

The Complication of MIPO Technique for Closed Fracture Proximal Third Tibia among Adult Patients

Dr. A.T. M. Rezaul Karim¹, Dr. A. K. M. Harun-Ar-Rashid², Dr. Mohammad Shaha Alam³, Dr. Ayesha Begum⁴, Dr. Abdur Rahman⁵, Dr. A. H. M. Azgar Ali Chowdhury⁶

¹Consultant of Orthopedic Surgery, Parkview Hospital, Chattogram, Bangladesh

²Assistant Prof. of Orthopedic Surgery, Cox's Bazar Medical College, Cox's Bazar, Bangladesh

³Assistant Prof. of Surgery, Cox's Bazar Medical College, Cox's Bazar, Bangladesh

⁴Assistant Prof. of Pediatrics, Chattogram Medical College, Chattogram, Bangladesh

⁵Assistant Prof. of Orthopedic Surgery, Chattogram Medical College, Chattogram, Bangladesh

⁶Junior Consultant of Orthopedic Surgery, Chattogram Medical College Hospital, Chattogram, Bangladesh

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*Corresponding author: Dr. A.T. M. Rezaul Karim

Abstract

Original Research Article

Objective: In this study our main goal is to evaluate the complication of MIPO technique for closed fracture proximal third tibia among adult patients. **Method:** This observational study was carried out at Department of Orthopaedic Surgery, Chattogram Medical College Hospital; Chattogram, From January 2012 to June 2013. A total of 26 patients within 18-60 years of age and were admitted in different Orthopaedic units of Chattogram Medical College Hospital with closed fracture in proximal tibia were included in the study. **Results:** During the study, motor vehicle accident accounted for 10 cases (43.48%), pedestrian struck by a motor vehicle for 3 cases (13.04%). Work accidents were responsible for 04 fractures (17.39%), mostly because of a falling heavy object. 3 fractures (13.04%) were caused by high-energy fall from heights of at least 3 meters. Sports injuries caused fractures in 2 patients (8.69%), of them 2 had football injuries. Direct trauma by h/o Assault for 1 cases (4.35%). Collectively, low-energy mechanisms had a mean time to union of 19.0 weeks. On the other hand, high-energy injuries had a mean time to union of 22.34 weeks with 3 delayed unions. Intraoperative displacement of a wedge fragment or comminution during plate positioning, occurred in four cases followed by the development of impending compartment syndrome after locking plate fixation occurred in only one patient, early aseptic wound complications including dehiscence, edge necrosis and haematoma formation occurred in three patients (13.04%), superficial infection (wound or soft tissue infection superficial to the deep fascia without muscle or bone involvement and with stable implant) occurred in 2 cases. **Conclusion:** Most importantly, it was easy to use, it was biological in the sense that the blood circulation to the proximal tibia was not compromised, the plate had not need to be configured and the angular screw fixation ensures fixed-angle stabilization. So, locking compression plate fixation in minimal invasion plate osteosynthesis (MIPO) is a reliable method of treatment of proximal tibial fracture without any significant problem.

Keywords: closed fracture proximal third of tibia, MIPO technique, locking plate.

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INTRODUCTION

Proximal third tibia fracture especially comminuted fractures are difficult to treat in all over the world. Fixation of diaphyseal fracture by intramedullary nail remains the gold standard but it is generally considered unsuitable for unstable proximal third of tibial fracture due to technical difficulty and design limitation [1, 2].

In most of the cases we use open technique for reduction which needs extensive surgical approach. It

jeopardized vascularity in the fracture site and increasing the chance of infection, delayed union, nonunion. DCP needs direct anatomical reduction and there is movement at screw plate interface. In comminuted fracture needs no attempt to reduce the fracture anatomically only length, alignment and rotation to be maintained, insertion of screws proximal and distal to it. So, no disturbance of biological internal environment occurs [3, 4].

