Original Article

Evaluation of the Results of Treatment of Distal Tibial Fracture by Minimally Invasive Locking Plate Osteosynthesis

Md. Khademul Islam[1], Md. Shafiqul Islam[2], Anjan Kumar Das[3], Md. Shihab Uddin[4], Quazi Shahid-ul Alam[5]

ABSTRACT:

Distal tibial fractures are considered as one the most difficult fractures to treat in orthopedic surgery because of the limited soft tissue, the subcutaneous location, and poor vascularity. classic open reduction and internal plate fixation requires extensive soft tissue dissection and periosteal stripping produce high rates of infection, delayed union and nonunion. In distal tibial comminuted fracture LCP fixation relies on the principle of minimally invasive locking plate Osteosynthesis (MIPO). Thus by maintaining fracture biology improves callus formation and bone healing. To assess the success of Minimally Invasive Locking plate Osteosynthesis (MIPO). This prospective interventional study was over a period of two years between July 2012 to June 2014-in the dept. of Orthopedics and Traumatology, DMCH. In this study, 11 patients of distal tibial fracture were selected during study period. In this study, the age of the patients was between 21-61 years, mean age being 40 years. Male-female ration was 8:3. Most (54.55%) of the patients were affected on the right side. The outcome of distal tibial fracture treated by Minimally Invasive Locking Plate Osteosynthesis (MIPO) demonstrated excellent to good result in majority of the cases.

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INTRODUCTION:

Tibia is the most subcutaneous long bone of the body which is suspected to break by trauma. Fractures of the distal tibia can be challenging to treat because of the limited soft tissue, the subcutaneous location, and poor vascularity.

The best treatment remains controversial and debatable (Hazarika, Chakravarthy and and Cooper, 2006.)[1]

Fractures of the tibia and fibula are among the most common injuries involving the lower extremities in children and adolescents. Although most can be reacted non operatively, with satisfactory long-term results, some fractures require surgical stabilization. The increasing experience in adults with minimally invasive plate osteosynthesis for the treatment of complex fractures of the lower extremity has

1. Assistant Professor, Dept. Of Orthopaedics, SBMCH, Barishal
2. Assistant Professor, Dept. Of Orthopaedics, SBMCH, Barishal
3. Assistant Professor, Forensic Medicine, Sheikh Sayera Khatun Medical College, Gopalganj
4. Assistant Professor, Dept. Of Orthopaedics, SBMCH, Barishal
5. Assistant Professor, Dept. Of Orthopaedics, DMCH, Dhaka

supported the treatment of selected distal tibia fractures in older children and adolescents. (Julio JMasquijo 2014).[2]

Distal tibial fractures constitute a wide spectrum of lesions from simple metaphyseal and diaphyseal fractures to metaphyseal collapse with articular surface impaction and severe compromise of the soft tissue. The standard of care still remains controversial. (Pellegrinia et al, 2012).[3] Classic open reduction and internal plate fixation require extensive soft tissue dissection and periosteal stripping even in expert hands, with high rates of complications, including infection and delayed union and nonunions (Janssen, Biert and Van Kanipen, 2007). [4]

The stability of fracture fixation with an ordinary plate is based on the friction induced by compression between the plate and the cortex but that with the locking plates depends on the angular stability produced by matching screws and the plate. So chance of implant failure is less in LCP (Egol et al, 2004).[5]

Fractures of the distal tibia are challenging for the orthopedic surgeon as there generally multi fragmented and associated with severe soft tissue injury & swelling. Less invasive technique such as percutaneous plating are very appealing when treating these types of fractures because a stable fracture bridging osteosynthesis can be achieved without further damage to the soft tissue. They should allowed for a better fracture healing with fewer complications and less need for additional operative procedures. Francois et al, (2004).[6]

Minimally Invasive Locking Plate Osteosynthesis (MIPO) could be done without disturbing the fracture haematoma and extra instrument. One or two snaps of portable X-ray or fluoroscopy may be enough during operation In DMCH this is the first study on Minimally Invasive Locking Plate Osteosynthesis (MIPO) in the treatment of distal tibial fractures.

Here we used locking compression plate (LCP) by Minimally distorted. So this study may help to find out the effectiveness of Minimally Invasive Locking Plate Osteosynthesis (MIPO) in the treatment of distal tibial fractures & encourage the Orthopaedic surgeons to treat their patients by this effective & safe technique with better outcome.

METHODS AND MATERIALS:

This was a Prospective Interventional study among 11 patients From July 2012 to June 2014 (2 Years) in Dept. of Orthopaedics and Traumatology, DMCH. Due to time limitation only 11 cases were selected during study period. Inclusion criteria of the patients was Distal tibia fractures AO type (A1-A3), Closed fracture, Gustilo I type fracture, Fractures less than 3 Weeks old, Age>18 years and <70 years, Sex: both sexes and Exclusion criteria of the patients was Open fracture (Gustilo type II & III), Pathological fracture, Infected cases, Patients who are unfit for surgical treatment, Distal tibia fracture AO type B, type C.

