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Study of Both bone fracture of forearm with LCDCP

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Introduction

Forearm bone fractures are commonly encountered in today's industrial era. Various treatment modalities were introduced from time to time and each of them had some edge over the previous one. Continuing this process of revolution and based on many years of experience with compression plating and promising results obtained with so called internal fixation, an implant system has been developed which combines the two treatment modalities. Despite the combination of these different treatment techniques no compromises were made with regard to application as a compression plate or as a bridging device in the form of an internal fixation. LCDCP (Limited contact dynamic compression plate) is a product of these combinations and is in line with the latest plating techniques, the aim of which is to achieve the smallest surgical incision and to preserve blood supply to the bone and adjacent soft tissues and stability at the fracture site.

LCDCP has got features of both DCP and a PC-Fix as it uses screw heads that are conically threaded on the undersurface and create an angular stable plate screw device. This type of plate fixation relies on the threaded plate-screw interface to lock the bone fragments in position and do not require friction between the plate and bone as in conventional plating[1]. The present study was undertaken to evaluate the use of LCDCPs in fractures of forearm bone.

The functional outcome was certified using "Anderson et al, scoring system". The variables taken into consideration were – Union of the fracture, Range of elbow and wrist movements [2].

Open reduction and internal fixation helps in perfect fracture reduction, rigid fixation, better bone healing and early mobilization, the normal functions of the hand can be achieved at the earliest.

Aim & Objectives

To study the functional outcome of treating diaphyseal fractures both bones forearm with Limited contact dynamic Compression Plates.

Methodology

The study includes treatment of 40 cases of fracture both bones of forearm by open reduction and internal fixation with 3.5 mm LCDCP between august 2016 to October 2018 at Gandhi Medical College and Hospital, Secunderabad. Patients of age 20-50 years, with diaphyseal fractures of both bones of forearm or closed fractures to Grade II fractures were included in the study.

On admission of the patient, a careful history and clinical evaluation of the general condition was done. Radiographs of the radius and ulna i. e., antero-posterior and lateral views, were obtained. The elbow and wrist joints were included in each view. This enables the surgeon to select the length of the appropriate plate to be placed. The patient was taken for surgery after routine investigations and after obtaining fitness towards surgery.

All the instruments that are required for the procedure are to be kept ready. A dose of Tetanus toxoid and antibiotic (after test dose) were given. The fore arm was prepared for the surgery. General anesthesia was used for 24 cases and brachial block in 16 cases.

Postoperatively the patient was instructed to keep the limb elevated and move their fingers and elbow joint. Suction drain was removed after 24-48 hours. Antibiotics and analgesics were given to the patient till the time of suture removal. Suture/staples removed on 10th postoperative day and check X-ray in antero-posterior and lateral views were obtained. After discharge, patient was advised not to lift heavy weight or exert the affected forearm.

All the patients were followed up at monthly intervals for first 3 months and evaluation was done based on "Anderson et al" scoring system. Elbow movements and wrist movements were noted and the union was assessed radiologically[3]. The fracture was designated as united when there was presence of periosteal callus bridging the fracture site and trabeculation extending across the fracture line.

Results

The results of the study are as follows:

Table 1 showing the general characteristics of study population

Parameter	Frequency	Percentage
Age		
18-20 Years	4	10
21-30 years	16	40
31-40 years	12	30
>40 years	8	20
Gender		
Male	28	70
Female	12	30
Side affected		
Right side	16	40
Left side	24	60
Mode of Injury		
RTA	20	50
Fall	16	40
Assault	4	10

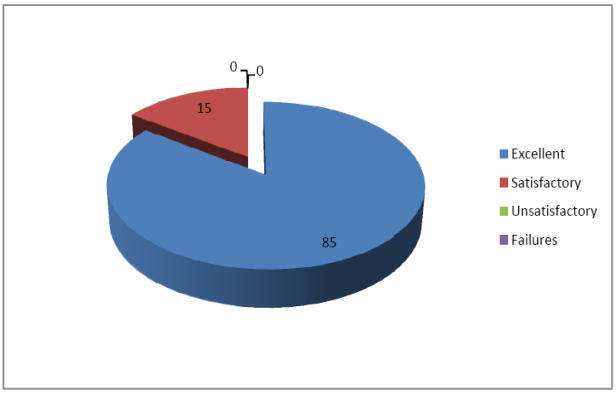
Table 2 showing the fracture characteristics of study population

