Original Article

The Functional Outcome of Minimally Invasive Plate Osteo Synthesis Technique in Fractures of Proximal Tibail Shaft

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ABSTRACT

Objective: To determine the functional outcome of minimally invasive plate Osteo synthesis technique in fractures of proximal tibail shaft.

Study Design: Observational Study

Place and Duration of Study: This study was conducted at the Imran Idris Teaching Hospital Sialkot during Jan 2020 to Oct 2020.

Materials and Methods: A total of 80 cases collected from patients presenting in department of orthopedics Imran Idris teaching hospital Sialkot fulfilling the inclusion and exclusion criteria were explained about the procedure and written consent was taken, risks and benefits were discussed and proper follow up plan was made. All patients were operated in elective theatre of orthopedics department by the same surgeon. Patients were discharged on post-operative day # 1 and were called in outpatient department every 4 weeks for follow up of functional outcome; the functional outcome at 16 weeks was done and recorded. The permission of Ethical Committee of the institute was taken to collect the data and get publishing in Medical Journal. The data analyzed for results by SPSS version 20.

Results: A total of 80 patients fulfilling the inclusion/exclusion criteria were enrolled to determine the functional outcome of minimally invasive plate Osteo synthesis technique in fractures of proximal tibail shaft.

Age distribution of the patients was done which shows majority of the patients between 30-40 years i.e. 41.25% (n=33) while 31.25% (n=25) were between 41-50 years and 27.5% (n=22) were between 51-60 years, mean and sd was calculated as 41.34+3.76 years.

Gender distribution of the patients was done which shows 71.25% (n=57) male and 28.75% (n=23) were females.

Frequency of outcome of minimally invasive plate Osteo synthesis technique in fracture of proximal Tibial shaft reveals 61.25% (n=49) excellent and 38.76% (n=31) were good. Stratification of functional outcome for age of the patients was done and presented in Table No. 4, out of 33 cases between 30-40 years excellent were 21.25%(n=17) and 20%(n=16) were good, out of 25 cases between 41-50 years 22.5%(n=18) excellent and 8.75%(n=7) good, while out of 22 cases between 51-60 years 17.5%(n=14) were excellent and 10%(n=8) were good.

Stratification of functional outcome for gender of the patients reveal out of 57 male case, 46.25% (n=37) were excellent and 25% (n=20) good while out 23 females 15% (n=12) excellent and 13.75% (n=11) were good.

Conclusion: The results of the study concluded that functional outcome in patients of fractures of proximal tibail shaft treated with minimally invasive plate osteosynthesis technique is significantly reliable and applicable in future.

Key Words: Proximal tibail shaft fracture, minimally invasive plate osteosynthesis, functional outcome, excellent, good

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INTRODUCTION

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The concept of biological osteosynthesis refers to the conservation of the vascularity of the bone during surgical intervention to ensure the continued vitality of the individual fragments and to improve fracture healing. Fracture is the result of mechanical overloading with important biological consequences[1]. Treatment of the tibial fractures have evolutionized over a period of time and currently there are four principal methods of treating tibial diaphyseal fractures, although each method has a number of variants. Non operative management can be undertaken using either long leg casts, patellar tendon-bearing casts which allow knee movement, or functional braces, which permit both knee and hind foot movement. The three

basic operative techniques are plating, intramedullary nailing and external fixation.[2]

In recent years, surgeons have stopped using fracture union as the only measure of successful treatment. As they have started to examine parameters such as joint stiffness, gait abnormality, and return to function and employment, it has become clear that there are a number of drawbacks to the use of casts or braces. high rates of joint stiffness and malunion after cast and brace management.[2]

Proximal tibial diaphyseal fractures usually follow high-energy injuries, and are often comminuted. These fractures are notoriously difficult to perform interlocking nail, as they frequently become malaligned, the most common deformities are varus or an anterior bow.

