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RESEARCH ARTICLE

PROSPECTIVE STUDY OF HUMERUS SHAFT FRACTURES IN ADULTS TREATED WITH DYNAMIC COMPRESSION PLATING

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ABSTRACT

Background and Objectives: Fractures of Humeral shaft account for approximately 3% to 5% of all fractures. Most will heal with appropriate conservative care, although a small but consistent number will require surgery for optimal outcome. The aim of this study is to assess the results of humeral shaft fractures with dynamic compression plate (DCP).

Methodology: This is a prospective study of 35 cases of fracture shaft of humerus admitted to Bapuji Hospital and C.G Hospital attached to J.J.M Medical College, Davangere,between october 2005 to september 2007. Cases were taken according to inclusion and exclusion criteria.

Results: In our series of 35 cases there were 31 males and 4 females, with average age of 42.5 yrs. 26(74%) cases were admitted due to road traffic accident and with slight predominance of left side. Out of 35 cases, 4(11%) were proximal third, 28(80%) were middle third and 3 (9%) were distal third. Transverse or short oblique fractures were most common i.e., 18(51%) patients. 11(31%) cases were having associated injuries. The fractures united in 33(94%) patients with 2(6%) cases going for non-union due to deep infection in one, in other case may be due to immediate weight bearing activity done by the patient. There was one (3%) case of delayed union which united after 6 months. Good or full range of mobility of shoulder and elbow joints was present in 32 (91%) patients with 3(9%) patients having stiffness of shoulder and elbow joint.

Conclusion: Internal fixation of the humerus with DCP achieves higher union rates and comparable better results as compared to other modes of treatment.

INTRODUCTION

Fractures of Humeral shaft account for approximately 3% to 5% of all fractures. Most will heal with appropriate conservative care, although a small but consistent number will require surgery for optimal outcome[10]. The aim of this study is to assess the results of humeral shaft fractures with dynamic compression plate (DCP).

PATIENTS AND METHODS

It is a prospective study which was carried out from October 2005 to September 2007 in Chigateri General Hospital and Bapuji Hospital attached to JJM medical College, Davangere, Karnataka state, India. In this study period 35 cases of fracture shaft of the humerus were treated by open reduction and internal fixation using Dynamic Compression Plate. *Exclusion criterias* were grade 3 Open fractures, non-union, delayed union & pathological fractures. *Pre-Op Evaluation* was done as History, Examination, Standard radiographs of the humerus, i.e., anteroposterior and lateral views were obtained. The shoulder and elbow joints wer included in each view. The limb was immobilized in a U-slab with sling. Injectable analgesics were given. Routine investigations were done and informed consent and physician reference for fitness was obtained. *Procedure:* Anterolateral approach with lateral plating was the most preferred surgical approach. Posterior approach was used in two cases due to the fracture being in the distal third. A broad 4.5mm DCP made of 316L stainless steel was used and a minimum of 6 cortices were engaged with screw fixation in each fragment. Standard surgical procedure was followed. *Follow Up*: Immediate range of motion excercises of shoulder and elbow were started. No external splint was given. All the patients were followed up at monthly intervals for the first 3 months, 2 monthly intervals till fracture union and once in 6 months till the completion of study.

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RESULTS

Total no. of patients were 35. Mean age of patients was 42.5 years (range: 18-65yrs). 31 patients were males and 4 were females. Left side was affected in 19 patients (54%) and right side was affected in 16 pts (46%). Most common *mode of injury* was road traffic accidents in 26 patients (74%), fall in 6 patients(17%), accident at work place in 2 patients (6%) & Assault in one patient (3%). 11 (31%) of the 35 patients have associated injuries. Majority of the fractures were in the middle third (28in number i.e.80%).

Fracture Pattern

Transverse or short oblique in 18 patients (51%), Communited in 13 patients (37%), Long oblique in 4 patients (12%) & no segmental fractures. General anaesthesia was given for all the cases. The Anterolateral approach of Henry was used in all cases except in two cases where the Posterior approach was used due to the fracture being distal. Tourniquet was not used in any of our cases, as it comes in the way of surgery so. The follow- up ranged from 6months to 16 months.

Duration of fracture Union

Sound union in 32 (91%) patients in less than 6 months, delayed union in 1(3%) patient, non- union in 2(6%) patients - one due to deep infection and in other it may be due to early weight bearing by the patient.