Parameter	Frequency	Percentage
Level of fracture		
Proximal one third	6	15
Middle one third	28	70
Distal one third	6	15
Type of fracture of Radius		
Transverse/short oblique	28	70
Comminuted	12	30
Type of fracture of Ulna		
Transverse/short oblique	30	75
Comminuted	8	20
Segmental	2	5
Duration of fracture union		
<4 months	32	80
4-6 months	8	20

Table 3 showing criteria for evaluation

Results	Union	Flexion/Extension at elbow joint	Supination/ Pronation
Excellent	Present	$<10^0$ loss	<25% loss
Satisfactory	Present	$<20^0$ loss	<50% loss
Unsatisfactory	Present	$>20^0$ loss	>50% loss
Failure	Non union with or without loss of motion		

Figure 1 showing the results of the surgery

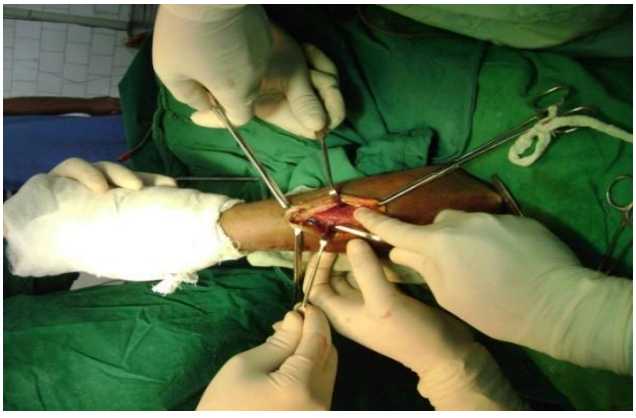


Complications: There were no cases of intra-operative complications. Superficial infection and posterior interossoeus nerve injury were the post operative complications and were seen in 5% of cases each.

In our study we noted the duration of surgery for fixation of both bones forearm ranged from 60-90 min, with average time of 77 min. The tourniquet time ranged from 40-60 min, with average time of 54 min.

Radial fracture fragments exposed 3.5mm and reduced

Fixed with 6 holed LCDCP.



Subcutaneous approach for Ulna

Fracture Ulna Fixed with 3.5mm LCDCP

Discussion

The present study was undertaken to determine the efficacy of LCDCP in the treatment of fractures of both bones of the forearm. A total of 40 patients of fracture both bones of forearm were treated with open reduction and internal fixation using 3.5mm LCDCP. The discussion can be done under the following heads:

Age Distribution: In our study, fracture was commoner in the second and third decade, with average age of 33.5 years (18-55 years). Our findings are comparable to the study made by Herbert Dodge (1972) and Berton Moed (1986). H.Nevile Burwell and A.D. Charnley in 1964 witnessed 50% of the patients between second and third decade and an average of 44.8 years[4].

Sex Distribution: Our series had male preponderance with 70% male patients and 30% female patients which was comparable to previous studies. H.Dodge in his study noted about 89% males and 11% females[5]. Michael Chapman noted about 78% males and 22% females[6].

Mode of Injury: In our series 50% of cases had road traffic accidents, 40% had fall and 10% had direct blow (assault). Our series is comparable to Grace et al[3]., and Smith series[7].

Affected Side: We accounted about 60% incidence of fracture both bones in left extremity. H. N. Burwell and A. D. Charnley reported about 50% incidence of fracture both bones in right arm[4].

Type of Fracture: Our series accounted 72.5% of fractures as transverse/short oblique and 27.5%

were comminuted. The results were not comparable to the previous studies, which can be attributed to low velocity trauma in our country. M. W. Chapman et al, series noted about 53% of fractures as comminuted and 47% were transverse/short oblique[6].

Level of Fracture: Our series had 70% of fractures in middle third, 15% in proximal third and 15% in lower third, comparable to previous studies. A. Sarmiento et al, noted about 84.6% of fracture both bones were in middle third and 15.4% of cases had lower third fracture of both bones[8].

Evaluation: Anderson's criteria for evaluation of union were taken into account. In our series we had an average union time of 11.85 weeks with range of 8 to 20 weeks. We had 100% union of both radius and Ulna. In our series we had 17 (85%) cases with excellent results, 3 (15%) satisfactory results. Anderson et al reported about 54 (50.9%) cases as excellent, 37 (34.9%) satisfactory, 12 (11.3%) unsatisfactory and 2 (2.9%) failure[2].

We had a follow up which ranged from 5 months to 24 months with an average mean of 12 months, which is comparable to Chapman series.

Conclusion

To obtain excellent results, proper preoperative planning, minimal soft tissue dissection, adherence to AO principles, strict asepsis, proper postoperative rehabilitation and patient education are mandatory

Source of Funding: Nil.

Conflicts of Interest: None

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