There are three technique of use of LCP – open, MIPO and LISS technique by bridging the

fracture. Open technique may increase the rate of nonunion. MIPO and LISS technique demands extra instrument set (Zig system). But bridge plating could be done without disturbing the fracture haematoma and extra instrument. One or two snaps of portable X-rays may be enough during operation [5].

In this study our main goal is to evaluate the complication of MIPO technique for closed fracture proximal third tibia among adult patients.

OBJECTIVE

- To assess the complication of MIPO technique for closed fracture proximal third tibia among adult patients.

METHODOLOGY

Type of study: This was an observational study.

Place and period of study: This study was carried out at Department of Orthopedic Surgery, Chattogram Medical College Hospital; Chattogram, From January 2012 to June 2013.

Study population: All the patients were within 18-60 years of age and were admitted in different orthopedic units of Chattogram Medical College Hospital with closed fracture in proximal tibia. For diagnosis AO classification of proximal metaphyseal and proximal shaft fracture of tibia was used. Cases were selected purposively.

Sample size: Total 26 patients were enrolled in the study. Three patients were lost to follow-up. So, finally 23 patients were available for evaluation.

Inclusion Criteria

- Age – 18-60 years
- Sex – patients were selected irrespective of sex.
- Site – Fractures of the proximal metaphysis and proximal diaphyseal fracture of tibia.
- Closed fracture.
- Those fractures in which initial conservative management for soft tissue injury.
- Within 2 weeks of initial injury.

Exclusion Criteria

- It excludes patients of age less than 18 years and more than 60 years.
- Type of fracture
- Open fracture
- Diaphyseal fractures extending into middle and distal third.
- Fracture associated with neuro-vascular injury.
- Pathological fractures.

Preoperative preparation

Patient was consulted regarding the treatment procedure with emphasis on the available treatment options along with merits and demerits of each. He/she was also being informed about the possible postoperative sequels. Informed written consent was obtained from each case included in the study. All issues regarding the patients' welfare were approved by the local ethical committee.

DATA ANALYSIS

Collected data were analysed using software SPSS (Statistical Package for Social Sciences) version 23 for windows. Descriptive and inferential statistics were used to analyse the data. Analysed data were presented in the form of tables and charts with due interpretation.

RESULTS

In table-1 shows age distribution of the patients. The study population included 23 patients, who ranged in age between 18 years and 60 years (average 35.43 years). The mean age for males was 36.35 years whereas the mean age for females was 32.83 years. The maximum incidence occurred between 21 and 40 years with 78% of cases occurring in patients before their fifth decade. The following table is given below in detail:

Table-1: Age distribution of the patients (n=23)

Age (Yrs)	Frequency	Percentage	Mean age
16-20	0	0%	35.43
21-30	7	30.43 %	
31-40	11	47.83 %	
41-50	3	13.04 %	
51-60	2	08.70 %	

In table-2 shows sex Distribution. Most (73.91%) of the patients were male and the rest (26.09%) were female, giving a male to female ratio of roughly 4:1. The following table is given below in detail:

Table-2: Sex distribution

Sex	Males	Females	Total
All patients of the study	17	06	23
Percentage	73.91%	26.09%	100%

In figure-1 shows mode of injury where motor vehicle accident accounted for 10 cases (43.48%), pedestrian struck by a motor vehicle for 3 cases (13.04%). Work accidents were responsible for 04 fractures (17.39%), mostly because of a falling heavy object. 3 fractures (13.04%) were caused by high-energy fall from heights of at least 3 meters. Sports injuries caused fractures in 2 patients (8.69%), of them 2 had football injuries. Direct trauma by h/o Assault for 1 cases (4.35%). The following figure is given below in detail:

