

# **JPOA**

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# A COMPARATIVE STUDY OF CLOSED INTRAMEDULLARY NAILING WITH POP CAST VS DYNAMIC COMPRESSION PLATING IN FRACTURE MIDDLE SHAFT OF TIBIA

By,

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## ABSTRACT

### Background

Tibial shaft fractures occupy a unique place in Orthopaedic trauma surgery. It is one of the most frequently fractured long bone in this day and age of high energy trauma. Tibia has poor soft tissue coverage and poor blood supply and because of the severe injury particularly if combined inadequate and inappropriate treatment, can lead to severe complications and major disability.

### MATERIALS AND METHODS

Sixty patients of adult age group with tibial shaft fracture attending Emergency and Out-patient Departments of Lahore General Hospital, Services Hospital, Mayo Hospital and Jinnah Hospital, Lahore were collected and admitted in Orthopaedic Ward. Out of them thirty were operated by closed intramedullary

nailing with POP cast and thirty were treated by dynamic compression plating. Only closed middle shaft fracture with less than 50% comminution were included in this study.

### CONCLUSION

It was concluded that closed intramedullary nailing with POP cast is more appropriate method of treatment in simple fracture of middle shaft of tibia with less complications.

### INTRODUCTION

As the world advances in automobiles, the number of accidents is increasing. The automobiles are increasing in number as compared to the size and number of roads in the world, especially in developing countries like Pakistan.

In this age of vehicular accidents the tibia and fibula are frequently injured to high-energy trauma. The tibia has poor soft tissue coverage and poor blood supply. Because of the severe injury

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particularly if combined with inadequate or inappropriate treatment, can lead to severe complications and major disability (Chapman, 1980).

In these circumstances it was found necessary to compare closed intramedullary nailing with pop cast with dynamic compression plating in middle shaft fracture of tibia.

### **AIMS AND OBJECTIVES**

The main aim of this study is to have a comparison between closed intramedullary nailing with POP cast and dynamic Compression plating in fractures middle shaft of tibia. Objectives are as follows :

1. To collect the basic data of tibial shaft fracture, mechanism of injury ,nature , type and site of tibial shaft fracture.
2. To Compare the duration of treatment
3. To compare the duration of surgery is both types.
4. Healing time of fracture in both types.
5. Ambulation time in both types.
6. Compare cost of treatment in both types.
7. To observe & compare the rate of complication in both types.
8. To evaluate the efficacy of closed Intramedullary K-nail with dynamic compression plate.

### **MATERIALS AND METHODS**

Sixty patients of adult age group with tibial shaft fracture attending Emergency and

Out-patient Departments of Lab General Hospital, Services, Mayo Jinnah Hospital were collected admitted in Orthopaedic Ward.

Complete History, Physical, local and radiological examinations along with laboratory investigations were carried out. Out of sixty Patients, 30 were managed by closed intramedullary nailing and 30 were treated by DCP.

### **INCLUSION CRITERIA**

1. Patients between 20 – 50 years of age
2. Both sexes.
3. Fractures of diaphysis.
4. Patients with skin injuries ICI, IC2 and 101.
5. Wedge fracture less than 50% comminution.

### **EXCLUSION CRITERIA**

1. All Patients with diabetes & other systemic diseases.
2. All Patients between 20 – 50 years.
3. Diaphysis metaphyial fractures.
4. Wedge fracture more than 50%.
5. All unstable / comminuted fractures.

### **RESULTS**

A total number of 60 cases were selected, 30 for tibial nailing designated by group A and 30 cases for tibial plating designated by Group – B.

### **TECHNICAL DETAILS**

In both Groups simple (A)

transverse closed fracture were common. No open fractures were included. The mean age of both groups was 33.3 years. In Group A 16 (45.62%) Patients, and 18 (59.94%) patients were in Group - B, between the age of 20 - 29 years. The mean age in Group A was 31.93 years and in Group B the mean age was 31.30 years. The SD of Group - A was 7.88 years and 8.90 years was in Group - B. Male to Female ratio in Group A was 4:1 and 29:1 years in Group - B. Right side was dominant in both groups. 17 (56.66%) patients were in Group - A and 19 (63.33%) patients were in Group - B. According to Mechanism of injury 56 fractures (93.3%) were and to road traffic accident 27 (90%) were in Group - A, and 29 (96.66%) in Group - B.

