

PATTERN OF TIBIAL SHAFT FRACTURES IN UNIVERSAL COLLEGE OF MEDICAL SCIENCES, BHAIRAHAWA: A REVIEW OF SIXTY CASES

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ABSTRACT

BACKGROUND: Tibia is one of the commonest long bone fracture seen in emergency. Road traffic accidents are the major causes of fracture shaft of tibia. However, studies on these fracture have not been conducted in this part of the world so we conducted this study to identify epidemiological characteristics (age, sex, mechanism of injury, season, source of injury, type of fracture, any associated injury, location, method of treatment and complication) in patients with fracture shaft of tibia admitted in the emergency of Medical College hospital, Bhairahawa.

METHODS: This is hospital based prospective observational study conducted at Universal College of Medical Science Teaching Hospital, Bhairahawa (Lumbini zone) among 60 tibial shaft fracture patients in hospital emergency. The study period was from December 2010 to November 2011.

RESULTS: All total of 60 tibial shaft fracture in 60 patients with a mean age of 28.35 yrs (3-75yrs) were reviewed. The cause of injury were mostly road traffic accident of which Bike (26.6%), Bus (6.7%), Car (6.7%), Cycle (10%), Rickshaw (6%), Tractor (6.7%), Truck (1.7%), and Vehicle collision (3.3%) were more prevalent. Other injuries were Bomb blast (1.7%), Fall injury (16.7%), Logroll (3.3%), Sports/football (5.5%) and Stone injury (1.7%). Distal one third of tibial shaft (49.2%) was the commonest site of fracture. Most of the patients presented between 1st hour to even 10 days of injury. Sixty five percent of the fracture were closed and 35% were open. Most were managed operatively (51.7%). Mean time for union of close type of fracture was 13.78 (SD±2.99) weeks and for open was 16.2 weeks (SD±3.34). Complication included infection in one patient and delayed union in two patients.

CONCLUSION: In our present study, most tibial shaft fracture were due to road traffic accident. So, efforts should be made by concerned authorities for improving the roadways system of Nepal as well as provision of standard but affordable health care for victims of road traffic crashes.

KEYWORDS: Tibial shaft, Fracture, Crashes, Injuries, Traffic

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INTRODUCTION

Tibia is the commonest long bone involved in fractures and is also the commonest site of open fracture of long bones.¹ The subcutaneous location of the anteromedial surface of the tibia means that severe bone and soft tissue injury is not infrequent.² They occur approximately two tibial shaft fractures per 1000 individuals and 26 per 100,000 populations per year.^{3,4} The average age of a tibial fracture population is about 37 years; males have an average age of about 31 years and females 54 years. Males are more commonly affected than females with highest incidence in young males between the ages of 15 and 19 and over the age of 80 in females.⁴ Tibial shaft fractures caused by high energy trauma usually occur in young adults. The mechanism of most high energy fractures are automobiles, motorcycle or car pedestrian accidents. Most commonly, high energy fractures result from bumper injuries and are associated with other injuries in the ipsilateral limb and the contralateral tibia. Low energy fractures may occur secondary to athletic injuries or twisting falls. The amount of energy absorbed by a fracture which can be estimated from the history of injury, strongly influences the timing and the type of treatment.⁵ Fracture can be closed and open. Closed fractures are more common than open fracture. The average age of the patient with closed fractures was 35.6 years, and 42.4 years for the open fracture population. The average age of males with closed tibial diaphyseal fractures was 29.6 years compared with 38.4 years for males with open fractures. In females, there was no significant difference in the age of patients with closed or open fractures, with an average of 53.5 years for the closed fracture group and 54.6 years for those with open fractures. This difference probably reflects the increased numbers of sports-related tibial fractures in young males.⁴

The most comprehensive classification of tibial diaphyseal fractures is the Orthopaedic Trauma Association (OTA) classification initially described by the AO group. This is a morphologic classification based on the initial anteroposterior and lateral radiographs.⁶ Open fractures are usually grouped according to the classification of Gustilo and Anderson, later modified by Gustilo et al. The classification depends on increasing soft tissue injury, degree of contamination, delay before treatment, and the requirement for vascular surgery.^{7,8} Closed and open tibial diaphyseal fractures can be classified by the Tscherne classification. This system includes soft-tissue damage and compartment syndrome, which are not included in other grading schemes.⁹

