Original Article

A study of primary treatment modality and period of union of fracture shaft of femur and tibia

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Abstract

Introduction: The goal of any fracture treatment is early union of fracture and to restore the function of the injured extremity completely. This may be achieved by closed reduction and immobilization and different modes of internal fixation. **Aims and Objectives:** To Study Primary Treatment Modality and Period of Union of Fracture Shaft of Femur and Tibia. **Methodology:** This study includes retrospective and prospective cases with complex fractures of shaft of femur and tibia admitted at our hospital during the period July 1998 to June 2002. A series of 52 cases of comminuted fractures of shaft of femur and tibia were studied. The study included 21 fractures of shaft femur of which 3 were Grade I compound and 18 were closed and 31 fracture of tibia of which 5 were grade I compound and 26 were closed. **Result:** In maximum cases 27 (57.69%) primary modality of treatment was POP slab and in 22 (41.30%) cases was skeletal traction was applied. Average operative period was 72 minutes out of 18 cases with operative period more than 90 minutes, 17 were fracture femur and one of fracture tibia. Average period of union was 23.05 weeks for fracture of femur and 17.6 weeks for fracture of tibia By neer's criteria Excellent Outcome was found in Tibia fracture (83.33%) while Good and Fair in Femur Fracture (10.58%), (26.31%) and Poor outcome was also found in Femur Fracture (5.26%). **Conclusion:** The technique of minimally invasive plate osteosynthesis is a safe and reliable treatment modality for complex comminuted fracture of femur and tibia. In biological plate osteosynthesis the incidence of nonunion, implant failure is much lower compared to conventional open plating for similar fractures

Keywords: Primary Treatment Modality, Period of Union, Fracture Shaft of Femur and Tibia.

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INTRODUCTION

The goal of any fracture treatment is early union of fracture and to restore the function of the injured extremity completely. This may be achieved by closed reduction and immobilization and different modes of internal fixation. The new term "Biological fracture fixation" with regard to the attribute "biological mainly draws attention to a requirement, which must be intrinsic to every bone fixation, the objective of biological fixation is to assist the physiological process of fracture healing wisely and optimally by minimal amount of operative intervention, minimal soft tissue dissection and periosteal elevation. Femur shaft fractures are a major cause of morbidity and mortality in patients with lower extremity injuries.[13,14,15] Femoral shaft fractures occur in a bimodal distribution. Femoral shaft fractures are usually the result of high velocity trauma and are more commonin the younger population. Fractures usually occur as a result of motor vehicle accidents.[16,17,18] The art of treating femoral shaft fractures is a delicate balance between restoration of limb length and alignment, and at the same time achieving early mobilization of the limb. This is, however, prevented by strong muscular forces, which become specifically important when the fracture is either proximal or distal. Various treatment modalities have been used to treat these fractures with Intramedullary (IM) nailing being the gold standard. IM nails are weight sharing implants which allow immediate weight bearing after static locking even in unstable fractures. They have the advantage of providing greater fatigue strength, better stability in all planes specially if locking screws are used and providing reamed bone at the fracture site.[8-12] Biological osteosynthesis, Bridging plate osteosynthesis, minimally invasive plate osteosynthesis (M.I.O.P) (first coined by Christian krettek[2] and The biological plating technique has been described by kretteck c[2].

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MATERIAL AND METHODS

This study includes retrospective and prospective cases with complex fractures of shaft of femur and tibia admitted at our hospital during the period July 1998 to June 2002.A series of 52 cases of comminuted fractures of shaft of femur and tibia were studied. The study included 21 fractures of shaft femur of which 3 were Grade I compound and 18 were closed and 31 fracture of tibia of which 5 were grade I compound and 26 were closed. Duration of follow up ranged from 6 months to 4 years. Fractures from sub-trochanteric to supracondylar area of femur, upper tibial metaphysis, tibial shaft and pilon fracture were included. Closed fractures and gustilo Anderson Grade I compound fracture were included in this group. Three cases were lost to follow up.Intra-articular fracture of femur, Infection, Poor skin condition, Gustilo grade II and more severe grades of compounding Pathological fracture excluded from study. Implants Used: For sub trochanteric fractures, contoured simple plate, DCP or LCDCLP were used. For supracondylar fractures, contoured simple plate, DCP or LCDCP were used.