#### **DURATION AFTER INJURY TO PRESENTATION (HRS)**

In Group - A, the average duration after injury to presentation was 11.92 hours. In this series 10 (33.3%) patients were received after more than 24 hours. One (33.3%) patient was presented at duration of 6 - 10 hours. In Group - B the average duration was 6.5 hours. 13 (43.4%) patients were received with 1-5 hours and 2 (6.66%) patients were at 6-10 hours duration. The SD of Group - A was 11.32 and Group B was 9.35.

#### **DURATION OF PROCEDURE**

In group A, the mean time of procedure was 60 minutes (range = 45-90). Shortest time was 45mins & longest time was 90 mins. In Group - B, the mean time of procedure was 75 min (45-120min) shortest time was 45min and longest time was 120min.

#### **DURATION OF HOSPITALIZATION AFTER OPERATION**

In Group - A, the mean time in hospital was 3.03 days, and in Group - B was 4.7days.

#### **DURATION OF HOSPITALIZATION (FROM ADMISSION TO DISCHARGE)**

In Group - A, the mean time of hospitalization was 8.17 days and Group - B was 9.83 days. Standard Deviation of Group - A, was 4.42 and Group - B was 7.16 days.

#### **DURATION OF TREATMENT**

The mean days for Group - A was 12.5 days and Group - B 13.05 days. The Standard deviation of Group - A was 0 and Group - B 1.65.

#### **TIME OF UNION**

The mean time to roentgenographic union was 16.1 weeks in Group A and 17.4 weeks in Group - B.

**TIME TAKEN FOR FRACTURE UNION / AMBULATION IN GROUP - A AND**

**GROUP - B**

Weeks	Group - A		Group - B	
	No. of Pts.	% age	No. of Pts.	% age
12	5	16.66%	4	13.32%
16	20	66.6%	14	46.62%
20	4	13.33%	9	30%
24	1	3.33%	3	10%
Total:	30	100.00	30	100.00

Mean duration (weeks) of Group - A = 16.1 & of Group - B = 17.4 weeks

Standard deviation of Group - A = 2.63 and of Group - B = 3.34

**COMPLICATIONS IN GROUP - A AND**

**GROUP - B**

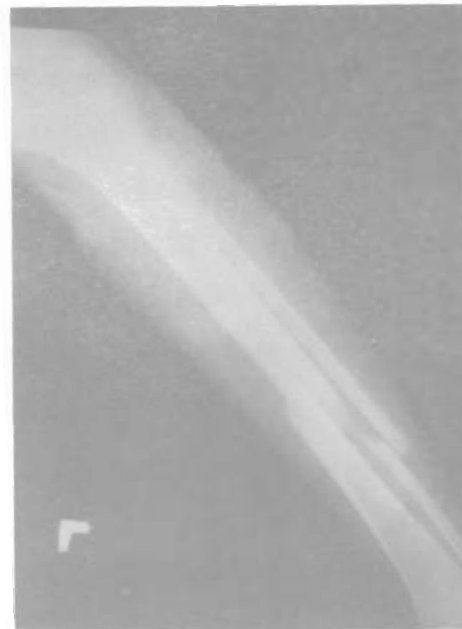
Complication	Group - A		Group - B	
	No. of Pts.	% age	No. of Pts.	% age
Superficial wound infection	--	--	1	3.33%
Knee contracture	--	--	--	--
Non-union	--	--	--	--
Delayed union	1	3.33%	3	9.99%
Malunion	--	--	--	--
Protrusion of nail	1	3.33%	--	--
Implant failure	--	--	--	--
Shortening	1	3.33%	1	3.33%
Deep wound	--	--	2	6.66%
Infection.	--	--	1	3.33%
Iatrogenic fracture	--	--	--	--
Total:	3	10%	8	26.66%

One from Group - B got superficial infection, no patient from Group - A, got infected. One (3.33%) delayed union in Group - A and 3 (10%) in Group -B were recorded. One (3.33%)

case was seen in Group – A with nail protrusion. One (3.33%) patient from Group A and 1 (3.33%) patient from Group – B had 1cm shortening. Two (6.66%) patients in Group – B had deep wound infection. Antibiotics were injected after culture sensitivity, wounds were debrided a few times. Both had delayed union after cure of infection One of the patient from Group - B had iotrogenic fracture. Average complication rate in Group – A was 10% and Group - B was 26.66%.