The goals of treatment are to obtain a healed, well-aligned fracture; pain-free weight bearing; and functional range of motion of the knee and ankle joints.¹⁰ The decision for treatment depends on many factors, including the patient's overall health, the extent of soft-tissue injury, associated injuries of the thigh, knee, and foot, and the pattern of injury to the bone itself.¹¹ Fracture can be treated by operative and non

operative method. Nonoperative management can be undertaken using casts or functional braces, whereas plating, intramedullary nailing and external fixation are the three basic operative techniques.² Nonoperative treatment now is generally reserved for closed, stable, isolated, minimally displaced fractures caused by low-energy trauma and some stable low-velocity gunshot fractures. Operative treatment is indicated for most tibial fractures caused by high-energy trauma. These fractures usually are unstable, comminuted, and associated with varying degrees of soft-tissue trauma. Delayed union, nonunion, and infection are relatively common complications of tibial shaft fractures.¹⁰

So far, this kind of study has not been published from this region. I believe this study will give foundation for further study in fracture shaft of tibia and will work as reference data for others.

METHODS

The study was conducted in the department of Orthopaedics and Traumatology of Universal college of Medical Science Teaching hospital, Bhairahwa between December 2010 to November 2011. It is a hospital based prospective observational study. Written informed consent was taken from all the patients. Sixty cases of closed and open tibial shaft fracture extending 5cm above and below the ankle and knee joint respectively with associated fibula fracture and other injuries irrespective of age group are included in the study. Those cases which did not fit in inclusion criteria and those which did not give written consent for the study are excluded from the study.

Those patients attending in casualty of hospital were initially assessed, resuscitated, and investigated. Regarding location tibial shaft is divided into upper, middle and lower one third. In regard of fracture pattern as transverse, spiral, bending wedge, comminuted wedge, comminuted wedge, complex spiral wedge, oblique, intact spiral wedge and segmental/wedge. After that fracture were classified according to the AO classification. For open fracture we used GUSTILO'S method.

Treatment performed was evaluated according to fracture being open or close with plaster cast, external fixator, intramedullary interlocking nail, kirschner-wire, minimal invasive percutaneous plate osteosynthesis, locking plate, open reduction and percutaneous plate osteosynthesis and titanium elastic nail system. Treatment was instituted after which they were either admitted or discharged from the hospital. The time to union was based on clinical as well as radiological assessment.

All data were analysed by computer programme, statistical package for social science (SPSS) version 17. Descriptive statistics, frequency distribution and diagram were used in proper context to interpret data

RESULTS

The study included 60 patients with tibial shaft fracture over one year from 1 December 2010 to 31 November 2011. All tibial shaft fractures irrespective of age attending the emergency dept of hospital were included.

The age group most commonly involved with tibial shaft fracture was those aged below 15 yrs. The mean age of the patient was 28.35 yrs; the median age was 21.5 yrs \pm 20.80973 SD. The minimum age was 3 yrs and maximum 75 yrs. This study consisted 43 males (71.7%) and 17 females (28.3%) i.e. M: F ratio of 2.5:1. All the tibial shaft fracture were grouped into five different categories depending on the history and the severity viz. pedestrian, fall injury, logroll injury, vehicle collision and others. A great majority of tibial shaft fracture were those that were caused by pedestrian accident (39 of 60, 65%) making it the most common mechanism of injury. The next common mode of injury was the fall injury (10 of 60, 16.7%). The right tibia was involved in 40 cases (right: left ratio of 2:1). Most of the patients (20%) presented during the winter months of January to April. Most patients (95%) came directly from the accident scene and the remaining 5 % were referred from lumbini zonal hospital. Our patients presented between 1st hr to even 10 days of injury. Ninety three percent were seen within a day of injury; 3.3% after a day, 1.7% after seven days and 1.7% after 10 days.

In the study, most tibial fracture were transverse i.e 19 cases (31.7%) followed by 12 cases (20 %) of spiral fracture, bending wedge in 9 cases (15%), oblique fracture in 8 cases (13.3%), intact spiral wedge in 5 cases (8.3%), communitied in 3 cases (5%), complex spiral wedge in 2 cases (3.3%), segmental/wedge in 1 case (1.7%) and communitied wedge in 1 case (1.7%). Twenty nine cases (49.2%) had fracture at lower one third of tibial shaft followed by mid one third (42.4%) and upper one third (8.5%). In the study, A 3.3 type was the most common type of tibial fracture which constituted 11 cases (18.3%) whereas B 1.1, B 1.3, B 3.1, B 3.2, C1.2 and C2.2 were least common type accounting for 1 case (1.7%) each. Sixty five percent of the fractures were closed and thirty five percent were open; of these open fractures 16.7% were of type IIIb Gustilo variety. Nine patients (15%) had other associated injuries. There was associated fibular fracture in thirty three (55%) of the cases.

