DOI: https://doi.org/10.3329/medtoday.v37i2.83170

ORIGINAL ARTICLE OPEN ACCESS

Morphology and Treatment of Tibial Fracture in Adult Patients at Teaching and Referral Hospital

Md. Rukanuddawla Khan[1], K M Badar Uddin[*2], Mohammed Mozaherul Islam[3], Asho Tosh Nath[4], Khandoker Muhammud Mazher Ali[5], Avijit Chowdhury[6], Tajuddin Molla[7]

Abstract

Introduction with Objective: *Tibia fractures are the most common long bone fractures in adult. The aim of the present study was to assess the morphology and treatment of tibial fracture in adult patients at a tertiary hospital.* ***Materials and Methods:*** *This Prospective Study was carried out among 48 patients attending at the department of Orthopedics Surgery at Chittagong Medical College Hospital, Chittagong for the treatment tibial fracture within the defined period from May 2022 to April 2023. Total 4 patients were dropped out in the middle of follow up. So follow up was done among 44 patients. All the data were compiled and sorted properly and the quantitative data was analyzed statistically by using Statistical Package for Social Science.* ***Result:*** *Out of 48 patients, the mean ± SD age of the patients was 36.98 ± 8.240 years. Most of the patients (83.33%) were male. According to type of fracture, 45.8% patients had both 42A (1, 2, 3) and 42B (2, 3) type and 8.3% patients had 42C (3) type of fracture. Regarding location of fracture, 52.1% patients had proximal 1/3 of shaft fracture and 47.9% patients had middle 1/3 of shaft fracture of Tibia. Average mean ± SD duration of operation was 83.25 ±10.903 minutes (range: 60-110 minutes). Average mean ± SD fluoroscopy time was 110.48 ±10.078 seconds (range: 90-134 seconds). Average mean ± SD radiological union time was 3.44 ±0.841 months (range: 3-5 month). Average mean ±SD range of motion (ROM) was 110.00 ±2.753o (range: 105-115o) after 1 month, 120.66±5.048o (range: 113-128o) after 3 months, 124.11±4.260o (range: 118-130o) after 5 months and 128.11±3.294o (range: 123-133o) after 6 months. Average mean ±SD range of Lysholm knee score was 57.55 ±2.256 (range: 55-62) after 1 month, 67.00 ±3.941 (range: 60-73) after 3 months, 77.50 ±5.364 (range: 70-86) after 5 months and 86.64 ±5.545 (range: 72-95) after 6 months. After operation with itramedullary nail approach most of the patients (79.5%) functional outcome after six month was excellent.* ***Conclusion:*** *Treatment of tibial fracture was mainly surgical using locked intramedullary nail.*

Keywords: *Tibial fracture, Morphology and treatment.*

Number of Tables: 06; Number of References: 12; Number of Correspondences:04.

1. Dr. Md. Rukanuddawla Khan
Consultant
Department of Orthopaedic and Traumatology
Chattogram Metropolitan Hospital Ltd
Chittagong, Bangladesh.

***2. Corresponding Author:**
Dr. K M Badar Uddin
Junior Consultant
Upazilla Health Complex
Chokoria, Coxs Bazar, Bangladesh.
E-mail: uddinkmb@gmail.com

3. Mobile: 01817202928
Dr. Mohammed Mozaherul Islam
Assistant Professor
Department of Orthopedic and Traumatology
Chittagong Medical College Hospital

4. Chittagong, Bangladesh.
Dr. Asho Tosh Nath
Medical Officer
Department of Orthopaedic and Traumatology
Chittagong Medical College Hospital
Chittagong, Bangladesh.

5. Dr. Khandoker Muhammud Mazher Ali
Registrar
Department of Orthopaedic and Traumatology
Chittagong Medical College Hospital
Chittagong, Bangladesh.

6. Dr. Avijit Chowdhury
Registrar
Department of Burn Plastic Surgery
Chittagong Medical College Hospital
Chittagong, Bangladesh.

