

# Comparative Study of External Fixator Versus Internal Fixation Using Interlocking Nail as Primary Fixation Method in Grade 1 and 2 Open Diaphyseal Fractures of Tibia in Elderly Female Patients

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## ABSTRACT

**Background:** Fractures of tibia shaft is itself a great dilemma and becomes more difficult to treat when it becomes a compound fracture. The purpose of the present study is to compare prospectively the results of interlocking intramedullary nailing with those of external fixator as primary fixation in Type I and II open fractures of the tibial shaft.

**Material & Methods:** This study was carried out on the patients admitted in the Department of Orthopaedics, SMS Medical College & Hospital, Jaipur. The study included 40 patients of compound fracture grade I & II of the tibia. Of these, 20 patients were treated by intramedullary interlocking nailing and the remaining 20 patients by External Fixator as primary fixation method.

**Results:** The mean age was 32.4 years in ILN group and 34 years in external fixation group. Road traffic accident was most common mode of injury (90%) in group B as compared to group A (75%). About 50% of the grade I Gustilo's fracture united within 8 weeks of nailing in group A and 30% more than 18 weeks in group II. In grade II Gustilo's fracture, 35% united within 16 weeks in group I & 40% in more than 18 weeks in group II. The outcome of our study showed that excellent in 70% cases in group A as compared to 45% in group B. Poor

outcome maximum in group B was 15% cases as compared to 5% in group A.

**Conclusion:** Thus our study concluded that in Grade I and II by Gustilo's classification of open tibial shaft fracture intramedullary interlocked nailing is excellent modalities, leading to accepted union with a mild delay but permissible early weight bearing and low patient morbidity.

**Keywords:** Fracture, Tibia, External Fixation, Intermedullary Nailing, Wound Infection.

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## INTRODUCTION

Fractures of tibia shaft are itself a great dilemma and becomes more difficult to treat when it becomes a compound fracture. As industrialization and urbanization are progressing year by year with rapid increase in traffic speed, incidence of high energy trauma are increasing with the same speed. High energy trauma has resulted in complex or comminuted fractures, which are frequently open with significant loss of skin and soft tissues and may be associated with compartment syndrome or neuro-vascular injury. Such fractures, when associated with vascular injuries, historically had a very poor outcome. Available literature suggests that open fractures of the tibial shaft are both common and may be fraught with complications like malunion, delayed union, nonunion, and infection. Moreover the presence of hinge joints at the Knee and the ankle, allows no adjustment for rotatory deformity after fracture. Also subcutaneous location of the tibia places the leg at risk for skin loss at the time of fracture which exposes the fracture site to external environment.

The earlier management of compound fractures of leg bones comprised of debridement and closed Plaster of Paris casts used by Winett Orr (1927)<sup>1</sup>, Trueta (1940)<sup>2</sup> and Brown & Urban (1969).<sup>3</sup> Although union rate was 100% but problems like difficulty in wound healing and wound toileting, persistent discharge leading to chronic osteomyelitis and malunion were common. Although its use has been documented in closed and minor compound fractures (De Bastiani, Aldegheri and Brivio 1984<sup>4</sup>, Court-Brown and Hughes 1985<sup>5</sup>, Evans, McLaren and Shearer (1988).<sup>6</sup> Holbrook et al. (1989)<sup>7</sup>, Court-Brown et al (1990)<sup>8</sup> and Tornetta et al. (1994)<sup>9</sup>, suggested that closed intramedullary nailing with an interlocking nail system is an excellent method of treating open tibial fractures.

The purpose of the present study is to compare prospectively the results of interlocking intramedullary nailing with those of external fixator as primary fixation in Type I and II open fractures of the tibial shaft.

**MATERIALS & METHODS**

This study was carried out on the patients admitted in the Department of Orthopaedics, SMS Medical College & Hospital, Jaipur. The study included 40 patients of compound fracture grade I & II of the tibia. Of these, 20 patients were treated by intramedullary interlocking nailing and the remaining 20 patients by External Fixator as primary fixation method.

**Case Selection**

All females patients above 18 years of age, having Gustilo's Grade I or II open fracture of the middle third or distal third of the tibia preferably comminuted and unstable were chosen for the

dynamic interlocking nailing. Patients selected were fit for general anaesthesia i.e. had no major head, chest or abdomen injury.

