

## OUTCOME OF MANAGEMENT OF DIAPHYSEAL FRACTURES OF TIBIA IN ELDERLY POPULATION

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### ABSTRACT

**Background:** Diaphyseal fractures of the tibia currently account for approximately 2% of all fractures presenting to orthopedic surgeons. Epidemiology has changed markedly during the last two decades with overcrowding and related to improved road safety. In comparison to young population majority of these fracture occur predominantly in females as compared to males in old population.

**Objectives:** To determine the outcome of diaphysis fractures of tibia in elderly patients

**Methods:** This study was carried out in department of orthopaedic Jinnah hospital Lahore from 2014-2017. One hundred and twenty patients both males and females in the age range of 65 to 80years, having diaphyseal fractures of tibia were included in the study. The patients with poly-trauma and with peri-prosthetic fractures were excluded from the study. After detailed medical history, clinical examination, the x-rays of tibia fibula AP and Lateral views including joint above and below were done to determine the configuration of the fracture. Each patient was followed at 1<sup>st</sup>, 2<sup>nd</sup> and at 6<sup>th</sup> week and then at 3<sup>rd</sup> month, 4<sup>th</sup> month, 6<sup>th</sup> month and later at 1 year. Data was entered and analyzed in SPSS ver: 21.0 and was presented and frequency and percentages. Cross tabulation was done for open and closed fracture for outcome and Chi Square test was used to assess statistical significance with p value of  $\leq 0.05$ .

**Results:** 62.5% were females and 37.5% were males with mean age of  $72 \pm 5.45$  years. The mode of injury in most of the patients was slip and fall 85% and 70 % of patients had closed fractures. Reamed intra medullary nailing was done in 80 patients and 25 patients with open fracture were treated with external fixator. In the remaining 5 patients we applied the POP cast. Nonunion was labeled at 9 months and was seen in 10.0% of patients while the delayed union was seen in 33.0% (40) of the patients. Among the patients who had nonunion 5 patients were treated with intramedullary nailing and 7 patients were treated with external fixator. Infection was seen in 10.0% (12) of patients and this happened in the patient with open fracture. No patient was lost in follow-up during the study. Overall mortality rate was 30% in the 1<sup>st</sup> year.

**Keywords:** Elderly, Diaphyseal fracture, Delayed union, Nonunion, Tibia fracture

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### INTRODUCTION

Diaphyseal fracture of tibia accounts 10% of all fractures<sup>1</sup>. Mostly these fractures occur as a result of fall in elderly people<sup>2</sup>, as compared to the young people where it results from high energy trauma. Tibia fractures have high incidence of open

fractures<sup>3</sup> and higher rate of delayed union<sup>4</sup>, nonunion<sup>5</sup> and mortality<sup>6</sup>.

Diaphyseal fractures have got different morphological characteristics with bone loss, comminution and disruption of vascular supply ending in impaired healing process<sup>7</sup>.

The factors such as loss of soft tissue and open fractures were mostly related to nonunion and delayed union, and it accounts for 10% of diaphyseal fracture of tibia<sup>8</sup>.

The role of current treatment modalities is to optimize the bone healing environment and to recognize and eliminate the factors which interfere with the fracture healing process<sup>9</sup>.

The union diaphyseal fracture of tibia can be achieved by different surgical and non-surgical techniques such as DCP with or without bone graft, locking plates, reamed and un-reamed intra-medullary nailing with or without dynamization and use of external fixators in case of open fractures<sup>10</sup>. POP cast can also be used depending upon the fracture geometry.

Moreover, to augment this healing process, a lot of medical options are available. The best one to augment the healing process is use of anabolic drugs, such as teripeptide, in fresh complex fractures<sup>11</sup>. It can also be used to potentiate the healing process especially in osteoporotic and fragility fractures<sup>12</sup>.

The elderly population throughout the world has increased significantly for the last 20-25 years due to increase in life expectancy. Diaphyseal fractures of tibia are more common in elderly females than males. The rate of Delayed union and nonunion is also more in elderly people as compared to general population In elderly population about 1/3<sup>rd</sup> of the fractures are considered as orthopaedic emergency.<sup>13</sup>

## METHODS

This observational study was conducted at Department of Orthopedic Surgery Jinnah hospital Lahore from January 2014 to January 2017. We included 120 patients having diaphyseal fracture of tibia presenting in the emergency department. Patients with age between 65 years to 80 years of any gender were included in the study. The patients with multiple fractures and poly-trauma were excluded from the study. Detailed medical history, clinical examination, and investigations were obtained. Radiographs of tibia fibula antero-posterior and lateral views including knee and ankle joint were obtained to determine the geometry of the fracture. Closed fractures were treated with intramedullary interlocking nail while open fractures were managed with external fixator. Stitches were removed on 15<sup>th</sup> day after surgery and then followed at 1 month, 2<sup>nd</sup> month, 3<sup>rd</sup> month, 4<sup>th</sup> month, 6<sup>th</sup> month and then at 1 year. At each follow up Radiographs of tibia fibula antero-posterior and lateral views including knee and ankle joint were obtained. Patient was instructed for the weight bearing according to fracture healing stage. Union was regarded as delayed when there was no healing recorded at 4<sup>th</sup> month and it was declared as nonunion when there were no signs of healing at 9 months or no progress in healing in last three months on x-rays. At each visit patients were also evaluated for any discharge and infection with history, clinical examination and ESR/CRP if needed. Data was entered and analyzed in SPSS ver:21.0 and was presented and frequency and percentages. Cross tabulation was done for open and closed fracture for

outcome and Chi Square test was used to assess statistical significance with p value of  $\leq 0.05$ .

