

Management of Both Bones Forearm Fractures with Dynamic Compression Plate

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ABSTRACT

Background: A study was conducted on Internal Fixation and Dynamic Compression Plating as management for both bones forearm diaphyseal fractures.

Materials and Methods: This is a retrospective study in which 30 cases of diaphyseal fractures both bones forearm in adults were treated in Sree Balaji Medical College Hospital, Chennai. The average age ranged between 20-30 years. Fracture union, function and complications were assessed for the patients.

Results: The grip strength and range of movements are good. Exceptional results were attained in 21 cases (70%), good in 5 cases (17.5%), fair result in 4 cases (12.5%). Occurrence of infection and delayed union were two and one cases respectively.

Conclusion: Dynamic Compression Plating proves to be an effective treatment for both bone forearm fractures and choice of treatment is open reduction and internal fixation.

Key words: Both bones, Diaphyseal, Forearm, Fracture, Fixation, Dynamic compression plate

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INTRODUCTION

To attain an acceptable range of supination and pronation it is paramount to regain axial alignment, length and normal rotational alignment when treating fracture of diaphysis of ulna and radius. Owing to the problems of reduction and maintenance of two parallel bones in the presence of forces of muscles in pronation and supination, both of which have rotational and angular influences, the chances of malunion and non-union are greater. Generally, for displaced shaft fractures in the adult, open reduction and internal fixation with plates are considered the best treatment. Several authors have pointed out the value of compression to obtain strong internal fixation. Compression techniques have a lower chance of non-union and accelerate rehabilitation, although with joint stiffness. The plates are reduced to a sufficiently rigid fixation of the bone fragments, promoting early mobilization. The ideal fracture management is a solidly united fracture in perfect anatomical alignment, stable internal fixation, preservation of blood supply to fragments and soft tissues followed by early mobilization of muscle and joints actively to prevent disease development by fracture. Factors such as the earliest rehabilitation of the patient, the unsatisfactory result of the conservative treatment of both forearm bone fractures

in adults prompted us to treat the fractures surgically by plating [1-5].

MATERIALS AND METHODS

This retrospective study conducted from May 2019 to June 2020, consists of 30 patients of both bone forearm fracture. Ethical authorization was obtained from the institutional ethics committee and informed consent from the patients.

Inclusion criteria

- Both bones forearm displaced diaphyseal fractures in adults.
- Both bones forearm closed or type 1 compound diaphyseal fractures.
- No neurovascular deficits of the affected extremity.

Exclusion criteria

- Both bones forearm fractures in children.
- Fractures of either ends of ulna and radius.
- Type II and III open fractures.
- Pathological fractures.
- History of long term steroid therapy.

There were 25 males (82%) and 5 females (18%), with an average age 30 years (range 16-60 years). 26 cases (86%) of the cases were simple and 4 cases (14%) were compound fractures. 20 cases (66%) had fractures on the right side and 10 cases (34%) had fractures on the left side.

The fractures were classified according to AO/ASIF alpha numeric classification system. 4 cases (14%) had fractures in the upper one third, 18 cases (61%) had fractures in the middle one third, 8 cases (25%) had fractures in the lower one third. All the cases were treated with open reduction and internal fixation under brachial block or general anaesthesia, under tourniquet control with the patient in supine position and the radius fractures were approached either by Thompson’s approach or Henry’s approach, the ulnar fractures by standard posterior subcutaneous approach and the

fractures were fixed with 3.5mm dynamic compression plate employing the techniques of surgery described by the AO/ASIF group. Posterior plaster slab was applied for 2 weeks until the stitches were removed and continued for 4 weeks in cases of Comminuted fractures. Surgical intervention for forearm fractures is best performed 7 to 14 days from the time of injury. At that time, the initial edema subsided; much of the soft tissue damage heals. The surgery can be performed on a routine list in the best available time as an elective procedure (Table 1).

Table 1: AO classification.

Types	Number of patients
22 - A3	33
22 - B3	18
22 - C3	5

The patients were being followed up clinico-radiologically for a period of six months minimum. 3-4 weekly, the patients were evaluated for the first 3months, 6 weekly thereafter for 3months, and then at 3monthly intervals. On the basis of fracture union, muscle power, range of movements and complications, the results were

evaluated. Using the criteria of Anderson the functional outcome was summarised. In terms of non-union, infections (superficial/deep), synostosis, loss of reduction by implant loosening, refractive the complications were assessed (Table 2 and Figure 1).

Table 2: Functional outcome assessment-Anderson criteria.

Outcome	Union	Axial movements at wrist joint	Pronation and supination
Excellent	Present	<10° loss	<25% loss
Good	Present	<20° loss	<50% loss
Fair	Present	<300° loss	<50% loss
Poor		Nonunion with or without loss of motion	



Figure 1: Preoperative x-ray shows fracture of both bones, immediate postoperative x-ray following fixation with DCP.



Figure 2: Clinical photo showing follow up at 10 months with full range of supination and pronation.

RESULTS

In 11-25 weeks (average of 14 weeks) time union of fracture of both bones forearm was attained. Anderson criteria were followed for assessment of functional outcome. Excellent results were attained in 21cases (70%), good in 5 cases (17.5%), fair result in 4 cases (12.5%) . Occurrence of infection and delayed union were two and one cases respectively (Figure 2).

DISCUSSION

For most of the fracture of diaphysis of the both bones forearm in adults, ORIF is the treatment of choice. It is paramount to correct the angulation, rotation deformities and radial bowing while reducing the fractures. Permanent limitation of rotation will occur if the forearm axis relationship is altered by angulation and the radio ulnar joint mechanism is altered. The rotational axis of the forearm bones extends from the centre of the head of

the radius to the insertion of the fibro-triangular cartilage at the base of the ulnar styloid process. Radio-ulnar movement will also be limited by rotational deformities. The pronators are inserted distally and the supinator's are inserted proximally. This results in midshaft fracture of radius. The proximal fragment supinates and the distal fragment pronates which is seen in the X-Ray as a distinct change in the width of the interosseous space between the proximal and distal fragments, intramedullary space and cortical thickness of proximal and distal fragments. The recommendation for such cases is always ORIF as the maintenance of the reduction in plaster casing is difficult as there are chances of displacement to take place.

7 cases were immobilized with above elbow slab and bandage, delayed union 1 case, infection in 2 cases. Out of 30 cases 26(87.5%) cases are graded excellent and good; fair 4(12.5%) cases [6-8].

Timing of operation

Surgical intervention for forearm fractures is best performed 7 to 14 days from the time of injury. At that time, the initial edema subsided, much of the soft tissue damage heals. The operation can be performed on a routine checklist in the best available time as an elective procedure.

CONCLUSIONS

Our study has shown that ORIF of radius and ulna shaft fractures can be best performed with the dynamic compression plating technique which has yielded excellent to good results. The complications of the procedure are insignificant and the result is determined by the principles of proper plating. The care of the soft tissues is extremely important, that is, a minimum of

periosteal removal from the surface of the bone on which the plate is applied. This facilitates optimal vascularity at the site of fracture. Proper preoperative planning, operative technique and postoperative rehabilitation programs are essential for excellent outcome. All fractures of both bones of the forearm can be treated by ORIF with dynamic compression plates to obtain a healthy union and good range of motion.

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