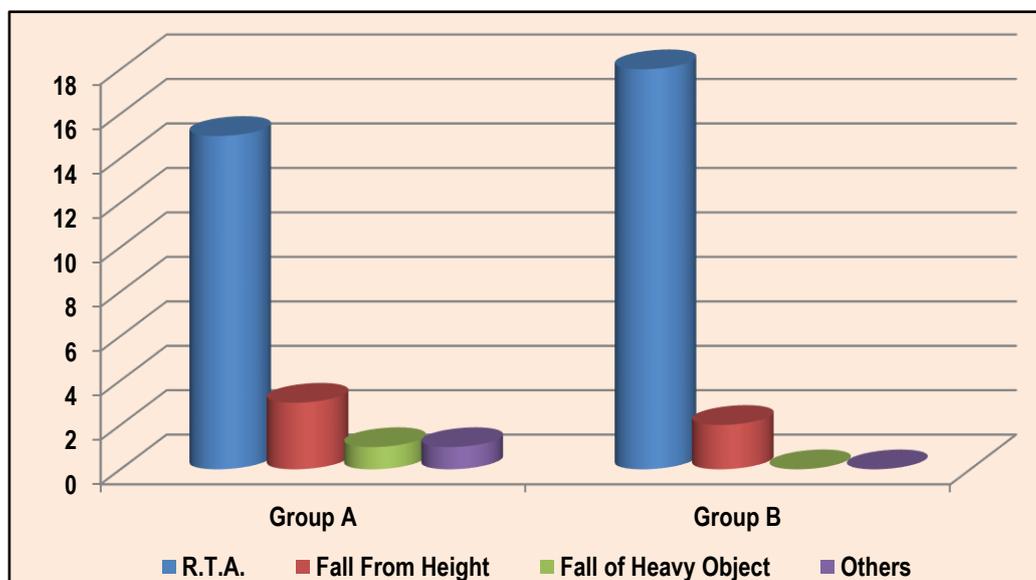
Control cases for comparative study was Gustilo's Grade I or II open fracture of the tibia and were treated by debridement under general anaesthesia and traditional groin – to – toe and patellar – tendon bearing cast treatment.

The patient is usually followed up at 4 weeks, 8 weeks, 6 months. Check X-rays are taken at every visit and patient is assessed clinically for fracture union.

**Table 1: Age distribution**

Age Group (yrs)	Group A	Group B	Total
18-30	11 (55%)	9 (45%)	20 (50%)
31-40	4 (20%)	6 (30%)	10 (25%)
41-50	4 (20%)	4 (20%)	8 (20%)
≥50	1(5%)	1 (5%)	2 (5%)
<b>Total</b>	<b>20 (100%)</b>	<b>20 (100%)</b>	<b>40 (100%)</b>

Chi-square test (Fisher exact test), 3 degree of freedom, P =0.8964



**Graph 1: Mode of Injury**

**Table 2: Associated injury**

Associated injury	Group A	Group B
No injury	10 (50%)	12 (60%)
Concomitant injuries		
Upper extremities injury	2 (10%)	2 (4%)
Lower extremities injury	3 (15%)	3 (15%)
Head injury	5 (25%)	3 (15%)

Chi-square test (Fisher exact test), 3 degree of freedom, P =0.8775

**Table 3: Infection**

Infection	Group A	Group B
No	16 (80%)	8 (40%)
Infection		
Superficial	3 (15%)	6 (30%)
Deep		
Chronic osteomyelitis	1 (5%)	1 (5%)
Pin tract infection	0 (0%)	5 (25%)
<b>Total</b>	<b>20 (100%)</b>	<b>20 (100%)</b>

Chi-square test (Fisher exact test), 3 degree of freedom, P =0.0341\*

**RESULTS**

In our study showed that the maximum no. of patients 55% in group A and 45% in group B was 18-30 years of age group. The mean age was 32.4 years in ILN group and 34 years in external fixation group. (Table 1) Road traffic accident was most common mode of injury (90%) in group B as compared to group A (75%). (Graph 1)

The 25% & 15% patients was associated with head injuries in both group respectively Followed by upper extremities (10% each) and lower extremities (15% each). (Table 2)

