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ROLE OF DYNAMIC COMPRESSION PLATE (DCP) IN FEMORAL SHAFT FRACTURES

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ABSTRACT Although intramedullary fixation has standardized the management of femoral shaft fractures, Dynamic compression plating is a useful technique for specific indications where intramedullary nailing may be contra-indicated or technically not feasible. Our aim is to assess and study the Femoral shaft fractures presented to casualty and orthopaedic department at Viswabharathi Medical College & General Hospital, Kurnool from November 2016 to November 2019 and to evaluate the final outcome of patients treated with Dynamic compression plate. The procedure is safe with minimal morbidity, relatively few complications and helpful in early recovery after surgery.

KEYWORDS : Fractures Of Femur Shaft, Dynamic Compression Plate, Open Reduction & Internal Fixation, Postero-lateral Approach.

SUMMARY:

There is a definite place for Dynamic Compression Plate in well selected cases of Femoral shaft fractures which offers excellent to good outcomes in the hands of a competent surgeon experienced in this method of treatment.

INTRODUCTION:

The femoral shaft is one of the most commonly fractured long bone and is associated with high energy trauma. The development of compression plate technique based upon the contributions of Danis and perfected by Muller, Allgower and Willenegger represents significant improvement in the efficacy of internal fixation. The internal fixation of fractures of the femur allows ready access for nursing care in patients with multiple injuries. Early mobilisation of the limb helps to prevent the fracture disease (Muller et al) [1]. Various modalities of treatment are present for the treatment of femoral shaft fractures like skin traction, skeletal traction, cast bracing, external fixation with percutaneous pins, intramedullary fixation with nail, plating of femoral fractures. AO broad dynamic compression plate is the implant of choice for plating of femoral shaft fractures[2]. The plate should be applied to the lateral aspect of the femur, so that its posterior border lies flush with the linea aspera. The plate should be fixed with 8-9 cortices in each main fragment to provide enough stability. The following study highlights the role of regular AO BROAD DYNAMIC COMPRESSION PLATE in treating femoral shaft fractures.

MATERIALS AND METHODS:

In the present study, 37 cases of Femoral shaft fractures both Acute fractures and Non unions were treated by Dynamic Compression Plate over a period of 3 years from November 2016 to November 2019 in the Department of orthopaedics, Viswabharathi Medical college & General hospital, Kurnool. Pathological Fractures, Compound Fractures & Transverse Fractures Of The Middle Third Of Femoral Shaft Are Excluded From This Study. All the cases were examined either in the casualty or in the orthopaedic outpatient department for hypovolemic shock, neurovascular deficit and associated injuries. X-rays AP and LATERAL views of the injured thigh including hip and knee joints were taken and fracture geometry studied. Fixation of the fractures with DCP was undertaken as elective procedure after thorough pre-anaesthetic check up. All cases were done under spinal anaesthesia in lateral position through Poster lateral approach. Incision centered over the fracture site, cleavage developed between vastus lateralis and the lateral intermuscular septum. Fracture site was exposed, minimal periosteal stripping and soft tissue dissection performed, ends of the fragments cleaned and in case of Non unions fracture edges were freshened. Fracture was reduced anatomically and appropriate length DCP was placed over the Posterolateral aspect of the femoral shaft and fixed with appropriate length 4.5 mm cortical screws. Wound closed over suction drain after securing haemostasis. Postoperatively suction drain is removed after 24 hours and knee bending exercises are started from 2nd day. Sutures are removed on 15th day and patient is advised to do active knee bending and quadriceps exercises. All the cases are followed up at 4 weeks intervals and examined for pain and tenderness at fracture site, mobility at the fracture site, range of motion of hip and knee joint, power of quadriceps and signs of infection. Our results are classified as per **MODIFIED MAGERL'S CRITERIA** of evaluation for the fractures (Magerl et al, 1979)[3].

RESULTS:

In this series of 37 cases, there were 32 males and 5 females with age range between 11 and 50 years. The peak age incidence was 21-30 years and 75% were within 21-50 years age group. About 19 fractures occurred on right side and 18 occurred on left side. Most of the injuries were from Road traffic accidents in 26 cases, while fall from height occurred in 11 cases**.** Earliest union was noted at 10 weeks and longest at 22 weeks. Average time for union in our series was 17 weeks. Complications seen were superficial infection in 2 cases, Deep infection in 1 case, Severe knee stiffness (>30 degrees loss of flexion) in 2 cases, Shortening of limb in 3 cases and Implant failure was seen in 2 cases. No Non-unions were seen. As per MODIFIED MAGERL'S CRITERIA, In our study we had Excellent results in 12 cases, Good results in 21 cases, Fair results in 2 cases and poor in 2 cases.

