragment.**  
**FIGURE 2**

**6 months old post operative united fracture.**

**RESULTS :** A total of 30 patients with fracture shaft of humerus were treated with anteromedial plating. Twenty patients were male and ten patients were female. None of the patients had preoperative radial nerve palsy. There was no requirement for blood transfusion for any of the patients. Radial nerve palsy was not observed in any of the case immediately after surgery. The mean duration of surgery for anteromedial humerus plating was  $55.5 \pm 5.00$  minutes. Evidence of healing was seen between six to twelve weeks. Callus formation and cortical union were observed on radiographs as evidence of radiological union. One patient developed superficial infection which healed with antibiotic therapy.

**DISCUSSION:** Most of middle third of humerus fractures best treated by conservatively with good union rates and acceptable functional outcomes, even-though there are various primary and secondary indications for surgical fixation. The plate osteosynthesis remains the gold standard fixation for humeral shaft fractures. [6] The most surgical approaches used for humerus are anterolateral approach described by Henry and posterior approach. Antero-lateral approach best suited for middle third and proximal third fractures. Posterior approach best suited for distal third fractures. The entire length of humerus shaft can be approached by anterolateral approach. The placement of plate on anterolateral surface of humerus carries potential damage to radial nerve either by traction injury, by fracture reduction, compression by retractors or bone levers or by implant itself. The global incidence of post surgical radial nerve palsy varies from 0 to 12 percent. The anterolateral approach with placement of plate on anteromedial surface prevents the unnecessary dissection at lateral side of humerus and avoids injury to the radial by the retractors and the implant. In our study we didn't see any post surgery radial palsy in antero medial plating. A study conducted by Ivan Kirin et al comparing antero-medial and antero-lateral plating of humerus reports no post operative radial nerve palsy in antero-medial approach. [9] In terms of neurologic sequelae, injury to the radial nerve with neuropraxia is most frequently encountered nerve deficit associated with humeral fracture. [10] Spontaneous recovery over a period of 4 months occurs in 70% to 92% of all the patients managed with observation. (11,12). The main concern regarding plate placement on anteromedial surface of humerus is damage to nutrient artery of humerus as decried by many authors. (4,5) As described by Laing, (13) the displaced fractures at junction of middle and lower third humerus shaft will probably destroy the main nutrient artery and open reduction of middle third humerus fractures damages the nutrient artery greatest. The blood supply to upper end

of distal fragment depends on periosteal vessels and ascending branches from the epicondyles. The proximal fragment supplied by accessory nutrient arteries and periosteum. Antero lateral plate placement needs more soft tissue stripping compared to anteromedial plate placement as anteromedial surface relatively free of muscle attachments. Our study shows that the mean time required for antero-medial plating is much less.

**CONCLUSION;** In our study we performed anteromedial plating through anterolateral approach and there was no radial nerve palsy, mean time required for surgery is also less.

#### REFERENCES;

1. Tytherleigh-Strong G, Walls N, McQueen MM. The epidemiology of humeral shaft fractures. *J Bone Joint Surg.* 1998 Mar; 80 B(2):249-253.
2. Tsai C-H, Fong Y-C, Chen Y-H, Hsu CJ, Chang C-H, Hsu H-C. The epidemiology of traumatic humeral shaft fractures in Taiwan. *Int Orthop.* 2009 Apr; 33(2): 463-467.
3. Egol AK, Koval JK, Zuckerman DJ. *Handbook of Fractures*, 4th edn. 2010; Wolters Kluwer Lippincott Williams and Wilkin, New York. Page 203
4. Bhojaraja VS, Kalthur SG, Dsouza AS. Anatomical study of diaphyseal nutrient foramina in human adult humerus. *Arch Med Health Sci* 2014 Nov; 2(2):165-169.
5. Chandrasheharan S, Shanthi KC. A Study of Nutrient Foramina of Adult Humerii. *J Clin Diagn Res.* 2013 Jun; 7(6): 975-977.
6. Livani B, Belangero W, Medina G, Pimenta C, Zogiab R, Mongon M et al. Anterior plating as a surgical alternative in the treatment of humeral shaft nonunion. *Intl Orthopaedics (SICOT).* 2010 Oct; 34(7):1025-31.
7. Wang JP, Shen WJ, Chen WM, Haung CK, Shen YS, Chen TH. Iatrogenic radial nerve palsy after operative management of humeral shaft fractures. *J Trauma.* 2009 Mar; 66(3):800-3.
8. Paris H, Tropiano P, Clouet D, Orval B, Chaudet H, Poitout DG. Fractures of shaft of humerus ; systematic plate fixation. Anatomic and functional results in 156 cases and a review of literature. *Rev Chir Orthop Reparatrice Appar Mot.* 2000 Jun; 86(4):346-59.
9. Kirin I, Jurisic D, Grebic D, Nadalin S. The advantages of humeral anteromedial plate osteosynthesis in the middle third shaft fractures. *The Middle Journal of Medicine* 2011 Feb; 123(3-4): 83-87.
10. Pallock FH, Drake D, Bovill EG, Day L, Trafton PG. Treatment of radial neuropathy associated with fracture of the humerus. *J Bone Joint Surg Am.* 1981 Feb; 63(2):239-43.
11. Rogers J, Bennet J, Tullos H. Management of co-committant ipsilateral fractures of the humerus and forearm. *J Bone Joint Surg Am.* 1984 Apr; 66 (4): 552-556.
12. Shao Y, Harwood P, Grotz M, Limb D, Giammondis P. Radial nerve palsy associated with fracture of the shaft of humerus: a systematic review. *J Bone Joint Surg Br.* 2005 Dec; 87(12):1647-52
13. Laing PG. The arterial supply of the adult humerus. *J Bone Joint Surg.* 1956 Oct; 38 (5): 1105 -1116.