RESULT

Table 1: Primary treatment modality

Stabilizing mode	No. of cases	Percentage
External fixator	**3**	**5.76**
POP slab or cast	**27**	**51.92**
Skeletal traction	**22**	**41.30**

In maximum cases 27 (57.69%) primary modality of treatment was POP slab and in 22(41.30%) cases was skeletal traction was applied. In one case, initial stabilizing mode was intramedullary nailing

Table 2: Duration of surgery

Time (in minutes)	NO of cases		Percentage (%)
	Femur	Tibia	
≤90	4	30	64
>90	17	1	10

Average operative period was 72 minutes out of 18 cases with operative period more than 90 minutes, 17 were fracture femur and one of fracture tibia.

Table 3: Period of union of fracture

Union in	femur			Tibia		
weeks	closed	compound	%	closed	compound	%
12-18	3	1	21.05	18	2	66.66
19-24	10	2	63.15	7	1	26.66
25-31	2	0	10.52	1	0	3.33
>31	1	0	5.26	0	1	3.33
Total	**16**	**3**		**26**	**4**	

Union was considered when there was no tenderness over fracture site no abnormal mobility, no pain on full weight bearing with evidence of callus in three cortices of two views of fracture site on radiograph. Average period of union was 23.05 weeks for fracture of femur and 17.6 weeks for fracture of fibia. Three cases were lost to follow-up.

Table 4: Results According to neer's Criteria

Bone	Excellent		Good		Fair		poor	
	Cases	%	Cases	%	cases	%	cases	%
femur	11	63.15	2	10.58	5	26.31	1	5.26
Tibia	25	83.33	2	6.66	2	6.66	1	3.33
Total	**37**	**75.51**	**4**	**8.16**	**6**	**12.24**	**2**	**4.68**

By neer's criteria Excellent Outcome was found in Tibia fracture (83.33%) while Good and Fair in Femur Fracture (10.58%), (26.31%) and Poor outcome was also found in Femur Fracture (5.26%)

DISCUSSION

Average operative period was 72 minutes out of 18 cases with operative period more than 90 minutes, 17 were fracture femur and one of fracture tibia.

Duration of Surgery

	Average Duration
C.Krettek *et al*[2]	125 minutes
K.A. Siebenrock *et al*[3]	126 minutes (range 35 to 220 minutes)
A.K.Varshneya *et al*[6]	20 to 90 minutes

The union was define as ability to weight bear without pain, absence of tenderness at fracture sight and presence of callus in three cortices in two views radiologically. The average period of union in our series was 23.05 weeks for fracture femur and 18.86 weeks for fracture tibia. The period of union for fracture femur ranged from 14 to 36 weeks and for fracture tibia, 12 to 68 weeks. There was no case of non-union in our series. Union period in previous series; C Krettek *et al*[2](fracture femur) 16.3 weeks ranging from 7.7 to 29.6 weeks, c. kettek *et al*[2] (supracondylar fracture femur) 11.6 weeks, ranging from 8 to 17 weeks. China *et al*[4] (fracture femur and tibia) 20.4 weeks. In our series, 4 cases (8.16%) had delayed union. Of the 4 cases 2 had fracture femur (10.5%) with segment comminution and 2 had fracture tibia (6.66%) of the two fracture fibia, one developed chronic osteomyelitis and another had grade III comminution with superficial infection. Both femoral fractures eventually united at 36 weeks. One of the fracture tibia with chronic osteomyelities at united at 66 weeks and other took 30 weeks. Delayed union was reported by j.s. china *et al*[4] (3.57%), A.K. varshneya[42] (8%) and K. wenda *et al* [7] (17.64%) In our series malunion was seen in 5 case (10.20%) of these 3 had fracture tibia and 2 had fracture femur. Of the fracture tibia 2 had fracture proximal third and developed varus angulation of 10%. one case of fracture femur (subtrochanteric) had external rotation deformity of 20^0 and another case (segmental

comminuted) had 2.5cm. shortening. Malunion was reported by K.A. siebenrock *et al*[3] 2 patient (10%) in femur, c.krettek *et al*[2] 4 patients (37.5%) in femur, k wenda *et al*[7] 1 case (5.88%) in femur.

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