### COST OF TREATMENT

The cost of treatment of each group of patient was compared and nail was found to be cost effective as compared to plating.





## DISCUSSION

Internal fixation of tibial shaft fracture is usually recommended in closed displaced & unstable tibial shaft fractures. Closed undisplaced stable fractures may be treated in plaster cast. In this study sixty patients of simple and wedge type of tibial fracture were treated and compared by two methods i.e. intramedullary nailing with POP cast and Dynamic compression plating. The parameters we used for evaluation of efficacy of results and to collect data during the course of this project were age and sex incidence, Mechanism of injury, nature and type of tibial shaft fracture, duration of injury & presentation, duration of surgery, duration of union and ambulation, rate of complication and cost of treatment in both groups. The goal was to clearly determine the advantages & disadvantage of the two methods.

In both Groups A & B, male to female ratio was 7.5:1 if we compare it with Sarmiento et al (1989) who reported a series of 780 tibial fractures in which 610 were male and 170 were female i.e.3.5:1 . Thunold et al (1975) in his series of 99 fractures treated with DCP reported sex incidence of 7:2. Gebuhr et al (1990) treated 64 tibial shaft fractures in his series during 1981 to 1983 with AO plate fixation, reported sex incidence of 2.6:1. In all above reports males are more prone to tibial fracture than female. Tibial shaft fractures are common in adults, in our study incidence was

31.9 years in group A & 31.3 years in group B. Ekland et al (1988) in a series of 45 tibial shaft fractures treated with Nail reported 35 years mean age. Vander Linden et al (1979), in his series of 100 tibial shaft fracture treated by AO plates reported mean ages of the patients between 18-70 years. Court Brown et al (1990) reported in his series of 125 fractures treated by Nail, the mean age was 32.5 years. This age group is the most active part of life during which individuals are most vulnerable to trauma.

In present study the major cause of injury was road traffic accidents. 50 (93.3%) cases reported with road traffic accidents. Karlstrom et al (1983) reported 70% cases with road traffic accidents. Rommens and Schnt (1987) reported 68.9% cases with road traffic accidents. Mean time duration of procedure was 60 minutes in intramedullary nailing and 75 minutes for compression plating while the time of compression plating recorded by Vander Linden and Larson (1970) was 50 minutes. Our time was higher but nailing time was lower as compared to plating time. Duration of hospitalization was 8.17 days for group A and 9.83 days for group B while Vander Linden et al (1979) reported hospital time of 15 days after compression plating. Puno et al (1986) in

a series of 201 Patients, treated by intramedullary nail, mean hospitalization time was 11.7 days. Gebuhr et al (1990), in a study of 64 patients treated by DCP reported the mean hospital time was 15 days for open fractures and 6 days for closed fractures. Our time is quite comparable to other authors. Time for fracture union in group A was 16.1 weeks as compared to the time reported by Ekeland et al 1988 which was 16 weeks & Court Brown et al (1990) 16.7 weeks. In Group – B i.e. plating, the time of union was 17.4 weeks. It is compared with Thunold et al (1969) which is 16 weeks or Gebuhr et al (1990) which is 14 weeks. In our study time of union was high. Infection rate was zero% in-group A while in-group B was 6.66%. If we compare it with Pandey et al (1991) who presented the experience of 429 fracture of tibia fixed with I m nail, infection rate was 2.09%. Rommens et al study it was 2.4%.

### **Conclusion**

Closed intramedullary nailing is more appropriate method of treatment in simple fractures middle shaft of tibia than dynamic compression plating.

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