



## Mode of Injury, Involvement of Bones and Post-Operative Surgical Outcomes of Patients presented with Lower Limbs Fractures attended at a Tertiary Care Hospital at Tourist City of Bangladesh



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### Abstract

**Background:** Surgical management is very much crucial among the lower limb fracture patients. **Objective:** The purpose of the present study was to find out the mode of injury, involvement of bones and post-operative surgical outcomes of patients presented with lower limbs fractures patients. **Methodology:** This prospective hospital-based study was conducted in the Department of Orthopaedic and Traumatology at Cox's Bazar Medical College Hospital, Cox's bazar, Bangladesh from January 2019 to June 2022 for a period of three and half years. All the patients who were presented with the clinical features of fracture of lower limbs were selected as study population. The patients were managed by conservative or surgical way. The outcomes of both procedures were recorded. **Results:** A total number of 370 cases were recruited for this study. The mean age with SD of the study population was 18.2±11.56 years. Among these road traffic accident was the most common mode of injury which was 204(55.0%) cases. Open type of fracture was found in 141(38.0%) cases and the close was found in 229(62.0%) cases. The most common bones involved was the shaft of tibia and fibula which was 159(43.0%) cases. During conservative treatment mal-union was reported in 193(66.8%) cases and the rest of the 96(33.2%) patients had shown the stiffness. Among 81 operated cases majority were recovered which was 70(86.0%) cases. However, death was found in 2(2.0%) cases. Minor and major infection were reported in 6(8.0%) cases and 3(4.0%) cases respectively. **Conclusion:** In conclusion the most common mode of injury is road traffic accident with the involvement of shaft of tibia and fibula with majority improvement. [*Journal of National Institute of Neurosciences Bangladesh, January 2023;9(1):59-64*]

**Keywords:** Post-operative; surgical outcomes; lower limbs fractures

### Introduction

Lower limb fractures are often complicated injuries to manage and require joint surgical experience<sup>1</sup> and expertise from plastic, orthopedic and vascular specialists due to the associated soft-tissue damage and musculoskeletal injuries<sup>2</sup>. Open fractures of the lower limb require immediate examination, stabilization, systemic antibiotics, debridement and irrigation followed by timed soft tissue coverage and extensive rehabilitation<sup>3</sup>. There are several lower limb fractures highlighting a number of important issues including

examination of fractures, use of antibiotics and timing of debridement and surgical intervention<sup>4</sup>.

There have been several classification systems used to grade open tibial fractures to guide severity to ensure appropriate management<sup>5</sup>. The most widely used system is the Gustilo and Anderson score which is based on three factors size of the open wound, degree of contamination, extent of soft tissue injury<sup>6</sup>. The Gustilo and Anderson system has found to have poor interobserver reliability especially among inexperienced surgeons. However, due to its simplicity the Gustilo and

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Anderson Score is still recommended for daily use to grade the severity of open fractures<sup>7</sup>. Other systems though more comprehensive are found not to be user friendly and therefore recommended only for audit purposes. The purpose of the present study was to find out the mode of injury, involvement of bones and post-operative surgical outcomes of patients presented with lower limbs fractures patients.

### Methodology

**Study Settings and Population:** This prospective hospital-based study was conducted in the Department of Orthopaedic and Traumatology at Cox's Bazar Medical College Hospital, Cox's bazar, Bangladesh from January 2019 to June 2022 for a period of three and half years. Cox's Bazar is the tourist city of Bangladesh which is more than 350 km away from the capital of Bangladesh. In this city the longest sea beach is situated and millions of people from all around the country are visited in every year. All the patients who were presented with the clinical features of fracture of lower limbs were selected as study population. The patients who were unwilling to participate in this study were excluded from this study.

**Study Procedure:** Eligible patients for enrolment in the present study had to sustain an osseous infectious process confirmed by radiological findings lasting more than 2 weeks without acute symptomatology. Analyses were based on clinical records, demographics (age and gender), body temperature, the bone involved. The orthopaedic surgical cases were included in this study. The management was done according to the surgical condition of the patients.

Fracture of tibia fibula was treated with close reduction and internal fixation by intramedullary interlocking nail, open reduction and internal fixation by intramedullary interlocking nail, open reduction and internal fixation by Broad dynamic compression oplate (DCP) for shaft fracture, open reduction and internal fixation by proximal tibial locking plate or open reduction and internal fixation by distal tibial locking plate depending on the situation of the patients. Fractures of femur were operated by close reduction and internal fixation by intramedullary interlocking nail, open reduction and internal fixation by intramedullary interlocking nail and open reduction and internal fixation by broad dynamic compression plate (dcp) for shaft fracture.