## RESULTS

37.5% (45) were male and 62.5% (75) were females, mean age was  $72 \pm 5.45$  years. The mode of injury in most of the patients was slip and fall (85%  $P < 0.5$ ) and in the remaining 15.0% had RTA. 70% (84) of the patients had closed fractures while the remaining 30.0% (36) of the patients had open fractures. 63 (52.5%) had union among them 55 (87.3%) had closed fracture and 1.7% (8) had open fracture. Delayed union was seen in 40 (33.0%) patients. Among the patients who had delayed union 55.0 % (22) had closed fracture and 45.0% (18) were with open fracture. (Table no: 2)

10.0 % (12) patients got the infection and all these patients were treated with external fixator for open fractures. No patient was lost in one year of follow-up. Overall mortality rate was seen in 30% of the total patients having this fracture in the study duration. ( $p = .000$ ). (Table no: 2)

Table 1 demographic and clinical characteristics of subjects

Variables (n=120)	Frequency	Percentage
Age: Mean age $72 \pm 5.45$ years.		
< 70	67	55.8%
> 70	55	44.2%
Gender		
Male	45	37.5%
Female	75	62.5%
Mode of fracture		
Slip and fall	102	85%
RTA	18	15%
Fracture type		
Open fracture	36	30.0
Closed fracture	84	70.0

Table no: 2 Outcome of fracture

Outcome	Open fracture	Closed fracture	Total	Chi-square P value
Union	8 (1.7 %)	55 (87.3 %)	63 (100 %)	X <sup>2</sup> = 29.722 P = 0.000
Delayed union	18 (45.0 %)	22 (55.0 %)	40 (100 %)	
Nonunion	7 (58.3 %)	5 (41.7 %)	12 (100 %)	
amputations	5 (100 %)	0 (0.0 %)	5 (100 %)	
deaths	3 (60.0 %)	2 (40.0 %)	5 (100 %)	
Total	36 (30.0 %)	84 (70.0 %)	120 (100 %)	

## DISCUSSION

Fracture of the tibia in elderly people is among the most challenging ailment of this age group treated by orthopedic surgeons. The presentation of these injuries varies a lot and so their outcomes are also unpredictable. The diaphyseal tibia fractures are prone to significant morbidity and mortality in the acute setting. The Etiology of diaphyseal tibia fractures is different in elderly people when compared with young people. In general population the male to female ratio is 60:40 and in elderly people it is 27:73. Similar gender distribution has been observed in our study. The overall mortality is greatest especially in females as compared to males in their 1st year after the injury. A diaphyseal fracture usually occurs with low energy trauma in this age group. In our study out of 120 patients 75 patients were elderly females while 45 patients were elderly male the study of co-x et al shows similar gender distribution with male and female our study is also comparable to Chatziyiannakis<sup>10</sup> et al which states that elderly patients have greater rate of open fractures than young age group, we have observed elderly bone and soft tissue become fragile and osteoporotic as the age progresses, so we can expect increased severity of the injury with minimal trauma. The study of Cook et<sup>1</sup> all has also described in his article regarding the aging of skin implication for cutaneous surgery.<sup>5</sup> patients required amputation in open fractures due to skin loss and deep infections. There was deep infection in 8% of our patients. This is supported by Guistilo distribution in elderly people.<sup>6</sup>

In our study the rate of nonunion was 12% and the delayed union was 20%. The mortality rate was as high as 20% in our study, and it was much higher with open fractures than closed fractures.<sup>14</sup> In the elderly patients the mechanism of injury of diaphyseal fractures of the tibia was mostly as result of minimal trauma, which is different when compared with young patients, this is because of the increase fragility and osteoporosis in this age group<sup>15</sup>. These facts further support our study regarding diaphyseal fracture of tibia in elderly people.

## CONCLUSION

It is concluded from our study that etiology of diaphyseal fractures of tibia is completely different from young people. Elderly people get fractures even with minor trauma. There are increased chances of open fractures, delayed union, non-union and even amputations in our old population. All these patients require proper optimization of treatment, rehabilitation, facilitation, and definitive care to reduce the hospital stay.

## ETHICAL APPROVAL

The study was approved by the Ethical Review Committee of Allama Iqbal Medical College / Jinnah Hospital, Lahore, Pakistan. Vide reference No. 450/13 dated December 30, 2013.

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#### **AUTHORS' CONTRIBUTION**

**MZI:** Data Collection, Research Methodology, Statistical Analysis

**STMK, IG:** Data Collection, Research Methodology

**MA:** Data Collection, Investigation, Discussion

**MASK:** Data Collection, Manuscript Writing