Table 1. COMPREHENSIVE DATA OF OUR CASES

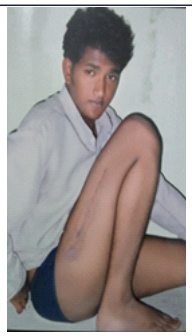
MODE OF INJURY	ROAD TRAFFIC ACCIDENTS	26
	FALL FROM HEIGHT	11
AGE GROUP	11-20 YRS	4
	21-30 YRS	12
	31-40 YRS	6
	41-50 YRS	10
SEX	MALES	32
	FEMALES	5
SIDE	RIGHT	19
	LEFT	18
DURATION OF FRACTURE	ACUTE FRACTURES	31
	NON UNIONS	6
FRACTURE LOCATION	UPPER THIRD	18
	MIDDLE THIRD	4
	LOWER THIRD	15

Table 2. COMPLICATIONS IN OUR SERIES

SUPERFICIAL INFECTION	2 CASES
DEEP INFECTION	1 CASE
SEVERE KNEE STIFFNESS	2 CASES
SHORTENING (<1.5cm)	3 CASES
IMPLANT FAILURE	2 CASES

PRE-OP

POST-OP



CLINICAL PHOTO

DISCUSSION:

The diaphyseal fractures of the femur can be treated by different methods. Good anatomical reduction, Rigid internal fixation, Atraumatic technique on soft tissue & bone and Early active mobilization are the sheet anchors of the fracture management. In adults, Internal fixation allows early post operative movement of hip and knee joints thereby preventing Fracture disease. Careful adherence to the principles of prophylactic Antibiotics, Cancellous bone grafting wherever needed & meticulous soft tissue dissection can significantly reduce the complication rate of plating. DCP allows a more exact reconstruction of normal anatomy and rigid fixation by interfragmentary compression. In addition, the medullary vascular supply is less extensively destroyed during plating technique. Muller et al[4] has advocated that compression to the fractures produced with rigid fixation gives the opportunity for early mobilisation and early union at the fracture site. Healy et al (1987)[5] suggest that at least six points of cortical fixation above and below the fracture site consistently achieve union. Majority of the cases in our study were caused by road traffic accidents. The sex incidence in the present study, Males 86.48% & Females 13.51% corresponds with that of NAGI et al series 1989 [6] in which males were 27 (83%) and females (5) 17%. The age range in the present study was between 11-50 years and most cases were in 21-50 years range which is almost same as 15-69 years in NAGI et al series[6]. This can be explained as they are the most active members of the society, thereby getting exposed more to trauma. Both right and left sides were almost equally involved in the present study. There were no compound fractures in our study. Average time of union in the present study was 17 weeks compared to Nagi et al which showed 19 weeks. In the present series, 33 out of 37 cases regained extension to more than 100 degrees of knee flexion which is on par with NAGI et al series[6]. One case of superficial infection healed with appropriate antibiotic treatment. One case of deep infection developed sinus formation and implant loosening and it was successfully managed with plate removal followed by debridement, interlocking nail and bone grafting. One implant failure was seen due to fall on the operated limb 2 weeks post operatively & another implant failure occurred due to premature weight bearing on operated leg, both of them were managed by interlocking nailing and bone grafting. Shortening of the limb (<1.5cm) was seen in 3 cases, who were effectively managed with a heel raise. Overall functional results in the present study are better than the results seen in NAGI et al series[6]

CONCLUSION:

Primary open reduction with Dynamic Compression Plate (DCP) has a definite role in the management of closed fractures of the femoral shaft in selective cases. DCP helps in achieving anatomical reduction and stable form of internal fixation. If carried out under strict aseptic conditions, chances of infection does not arise and due to the bulk of quadriceps muscle, plate exposure is never a problem. Finally, if performed as per AO guidelines DCP usage is the one of the best viable procedure for closed fractures of femoral shaft in limited indications and offers excellent to good outcomes in the hands of a competent surgeon experienced in this method of treatment.

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