Fifty five patients were admitted and managed using various techniques: plaster cast (in 24 fractures), intra medullary interlocking nail (10), external fixation (9), Minimal invasive per cutaneous plate osteosynthesis(8), Titanium elastic nail (2), open reduction and internal fixation with locking plate(1). Along with this nine patients were also treated with split thickness skin graft, one bone graft and one with patella tendon bearing cast. Majority of the patients were in follow up and only 47 had fracture healing times documented. Mean time to

union for closed was 13.78 weeks and for open was 16.2 weeks. Severe open fractures were associated with prolonged healing time in this series ($p=0.01$). The complications recorded included wound infection (2%) and delayed union (3%).

DISCUSSION

In this study, males were more predisposed to tibial fractures, a situation which is similar to those independently reported by Court-browne et al⁴ and Adeleke et al¹². This may be due to working of males outside the home and there involvement in various physical activity. The mean age group was 28.35 years. Majority of them were children (<15 years). The predominant age group affected in this study was <15 years which constitutes 36.7% of total cases. Our study is similar to the study conducted by Court-browne et al⁴ while Adeleke et al¹² and Grecco et al¹³ found the most common age group to be between 21-60 years and 21-30 years respectively. The reason for this is absence of rigid traffic rules for children. In our present study, right tibial fracture was common than left which is not similar to study done by Adeleke et al¹² that showed predisposition of left tibia. We found a disproportionately high incidence of tibial fractures during the winter season especially in the months of January to April. This could be due to poor visibility of road during winters. But in his study, Adeleke et al¹² found more incidence of tibia fracture during rainy season.

Our result shows that in 65% the most frequent causes of tibial shaft fracture were accident linked to traffic(motorcycle, automobiles, bicycle and over run) which is almost similar to that study conducted by Grecco et al¹³ in which they found 77% of cases were associated with traffic accident. Court browne et al⁴ found higher incidence (37.55) of those causes though in inferior rates than ours. The reason may be improper traffic management and poor condition of the roadways. In the present study, most of the patients (93.3%) arrived hospital within few hours in the 1st day which is almost similar to that study conducted by Adeleke et al¹² though findings were inferior then ours. Though our figures are still far from ideal, They suggests an improvement in utilization of medical services and rescue services. In our study, the most common site of tibial shaft fracture was distal one third (49.2%). However, in other study conducted by Grecco et al¹³ found majority of tibial shaft fracture at middle one third (54.18%). The reason of both study may be as a result of the subcutaneous nature of the tibial shaft. In our present study, most of the tibial shaft fracture were closed type (65%) which is similar to study conducted by Court-brown et al⁴ (76.5%). Whereas, Grecco et al¹³ found 67 % of open fracture. The reason for this may be due to low energy injury and inherent quality of bone in children.

The treatment we performed were plaster cast, external fixator, intramedullary interlocking nail, minimal invasive per cutaneous plate osteosynthesis, ORIF with locking plate and

TENS which are almost similar to that performed by Santaro et al¹⁴, Ruaedi et al¹⁵, Krackhardt et al¹⁶ and Shankar NW et al.¹⁷ In our study we found complication like infection (2%) delayed union (3%) similar to that of Adeleke et al²⁴ except malunion. In the present study, mean time for union of close type of fracture was 13.78 weeks and for open was 16.2 weeks. In our series severe open fracture were associated with prolonged healing time ($p=0.01$) which was similar to the study conducted by Adeleke et al²⁴ ($p=0.03$).

CONCLUSION

In the present study, tibial shaft fracture had a higher incidence in males in the range of age <15 yrs; the most frequent cause were traffic accidents (65%); regarding location they occurred more frequently at distal one third (49.2%); closed fracture (65%) commonest fracture pattern being transverse (65%); mostly occurred in winter season (20%). These statistics will help to bring efforts on the part of government to curb the incidence of road traffic crashes in our society.

This kind of epidemiological study contributes in the identification of characteristics of injury and improvement of their management. I believe this study will give foundation for further study of fracture shaft of tibia and will work as reference data for others

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