The superficial infection of the proximal incision site was encountered in 3 patients in ILN group as compared to 6 patients

in EF group. This cleared by regular dressing and the usual oral antibiotics. Mostly pin tract infection present in 5 patients external fixation group. (Table 3)

About 50% of the grade I Gustilo's fracture united within 8 weeks of nailing in group A and 30% more than 18 weeks in group II. In grade II Gustilo's fracture, 35% united within 16 weeks in group I & 40% in more than 18 weeks in group II (table 4). The outcome of our study showed that excellent in 70% cases in group A as compared to 45% in group B. Poor outcome maximum in group B was 15% cases as compared to 5% in group A. (Table 5)

The maximum cases had wound management by primary closure (55% in group A, 45% in group B) in our study. (Table 6)

**Table 4: Union time with grade of fracture**

Grade	12-14 weeks		14-16 weeks		16-18 weeks		>18 weeks		Non-union	
	Group A	Group B	Group A	Group B	Group A	Group B	Group A	Group B	Group A	Group B
	Grade I	3	1	5	0	2	3	0	3	0
Grade II	6	0	1	0	0	3	2	8	1	2

**Table 5: Outcome**

Outcome	Group A	Group B
Excellent	14	9
Good	4	7
Fair	1	1
Poor	1	3

Chi-square test (Fisher exact test), 3 degree of freedom, P =0.4065

**Table 6: Wound Management**

Wound management	Group A	Group B
Primary closure	11	9
Delayed primary closure	5	6
Secondary closure	Simple	1
	SSG	3
	Myoplasty	1

**DISCUSSION**

Our study showed that the mean age was 32.4 years in ILN group and 34 years in external fixation group. Young generation was more prone as they are the individuals who were physically energetic, engaged in increased multiple outdoor activities, and thus are subjected to high-velocity injuries. Our study were supported by Bonatus et al<sup>10</sup>, in which the mean age was 30.3 years, C.M. court – Brown et al<sup>11</sup> found that mean age of unreamed group was 36.1 years & of the reamed group 35 years, G.A. Melcher et al (1994)<sup>12</sup> mean age was 38 years, Rolando M. Puno et al (1986)<sup>13</sup> mean age was 38.9 years.

In present study showed that the road traffic accident were most of the injury (90%) in group B as compared to group A (75%). This finding is confined by Lawrence et al<sup>14</sup> study showing 90% prevalence. Court Brown et al<sup>11</sup> study, also found that the commonest mode of injury was road traffic accidents. This high incidence in India can be assign to the lack of road traffic sense and poor quality of road infrastructures.

The major associated injuries were head injuries (25% & 15% in ILN group & EF group respectively) followed by upper extremities (10% each) and lower extremities (15% each). Most of the fractures requiring fixation were either in the distal third (60%) in ILN group & 40% in EF group.

Our study showed that the superficial infection of the wound site was encountered in 3 patients in ILN group as compared to 6 patients in EF group. This cleared by each dressing and the usual oral antibiotics and deep infection present more in EF group as compare to ILN group. All pin tract infection present in 5 patients external fixation group. Supported by K.N. Hamza et al (1971)<sup>15</sup> & Per Edwards (1965).<sup>16</sup>

About 50% of the grade I Gustilo's fracture united within 8 weeks of nailing in group A and 30% more than 18 weeks in group II. In grade II Gustilo's fracture, 35% united within 16 weeks in group I & 40% in more than 18 weeks in group II. Supported by similar results consisted with Ekeland et al<sup>17</sup> observed average union time of 16 wks, Vaquero et al<sup>18</sup> of 21 weeks.

The outcome of our study showed that excellent in 70% cases in group A as compared to 45% in group B. Goran Karlstrom and Sven Olerud (1974)<sup>18</sup> found that treatment also varied depending on nature of injury, personally and demands of patients, and available therapeutic resources.

### CONCLUSION

Thus our study concluded that in Grade I and II by Gustilo's classification of open tibial shaft fracture intramedullary interlocked nailing is excellent modalities, leading to accepted union with a mild delay but permissible early weight bearing and low patient morbidity. The advantages over the external fixation treatment are short duration of hospital stay, early amputation, early range of motion exercises and weight bearing without immobilization in plaster & decreased dependency.

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