7. Dr. Tajuddin Molla
Associate Professor (c.c)
Department of Orthopedic and Traumatology
Dhaka National Medical College Hospital
Dhaka, Bangladesh.

Introduction:

Tibial shaft fractures are the most prevalent type of tibia fracture[1]. The most frequent long bone fracture, accounting for 2% of all fractures in adults, is a tibial shaft fracture[2]. A large-scale study of

Received: 17 March 2025 *Accepted revised version:* 20 April 2025

tibial shaft fractures from a trauma databank found an incidence of 16.9/100,000 population with a bimodal distribution of peaks at ages 20 and 50[3]. The risk is somewhat higher in males (males 21.5/100,000 and females 12.3/100,000 incidence per year). The mechanism of injury among older adults primarily is fall, while motor vehicle collisions are the primary cause in younger age groups[4]. In comparison to other long bones, diaphyseal tibia fractures have one of the highest rates of non-union and malunion. Low-energy spiral fractures are more common in people over 50, while high-energy transverse and comminuted fractures are more common in patients under 30. Low-energy tibial fractures are more frequently caused by sports injuries and falls from standing height, whereas high-energy tibial diaphyseal fractures are most frequently caused by vehicle trauma[5]. The treatment of choice for operative fixation is the insertion of an intramedullary nail (IMN) with interlocking screws[6]. IMN has long been the standard procedure for surgical treatment of tibial shaft fracture, allowing for minimally invasive, dynamic fracture fixation and preservation of the extraosseous blood supply by adhering to the concept of biological osteosynthesis. And it has the advantages of early mobilization, high union rates, and few wound complications[7,8].

Materials & Methods:

This Prospective study was carried out among 48 patients attending at the department of Orthopaedic Surgery at Chittagong Medical College Hospital; Chittagong for the treatment tibial fracture within the defined period from May 2022 to April 2023. Ethical clearance was obtained from the Institutional Review Board (IRB) of CMCH. Purposive sampling was done according to availability of the patients. The collected data were entered into the computer and analyzed by using SPSS (version 20.1) to assess the morphology and treatment of tibial fracture in adult patients. All fractures were treated with a reamed intra medullary nailing in a non-dynamized mode. Total 4 patients were dropped out in the middle of follow up. So follow up was done among 44 patients.

Results:

Out of 48 patients, the mean ± SD age of the patients was 36.98 ± 8.240 years. The youngest and the oldest patient were 20 and 53 years. About 40 patients (83.33%) were male and 08 (16.66%) were female (Table I).

Table I: Age and Gender Distribution of the study patients (n=48)

Parameter	Mean ± SD	Range
Age (years)	36.98 ± 8.240	20-53
Gender Distribution	**Number**	**Percentage**
Male	40	83.33
Female	08	16.66

Data was expressed as frequency (%) or mean ± SD (range)

Table represents that, among 48 patients, according to type of fracture, 45.8% patients had both 42A (1, 2, 3) and 42B (2, 3) type and 8.3% patients had 42C (3) type of fracture. Regarding location of fracture, 52.1% patients had proximal 1/3 of shaft fracture and 47.9% patients had middle 1/3 of shaft fracture of Tibia **(Table II)**.

Table II: Fracture profile of the study population (n=48)

Parameter	Number	Percentage
Type of fracture		
42A (1,2,3)	22	45.8 %
42B (2,3)	22	45.8 %
42C (3)	04	8.3%
Location of fracture		
Proximal	25	52.1
Middle	23	47.9

Table III shows that, average mean ± SD duration of operation was 83.25 ±10.903 minutes (range: 60-110 minutes). Average mean ± SD fluoroscopy time was 110.48 ±10.078 seconds (range: 90-134 seconds). Average mean ± SD radiological union time was 3.44 ±0.841 months (range: 3-5 month) **(Table III)**.