Plating is one of the four main methods of treating tibial fractures. It requires open surgery, and the location of the incision and careful handling of the soft tissues are vital in order to minimize complications. No matter how much care is taken, however, soft tissue damage and periosteal stripping is inevitable, and this is a particular problem in comminuted or open fractures[2]. With the MIPO technique, the fracture site is not exposed and further damage to the soft tissues is prevented or minimized preserving the fracture hematoma. The philosophy is therefore similar to that of intra medullary nailing. The incision for implant insertion is distant from the fracture, the fracture is reduced closed, and the fixation of the implant to the bone does not interfere with the fracture.

Nonsurgical treatment of tibial fractures can increases the incidence of mal-alignment with unacceptable shortening. Hooper et al[3] concluded that no operative treatment resulted in more malunion and shortening. The most common surgical methods for treating distal tibial fractures are intramedullary nailing or medial plating.[4,5.] However, mal-alignment of the tibia may develop after nailing.[4]

Conventional Interlocking technique showed higher incidence of mal-alignment and deformity than MIPO for the treatment of the proximal or distal third fracture of the tibial shaft[6]

Classic open reduction and internal plate fixation requires extensive soft tissue dissection and periosteal stripping, with high rates of complications. Minimally invasive plating techniques reduce iatrogenic soft tissue injury and damage to bone vascularity and preserve the osteogenic fracture hematoma.[7]

MATERIALS AND METHODS

A total of 80 cases collected from patients presenting in department of orthopedics Idris hospital Sialkot fulfilling the inclusion and exclusion criteria were explained about the procedure and written consent was taken, risks and benefits were discussed and proper follow up plan was made. All patients were operated in elective theatre of orthopedics department by the same surgeon. Patients were discharged on post-operative day # 1 and were called in outpatient department every 4 weeks for follow up of functional outcome, the functional outcome at 16 weeks was done and recorded. The permission of Ethical Committee of the institute was taken to collect the data and get publishing in Medical Journal. The data was analyzed for results by SPSS version 20.

Inclusion Criteria: Fractures of proximal Tibail shaft were included in this study.

Exclusion Criteria: Without fractures of proximal Tibail shaft were excluded from the study.

RESULTS

A total of 80 patients fulfilling the inclusion/exclusion criteria were enrolled to determine the functional outcome of minimally invasive plate osteosynthesis technique in fractures of proximal tibail shaft.

Age distribution of the patients was done which shows majority of the patients between 30-40 years i.e. 41.25% (n=33) while 31.25%(n=25) were between 41-50 years and 27.5%(n=22) were between 51-60 years, mean and sd was calculated as 41.34+3.76 years. (Table No. 1)

Gender distribution of the patients was down which shows 71.25% (n=57) male and 28.75% (n=23) were females. (Table No. 2)

Frequency of outcome of minimally invasive plate osteosynthesis technique in fracture of proximal tibial shaft reveals 61.25% (n=49) excellent and 38.76% (n=31) were good. (Table No. 3)

Table No 1: Age Distribution of the Patients (N=80)

Age(in years)	No. of patients	Percentage (%)
30-40	33	41.25
41-50	25	31.25
51-60	22	27.5
Total	80	100
Mean and sd	41.34±3.76	

Table No 2: **Gender Distribution of the Patients (N=80)**

Gender	No. of patients	Percentage (%)
Male	57	71.25
Female	23	28.75
Total	80	100

Table No.3: **Frequency of Outcome of Minimally Invasive Plate Osteosynthesis Technique in Fractures Oproximal Tibial Shaft (N=80)**

Functional outcome	No. of patients	Percentage (%)
Excellent	49	61.25
Good	31	38.75
Total	80	100

Stratification of functional outcome for age of the patients was done and presented in Table No. 4, out of 33 cases between 30-40 years excellent were 21.25%(n=17) and 20%(n=16) were good, out of 25 cases between 41-50 years 22.5%(n=18) excellent and 8.75%(n=7) good, while out of 22 cases between 51-60 years 17.5%(n=14) were excellent and 10%(n=8) were good. (Table No. 4)

Stratification of functional outcome for gender of the patients reveal out of 57 male case, 46.25% (n=37) were excellent and 25% (n=20) good while out 23 females 15% (n=12) excellent and 13.75% (n=11) were good. (Table No. 5).