Trochanteric fracture was surgically operated with close reduction and internal fixation by dynamic hip screw and close reduction and internal fixation by proximal femoral nail. Fracture of neck of the femur close

reduction and internal fixation by cannulated hip screw or replacement hemiarthroplasty of femoral component by prosthesis.

**Statistical Analysis:** Statistical analysis was performed by Windows based software named as Statistical Package for Social Science (SPSS), versions 25.0 (IBM SPSS Statistics for Windows, Version 25.0. Armonk, NY: IBM Corp.). Continuous data were expressed as mean, standard deviation, minimum and maximum. Categorical data were summarized in terms of frequency counts and percentages. Every efforts were made to obtain missing data.

**Ethical Consideration:** All procedures of the present study were carried out in accordance with the principles for human investigations (i.e., Helsinki Declaration) and also with the ethical guidelines of the Institutional research ethics. Formal ethics approval was granted by the local ethics committee. Participants in the study were informed about the procedure and purpose of the study and confidentiality of information provided. All participants consented willingly to be a part of the study during the data collection periods. All data were collected anonymously and analysed using the coding system.

### Results

A total number of 370 cases were recruited for this study after fulfilling the inclusion and exclusion criteria. All the age group patients were found in the study population. Most common was in the 12 to 20 Years of age group which was 121(32.7%) cases. Second most common age group was more than 40 years and 5 to 12 years of age group which were 66(17.8%) cases and 64(17.3%) cases respectively. Furthermore 51(13.8%) cases and 46(12.4%) cases were present in the age group of 20 to 40 Years and 2 to 5 years of age group. The mean age with SD of the study population was 18.2±11.56 years with the age range of 1 year to 72 years (Table 1).

Table 1: Distribution of Study Population according to Age Group (n=370)

Age Group	Frequency	Percent
0 to 2 Years	22	5.9
2 to 5 years	46	12.4
5 to 12 Years	64	17.3
12 to 20 Years	121	32.7
20 to 40 Years	51	13.8
More Than 40 Years	66	17.8
<b>Total</b>	<b>370</b>	<b>100.0</b>
<b>Mean±SD (Years)</b>	18.2±11.56 (1 to 72)	

Male was predominant than female which was 207(56.0%) cases and 163(44.0%) cases respectively. The male and female ratio was 1.27:1 (Figure I).

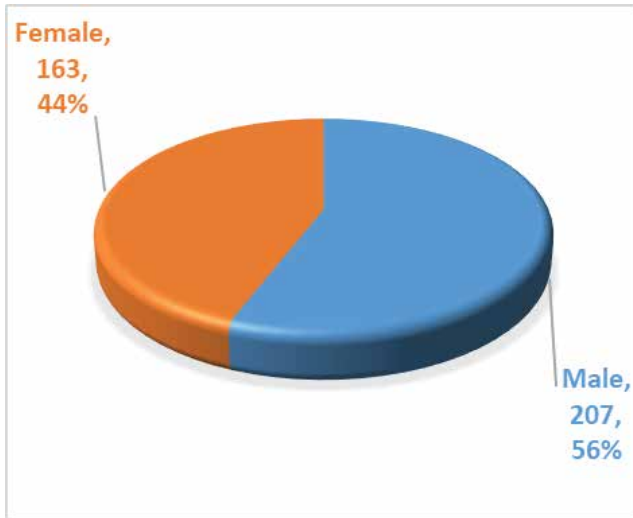


Figure I: Pie chart showing the Distribution of Study Population according to Gender (n=370)

There were several mode of injury among the study population. Among these road traffic accident was the most common mode of injury which was 204(55.0%) cases followed by fall from height, physical assault and Trivial Trauma which were 107(29%) cases, 44(12.0%) cases and 11(3.0%) cases respectively (Table 2).

Table 2: Distribution of Study Population according to Mode of Injury (n=370)

Mode of Injury	Frequency	Percent
Physical Assault	44	12.0
RTA	204	55.0
Fall from Height	107	29.0
Trivial Trauma	11	3.0
Others	4	1.0
<b>Total</b>	<b>370</b>	<b>100.0</b>

RTA=Road Traffic Accident

Open type of fracture was found in 141(38.0%) cases and the close was found in 229(62.0%) cases. Thus close fractures were more common among the study population than open fractures (Figure II).

The patients were presented with the fracture of different location of bones and joints. The most common bones involved was the shaft of tibia and fibula which was 159(43.0%) cases followed by the shaft of femur, ankle joint and plateau fracture which were 100(27.0%) cases, 30(8.0%) cases and 26(7.0%)

cases respectively. However, Neck of Femur and Foot Injury were reported in 15(4.0%) cases in each (Table 3).