Table III: Distribution of the patients according to duration of operation, fluoroscopy time and radiological union time with approach of intramedullary nailing (n=44)

Parameter	Number
Duration of operation (minutes)	
Mean ± SD	83.25 ±10.903
Range	60-110
Fluoroscopy time (seconds)	
Mean ± SD	110.48 ±10.078
Range	90-134
Radiological union time (month)	
Mean ± SD	3.44 ±0.841
Range	3-5

Table IV shows that, average mean ±SD range of motion (ROM) was 110.00 ±2.753o (range: 105-115o) after 1 month, 120.66±5.048o (range: 113-128o) after 3 months, 124.11±4.260o (range: 118-130o) after 5 months and 128.11±3.294o (range: 123-133o) after 6 months.

Table IV: Range of motion (ROM) of the patients after 1 month, 3 months, 5 months and 6 months (n=44)

ROM (o)	Number
After 1 month	
Mean ± SD	110.04 ±2.753
Range	105-115
After 3 months	
Mean ± SD	120.66±5.048
Range	113-128
After 5 months	
Mean ± SD	124.11±4.260
Range	118-130
After 6 months	
Mean ± SD	128.11±3.284
Range	123-133

Table V shows that, average mean ±SD range of Lysholm knee score was 57.55 ±2.256 (range: 55-62) after 1 month,

67.00 ±3.941 (range: 60-73) after 3 months, 77.50 ±5.364 (range: 70-86) after 5 months and 86.64 ±5.545 (range: 72-95) after 6 months.

Table V: Functional assessment by Lysholm knee score of the patients after 1 month, 3 months, 5 months and 6 months (n=44)

Lysholm knee score	Number
After 1 month	
Mean ± SD	57.55 ±2.256
Range	55-62
After 3 months	
Mean ± SD	67.00 ±3.941
Range	60-73
After 5 months	
Mean ± SD	77.50 ±5.364
Range	70-86
After 6 months	
Mean ± SD	86.64 ±5.545
Range	72-95

Table VI shows that, after operation with itramedullary nail approach most of the patients (79.5%) functional outcome after six month was excellent.

Table VI: Distribution of the patients according to functional outcome after 6 months with IMN approach (n=44)

Functional outcome	Number	Percentage
Poor	4	9.1
Satisfactory	5	11.4
Excellent	35	79.5

Discussion:

In this study the mean ± SD age of the patients was 36.98 ± 8.240 years. About 40 patients (83.33%) were male and 08 (16.66%) were female. In Shugie, Y., Kebede, S. et. al (2025) study mean age of the patients was 36.3 ± 13.9 years and most of the patients were male (76.3%)[9]. In our study, among 48 patients, according to type of fracture, 45.8% patients had both 42A (1, 2, 3) and 42B (2, 3) type and 8.3% patients had 42C (3) type of fracture. 52.1% patients had proximal 1/3 of shaft fracture and 47.9% patients had middle 1/3 of shaft fracture of Tibia. In Wanjema, S. et. al (2020) study, Middle 1/3 tibia shaft was the commonest site (52.7%) of fracture and type A fractures were the most common comprising 47.3%[10]. After operation with itramedullary nail approach most of the patients (79.5%) functional outcome after six month was excellent. These findings are compared with some studies as they recommend that based on the clinical outcomes of suprapatellar and infrapatellar tibial intra medullary nail insertion, the suprapatellar and infrapatellar approaches can get similar knee functional outcomes in the treatment of tibial shaft fracture (Al-Azzawi et al., 2021; Ringenberg et al., 2022)[11,12].

Conclusion:

Tibial fracture was commonly occur at proximal 1/3 level of shaft. Tibial shaft fractures are typically treated using intramedullary nailing (IMN), which is a traditional method. After operation with itramedullary nail approach functional outcome of the patients after six month was excellent.

Conflict of Interest: None.

Acknowledgements:

The authors are grateful to the entire staff of department of Orthopaedic Surgery at Chittagong Medical College Hospital, Chittagong during the study period.