Range of Mobility (ROM) of the Shoulder and Elbow Joints

28(80%) pts recovered full ROM of shoulder and elbow joint. 4 (11%) patients recovered good ROM (within 10-15% of full range). 3 (9%) patients had poor ROM, of these, 1 (3%) patient had a head injury with wrist drop, 1 (3%) patient had a deep infection causing non- union, the reason for stiffness in 1(4%) patient was not clear. The American Shoulder and Elbow Surgeons (ASES) [1,2] shoulder score is for 13 activities of daily living requiring full shoulder and elbow movement. The maximum possible score is 52 points. The average ASES score obtained was 48. Complications in our study are shown in Table 1. Results according to Romen et al scoring: Excellent results in 28(80%) patients, Good results in 04(11%) patients, and Poor results in 03(9%) patients. See Figure 1-5.

Table 1: Complications seen in our study

Complications	Number of patients
Radial nerve palsy (one more pt had preop RNP)	1 (2.8%) Recovered fully at 3months
Delayed union with stiffness of shoulder and elbow joints	1 (2.8%)
Infected non union (Deep infection)	1 (2.8%)
Nonunion	1(2.8%)

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Fig. 1. Preoperative radiographs

Fig. 2. X-Ray showing complete union

Fig.3. Range of motion in elbow and shoulder

Fig.4. Range of motion in elbow and shoulder

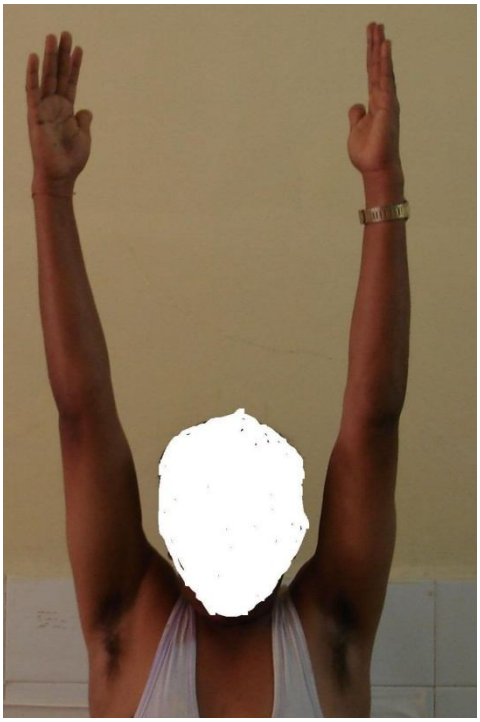

Fig.5: Range of motion in elbow and shoulder

DISCUSSION

In our study the fractures united in 33(94%) patients with 2(6%) cases going for non-union due to deep infection in one, in other case may be due to immediate weight bearing activity done by the patient. There was one (3%) case of delayed union which united after 6 months. Good or full range of mobility of shoulder and elbow joints was present in 32 (91%) patients with 3(9%) patients having stiffness of shoulder and elbow joint. Open reduction with plate fixation usually ensures a high likelihood of anatomic reduction, radial nerve exploration and ideal in patients with narrow medullary canal[3]. Disadvantages of plating are extensive dissection with greater disruption of the soft tissue envelope, risk of infection, potential injury to the radial nerve (5%), poor fixation in osteoporotic bone with DCP and the possible need for plate removal at a later date[4,5,6] . The higher percentage of stiffness in this series, as compared to studies done by McCormack RG et al [2] is an indication of the importance of patient education and physiotherapy during postoperative management. Acoording to various studies non-union rate ranges from 1-9% with plating [2,4,12]. Results of other studies with plating are compared with our study in Table 2.

Table 2. Various studies showing their results

Study	Total no. of patients in a study	Method of treatment	Excellent/good results
HeimD et al (1993) 4	127	DCP	87.3%
Tingstad E M et al (2000) 12	83	AO Plating	94%
McCormack RG et al (2000) 2	44	DCP & Intramedullary nail fixation	95.7%
Present study (2008)	35	DCP	91%

DCP: Dynamic Compression Plate

Conclusion

Strict adherence to the AO principles during fixation, meticulous attention to maintenance of asepsis during surgery, patient education and a well planned rehabilitation programme are required to obtain better results. If these principles are adhered to DCP fixation of humerus shaft fractures, it results in fewer complications and greater patient satisfaction. According to various RCT/metaanalysis (2,7,8,9,11) & our studies - plating is still the gold standard for fracture shaft humerus. Nailing is indicated in specific situations such as pathological fractures & segmental fractures (2)

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