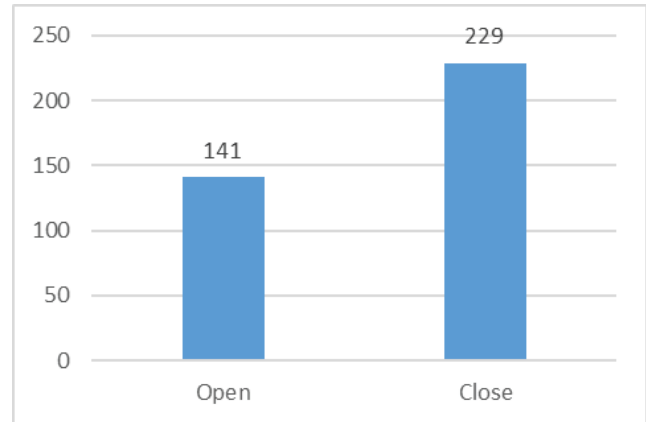


Figure II: Bar chart showing the Types of Fractures (n=370)

Table 3: Distribution of Location of Bones Involvement (Fracture) (n=370)

Location of Fracture of Bones	Frequency	Percent
Shaft of Tibia and Fibula	159	43.0
Shaft of Femur	100	27.0
Neck of Femur	15	4.0
Trochanteric	7	2.0
Ankle	30	8.0
Pelvis	11	3.0
Patella	7	2.0
Plateau fracture	26	7.0
Foot Injury	15	4.0
<b>Total</b>	<b>370</b>	<b>100.0</b>

The management of injury was performed by either conservative or surgical way. Most of the patients were managed by surgical procedure than conservative which was 78.0% cases and 22.0% cases respectively (Figure III).

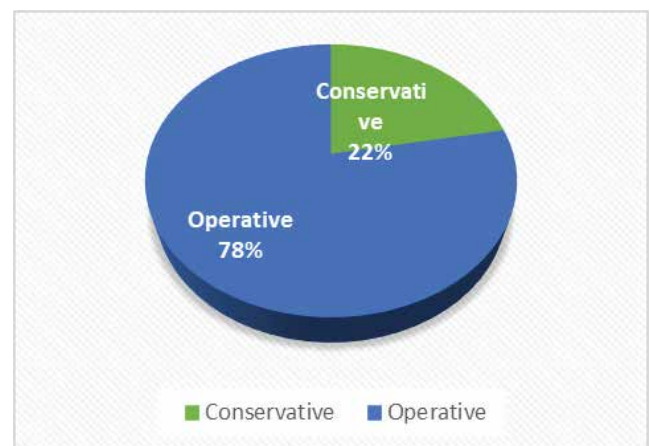


Figure III: Pie chart showing the Mode of Management of the Study Population

During conservative treatment mal-union was reported in 193(66.8%) cases and the rest of the 96(33.2%) patients had shown the stiffness. Among 81 operated cases majority were recovered which was 70(86.0%) cases. However, death was found in 2(2.0%) cases. Minor and major infection were reported in 6(8.0%) cases and 3(4.0%) cases respectively (Table 4).

Table 4: Post-Operative Surgical Outcomes of Patients (n=370)

Outcomes	Frequency	Percent
<b>Conservative</b>		
• Mal-union	193	66.8
• Stiffness	96	33.2
<b>Total</b>	<b>289</b>	<b>100</b>
<b>Post-Operative</b>		
• Recovered	70	86.0
• Death	2	2.0
• Minor Infection	6	8.0
• Major Infection	3	4.0
<b>Total</b>	<b>81</b>	<b>100.0</b>

## Discussion

Non-union is a fairly common complication of fracture management, with an overall rate of about 3.0% for the skeleton as a whole and 9.0% for the tibia<sup>8</sup>. High-energy injury fractures have a non-union rate as high as 75.0% cases<sup>5</sup>. Other factors that may lead to non-union are inappropriate treatment, infection, and pre-existing disease. The diagnosis of non-union is based largely on clinical examination and plain radiographs and tomograms, computed tomograms, and contrast imaging may be used to confirm non-healing<sup>9</sup>. Radionuclide imaging can help determine the presence of infection, an impaired blood supply, or impaired osteogenic activity at the fracture site. The treatment of un-united fractures is based on the principles of good fracture management like adequate immobilization, asepsis and soft tissue cover, osteoconduction (bone contact), osteoinduction (stimulation of bone growth), and metabolic well-being<sup>10</sup>. New modalities for osteoinduction are promising adjuncts to standard treatment, the autogenous bone graft, but conclusive proof of efficacy in humans does not yet exist.