Reference:

1. Sahni, G., Singh, S., Kavia, A., et al. Suprapatellar versus Infrapatellar Approach for Intramedullary Nailing in Tibial Shaft Fractures: A Prospective Interventional Study. Journal of Clinical and Diagnostic Research. 2023; Vol-17(1): RC01-RC04.

https://doi.org/10.7860/JCDR/2023/55398.17258

2. Laurila, J., Huttunen, T. T., Kannus, P., et al. Tibial shaft fractures in Finland between 1997 and 2014. Injury. 2019; 50(4):973-977.

https://doi.org/10.1016/j.injury.2019.03.034

PMid:30935744

3. Anandasivam, N. S., Russo, G. S., Swallow, M. S., et al. Tibial shaft fracture: A large-scale study defining the injured population and associated injuries. Journal of clinical orthopaedics and trauma. 2017; 8(3): 225-231.

https://doi.org/10.1016/j.jcot.2017.07.012

PMid:28951639 PMCid:PMC5605888

4. Larsen, P., Elsoe, R., Hansen, S. H., et al. Incidence and epidemiology of tibial shaft fractures. Injury. 2015; 46(4): 746-750.

https://doi.org/10.1016/j.injury.2014.12.027

PMid:25636535

5. Boulton, C. and O'Toole, R.Tibia and fibula shaft fractures. Court-Brown C, Heckman J, McQueen M, Ricci W, Tornetta P III, editors. Rockwood and Greens Fractures in Adults. 2015; 2: 2415-2472.

6. Thompson JH, Koutsogiannis P, Jahangir A. Tibia Fractures Overview. [Updated 2020 Aug 24]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2021 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK513267/

7. Bode, G., Strohm, P. C., Südkamp, N. P., and Hammer, T. O. Tibial shaft fractures - management and treatment options. A review of the current literature. Acta chirurgiae orthopaedicae et traumatologiae Cechoslovaca. 2012; 79(6):499-505.

https://doi.org/10.55095/achot2012/072

8. Foote, C. J., Guyatt, G. H., Vignesh, K. N., et al. Which Surgical Treatment for Open Tibial Shaft Fractures Results in the Fewest Reoperations? A Network Meta-analysis. Clinical

orthopaedics and related research. 473(7): 2179-2192.

https://doi.org/10.1007/s11999-015-4224-y

PMid:25724836 PMCid:PMC4457757

9. Shugie, Y., Kebede, S., Adugna, F., et al. "Poor radiological outcomes and associated factors among tibial shaft fracture patients treated with intramedullary nail fixation at Addis Ababa Burn, Emergency and Trauma Hospital, Ethiopia". Frontiers in Surgery. 12. 10.3389/fsurg.2025.1473038.

https://doi.org/10.3389/fsurg.2025.1473038

PMid:39968030 PMCid:PMC11832642

10. Wanjema, S., Oluoch, R., Ayumba, B.R. and Lelei, L.K. Tibial Diaphyseal Fractures: Aetiology, Morphology and Treatment In Adult Patients At Moi Teaching And Referral Hospital, Eldoret, Kenya", East African Orthopaedic Journal. 2020; 14: 8-13.

11. Al-Azzawi, M., Davenport, D., Shah, Z, et al. Suprapatellar versus infrapatellar nailing for tibial shaft fractures: A comparison of surgical and clinical outcomes between two approaches. Journal of clinical orthopaedics and trauma. 2021; 17:1-4.

https://doi.org/10.1016/j.jcot.2021.01.009

PMid:33717965 PMCid:PMC7920150

12. Ringenberg, J. D., Tobey, J. L., Horinek, J. L., Teague, D. C. Suprapatellar versus infrapatellar approach for intramedullary nail fixation of tibial shaft fractures: a review of the literature. OTA International, e196; 2022.

https://doi.org/10.1097/OI9.0000000000000196

PMid:35187413 PMCid:PMC884337