Table No.4: **Stratification of Functional Outcome for Age of the Patients (N=80)**

Age (in years)	No. of patients	Functional outcome	
		Excellent (%)	Good (%)
30-40	33	17(21.25%)	16(20%)
41-50	25	18(22.5%)	7(8.75%)
51-60	22	14(17.5%)	8(10%)
Total	80	49(61.25%)	31(38.75%)

Table no. 5: Stratification of Functional Outcome for Gender of the Patients (n=80)

Gender	No. of patients	Functional outcome	
		Excellent (%)	Good (%)
Male	57	37(46.25%)	20(25%)
Female	23	12(15%)	11(13.75%)
Total	80	49(61.25%)	31(38.75%)

DISCUSSION

Minimally invasive techniques in proximal tibial fractures are technically feasible and may be advantageous in that it minimizes soft tissue compromise and devascularization of the fracture fragments.[8,9] Indications for minimally invasive plate osteosynthesis of proximal fractures include displaced fractures involving the tibial plafond and those unstable fractures too proximal for safe stabilization with intramedullary nails.[10] This technique involves conventional open reduction and internal fixation of the associated fibular fracture when present, followed by minimally plate osteosynthesis of proximal tibia utilizing precontoured plates and percutaneously placed cortical screws. Post-operatively early active and passive motion is permitted while weight bearing gradually progress. Minimally invasive techniques maintain alignment without compression; the operative exposure and soft tissue stripping are minimized with vascular pedicle preserved throughout.[11]

We planned this study considering the fact that the sample size of previous studies was very small, and in Pakistan no study was conducted on this technique and international studies are also constraint on this technique which emphasizes the need of further studies to determine its outcome.

The results in this study reveal that majority of the patients were between 30-40 years i.e. 41.25%(n=33), mean and sd was calculated as 41.34+3.76 years, 71.25%(n=57) were male and 28.75%(n=23) were females, frequency of outcome of minimally invasive plate osteosynthesis technique in fracture of proximal tibial shaft reveals 61.25%(n=49) excellent and 38.76%(n=31) were good.

These findings are in agreement with a study[1] of 15 cases of proximal tibial fractures, they recorded 10 patient (i.e. 66.67%) achieved 0^0 to 110^0 of movement at the knee, in 4 patients (i.e. 26.67%) range of movement at the knee achieved was $90\text{-}110^0$ (flexion) and in only one patient (i.e. 6.67%) the range of motion was 0 to 90^0 (flexion).

Another study by Mahajan N revealed Out of 20 patients, 14 (70%)had excellent results, 4 (20%)had good results and 2 (10%)patient had a fair result, these findings are in agreement with the results of the study but the difference with this study was that they used this technique in distal tibial fracture and we used in proximal tibial fractures, but the out of both studies are consistent.[12,13,14]

MIPO, however relies primarily on the indirect reduction of the fractures using various techniques and in this way, the fracture environment is better preserved, as well as the blood supply to the bony fragments is not disturbed, which finally leads to decreased infection rate better fracture healing. MIPO offers several theoretical advantages compared to conventional open plating technique. A mechanically stable fracture-bridging osteosynthesis can be obtained without significant dissection and surgical trauma to the bone and surrounding soft tissues. As a consequence, the vascular integrity of the fracture and the osteogenic fracture hematoma are preserved.[15,16,17,18,19].

CONCLUSION

The results of the study concluded that functional outcome in patients of fractures of proximal tibail shaft treated with minimally invasive plate osteosynthesis technique is significantly reliable and applicable in future.

Author's Contribution:

Concept & Design of Study:	Adnan
Drafting:	Waqas Javed, Hannah Saleemi
Data Analysis:	Ammara Shafqat, M Arif, Kamran Hamid
Revisiting Critically:	Adnan, Waqas Javed
Final Approval of version:	Adnan

Conflict of Interest: The study has no conflict of interest to declare by any author.

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