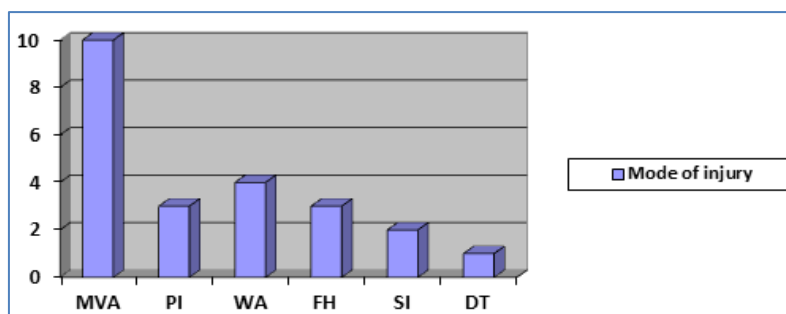


Fig-1: Mode of injury

In table-3 shows mechanism of trauma. Collectively, low-energy mechanisms had a mean time to union of 19.0 weeks. On the other hand, high-energy

injuries had a mean time to union of 22.34 weeks with 3 delayed unions. The following figure is given below in detail:

Table-3: Fracture union according to the mechanism of injury

	Union	Delayed union	Non union
High energy trauma	22.34 weeks	3	0
Low energy trauma	19.0 weeks	0	0

In table-4 shows complication of the patients where intraoperative displacement of a wedge fragment or comminution during plate positioning, occurred in four cases followed by the development of impending compartment syndrome after locking plate fixation occurred in only one patient, early aseptic wound complications including dehiscence, edge necrosis and haematoma formation occurred in three patients (13.04%), superficial infection (wound or soft tissue infection superficial to the deep fascia without muscle or bone involvement and with stable implant) occurred in 2 cases. The following table is given below in detail:

Table-4: Complication of the patients

Complication	n
Early technical complications	4
Compartment Syndrome	1
Neurological injury	0
Wound problems	3
Superficial infection	2

In table-5 shows distribution of the patients according to Varus/Valgus Angulati where 1 cases (4.35%) had 5° -7.5° valgus angulation. The following table is given below in detail:

Table-5

Valgus Mal Union	Valgus Mal Union	Percentage
5-7.5°	5-7.5°	4.35
7.5°-10o	7.5°-10o	-
> 10o	> 10o	-
	> 10°	

DISCUSSION

Dominant right sides due to searching of support during high energy trauma. The cause of left side involvement is probably due to unpreparedness following high velocity injury in most of the cases [6].

High energy trauma following road traffic accident occurs most commonly in young active people. The principal earning member of the family usually is working outside and more prone to road traffic accident.

Average healing rate was 21.6weeks. In this study all fractures were united. 3(13.04) patients developed delayed union which healed without the need of bone graft. There was no nonunion. In one study treated 29 patients out of them 24 patients healed within 6 months & 3 developed delayed unions [7]. Another study treated 21 patients of them 17 fracture healed within 6 months and 2 developed delayed union and two patient developed nonunion [8].

In this study 5 patients (21.74) noticed knee pain during walking. Most of the patient had no knee & ankle stiffness. In the study eight patients out of 19 had limp due to one patient need stick as a walking support. Four patients of them reduce movement then 20 degree compare to contralateral side [9]. In another study out of 22 patients one patient presented with persistant pain at distal end of scar [10].

In the study one patient valgus malunion (7°); who also developed <1cm leg length discrepancy. No patient had delayed infection or delayed wound breakdown. Only one patient developed surface wound infection 1 month after surgery which successfully treated by oral antibiotics. In other study, found out of 29, 4 had angular deformities one had varus deformity

& three patient had a valgus deformity. No patients had a leg-length discrepancy greater than 1.0 cm [11].

In another study wound breakdown in two cases & superficial wound infection in one case [12]. In another study one had superficial infection on lateral side that was treated without problem by antibiotics [13].

CONCLUSION

Most importantly, it was easy to use, it was biological in the sense that the blood circulation to the proximal tibia was not compromised, the plate had not need to be configured and the angular screw fixation ensures a fixed-angle stabilization. So, locking compression plate fixation in minimal invasion plate osteosynthesis (MIPO) is a reliable method of treatment of proximal tibial fracture without any significant problem.

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