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years and 5 to 12 years of age group which were 66(17.8%) cases and 64(17.3%) cases respectively. Furthermore 51(13.8%) cases and 46(12.4%) cases were present in the age group of 20 to 40 Years and 2 to 5 years of age group. The mean age with SD of the study population was 18.2±11.56 years with the age range of 1 year to 72 years. Male was predominant than female which was 207(56.0%) cases and 163(44.0%) cases respectively. The male and female ratio was 1.27:1.

There were several mode of injury among the study population. Among these road traffic accident was the most common mode of injury which was 204(55.0%) cases followed by fall from height, physical assault and Trivial Trauma which were 107(29%) cases, 44(12.0%) cases and 11(3.0%) cases respectively. Open type of fracture was found in 141(38.0%) cases and the close was found in 229(62.0%) cases. Thus close fractures were more common among the study population than open fractures. The patients were presented with the fracture of different location of bones and joints. The most common bones involved was the shaft of tibia and fibula which was 159(43.0%) cases followed by the shaft of femur, ankle joint and plateau fracture which were 100(27.0%) cases, 30(8.0%) cases and 26(7.0%) cases respectively. However, neck of femur and foot injury were reported in 15(4.0%) cases in each.

Lower limb fractures in patients are usually due to low energy mechanism such as wheelchair falls or transfers<sup>11</sup>. It has found such causes in at least 75.0% patients<sup>11</sup>. Fractures are mainly situated on lower limbs, especially close to the knee, 28.8% for distal femurs and 16.9% for proximal tibias in a study<sup>12</sup>. Concerning fracture management, there is currently no consensus regarding operative or non-operative procedures, although non-operative treatment seems to be often the chosen solution.

The main aim of fracture management in patients with SCI is definitely to have correct bone healing, but also to prevent general complications, reduce immobilization time and preserve patients' independence<sup>13</sup>. Surgery allows quick stabilization of fractures and early lower limb mobilization, thus accelerating the return to usual daily life activities<sup>14</sup>. Nevertheless, surgery may be responsible for infection, hemorrhage and skin non-healing. Non-operative treatment does not often have those risks but can be responsible for more frequent mal-alignments or non-union<sup>15</sup>.

The management of injury was performed by either



conservative or surgical way. Most of the patients were managed by surgical procedure than conservative which was 78.0% cases and 22.0% cases respectively. During conservative treatment mal-union was reported in 193(66.8%) cases and the rest of the 96(33.2%) patients had shown the stiffness. Among 81 operated cases majority were recovered which was 70(86.0%) cases. However, death was found in 2(2.0%) cases. Minor and major infection were reported in 6(8.0%) cases and 3(4.0%) cases respectively

In a study<sup>16</sup> it has found no difference in mortality between operative and non-operative management of fractures in people but they did not compare the occurrence of complications between these different treatments. Again it has been reported no increase of mortality and overall adverse events in patients with femoral fractures treated operatively<sup>11</sup>. Bone healing is an important point to consider in the evaluation of lower limb fracture management but medical secondary complications such as urinary infections, venous thrombosis or pressure sores, are also primordial consequences to look at because of functional and lethal risks.

## Conclusion

In conclusion the road traffic accident is the most common mode of injury followed by fall from height, physical assault and trivial trauma. The close fractures is the more common among the study population than open fractures. Most of the patients have been managed by surgical procedure than conservative. During conservative treatment mal-union and stiffness are reported. Majority are recovered. However, death, minor.

## Acknowledgements

None.

**Conflict of interest:** Other than technical and logistic support from the scientific partner the investigators did not have any conflict of interest in any means.

**Funding agency:** No.

## Financial Disclosure

This research project was not funded by any organization.

**Contribution to authors:** Ali MA, Jahan SA, Harun-Ar-Rashid AKM conceived and designed the study, analyzed the data, interpreted the results, and wrote up the draft manuscript. Kamal MS, Hussain MA & Shahed AM involved in the manuscript review and editing. All authors read and approved the final manuscript.

## Data Availability

Any inquiries regarding supporting data availability of this study should be directed to the corresponding author and are available from the corresponding author on reasonable request.

## Ethics Approval and Consent to Participate

Ethical approval for the study was obtained from the Institutional Review Board. As this was a prospective study the written informed consent was obtained from all study participants. All methods were performed in accordance with the relevant guidelines and regulations.

**How to cite this article:** Ali MA, Jahan SA, Harun-Ar-Rashid AKM, Kamal MS, Hussain MA, Shahed AM. Mode of Injury, Involvement of Bones and Post-Operative Surgical Outcomes of Patients presented with Lower Limbs Fractures attended at a Tertiary Care Hospital at Tourist City of Bangladesh. *J Natl Inst Neurosci Bangladesh*, 2023;9(1):59-64

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## Article Info

Received on: 7 October 2022

Accepted on: 24 December 2022

Published on: 1 January 2023

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