OBSERVATIONS AND RESULTS

Total 11 patients of distal tibial fracture were selected during study period. The purpose of the study was to evaluate the outcome of

treatment of distal tibial fracture by Minimally Invasive locking Plate Osteosynthesis (MIPO). All the patient, after proper resuscitation and investigation, were treated with distal tibial locking plate and followed at least 6 months.

Age distribution: Table I. Age distribution of the participants (n=11)

Age Group	Number of the patients	Percentage	Mean age= SD
21-30	3	27.27%	
31-40	3	27.27%	
41-50	3	27.27%	40=±8.4
51-60	1	9.09%	
61-70	1	9.09%	

Most (73%) of the patients were male and the rest were female

Occupation: The selected study subjects were predominantly Motor driver (27.27%) followed by housewife, students and service-holder (each 18.18%) and businessman & manual laborer (each 9.09%).

Type of fracture:

Table III. Distribution of patients by AO type of fracture (n=11)

Type	Number of patients	Percentage
A1	06	54.55%
A2	04	36.37%
A3	01	9.09%

Out of 11 patients, AO type of fracture, type A1 was predominant (54.54%), A2 (36.37%), A3 (9.09%).

Table XVIII. Outcome of patients based on scoring system of Olerud and H.Molander (1984)

Olerud and H.Molander (1984) criteria (n=11)

Olerud and H. Molander (1984) criteria	Number of Patients	Percentage
Excellent	05	45.46%
Good	04	36.36%
Fair	02	18.18%
Poor	0	0

Evaluation of outcome by Olerud and H.Molander criteria, (1984) 6 months after intervention demonstrated that 45.46% of the patients had excellent outcome, 36.36% good outcome and 18.18% of the patients had fair outcome.

Excellent and good outcome are considered as satisfactory & Fair and Poor outcome are considered as unsatisfactory.

Out of 11 patients Satisfactory outcome (Excellent+God)9(81.82%)and
Unsatisfactory outcome 2 (18.18%).

DISCUSSION:

Age of the patients was between 21-61 years, mean age being 40 years. Almost similar findings were reported by Francois J et al, (2004)[6] & Hasenboehier E (2006)[7] mean age was 42.5 years respectively.

Among 11 Patients 8 (72.73%) were male and 3 (27.27%) were female. In the study of Hazarika S (2006)[1] male-female ration was 4:1.

Analyzing the mechanism of injury, most 8 (72.73%) of cause was motor vehicle accident & sports injury was 3, (27.27%). Sukuik M. et al,(2007)[8] commonest cause of the injury was high energy trauma.

Regarding Configuration of fracture in this study most of the fracture were AO type A1 (6) 54.55% followed by A2 (4) 36.36% & A3 (1) 9.09%. In the study of David L et al, (1999)[9] most of the fracture were A type (12) followed C type.

Average interval between injury and fixation was 10.63 days. In the study of Hazariks S (2006)[1] median interval between admissions an fixation was 10 days.

Average healing rate was 5.09 months. Hasenboehier E (2006)[7] treated 29 patients out of them 24 patients healed within 6 month & 3 developed delayed.

In this study 36.36% patient (4) has no pain in walking on even or uneven surface, 45.46% patients (5) noticed pain during walking on uneven surface and two patient (18.18%) complaint pain while walking on even surface.

Most of the Patent had no ankle stiffness. 27.27% (3) patients complaint different degree of ankle stiffness. In the study of Mario R (2009)[10] eight patients out of 19 had limp due to one patients need stick as a walking support.

In this study 8 (72.73%) patients had no history of ankle Swelling. 3 patients complaint only evening swelling of ankle. In the study of Francosi J et al, (2004)[6] persistent monor ankles swelling was noted in two patients.

In the current study 6 patients returned to their previous activities & 5 patients after temporary loss returned to their pre injury activities. In the study of Borg T (2004)[11] 11 out of 21 patients had returned to per injury activities.

In this current study almost all (90.91%) patients could squat but only one patient could not squat. In the study of Koa FC, (2010)[12] 17 patients out of 24 had some impairment in climbing stair.

Only one patient developed surface wound infection on medial side 1 month after surgery. In the study of francois J et al, (2004)[6] one had superficial on lateral in one case.

In the final follow up according to ankle scoring system of Olerud and H. Molander (1984) the satisfactory result was 81.82% of which 45.46% was excellent & 36.36% good results.

Minimally Invasive Locking Plate Osteosynthesis (MIPO) is a reliable method of treatment of distal tibial fracture without any significant problem.

CONCLUSION:

In this study, outcome of treatment of distal tibial fracture by Minimally Invasive locking Plant Osteosynthesis (MIPO) demonstrated

excellent to good result in majority of the cases. 54.55% of the patients returned to routine pre injury activities without limitations, other 45.45% returned to routine pre injury activities after temporary loss. No patient had permanent limitation of movements leading to impairment of lifestyle or had changed to a simpler job. So, Minimally Invasive locking Plate Ostesoynthesis (MIPO) provide stable fixation in distal tibial fractures.

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