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Evaluation of outcome of distal metaphyseal extraarticular tibia fractures treated by locking plates and intramedullary nailing in medical college setup

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Abstract

Background: Distal tibia metaphyseal extra articular fractures are associated with great dilemma for operating surgeon. It is associated with high rate of delayed and non-union due to precarious blood supply and less muscle coverage. Has poor outcomes and high complication rates. Although multiple treatment modalities are described to treat these fractures, there is no consensus on the best method of treatment. We hereby want to evaluate the outcome of metaphyseal extra articular tibia fractures treated by plating and intramedullary nailing.

Methods: This study was undertaken in patients who were operated in between October 2015 to January 2018 at Dr. Ulhas Patil medical college and hospital Jalgaon Maharashtra. Study included 39 patients with distal tibia metaphyseal extraarticular fracture treated by surgery. All the fractures were closed. Twenty four patients underwent expert tibia nailing whereas 15 patients were treated by locking plates. Patients were followed up at 6 weeks, 12 weeks, 4.5 months, 6 months and 9 months with x-rays.

Results: Thirty nine patients included in study and they were divided into two groups as nailing group and plating group. Plating group included 15 patients whereas nailing group included 24 patients. The mode of injury was road traffic injury in 27 cases, followed by self-fall in 9 cases and sports related injury in 3 cases. The average duration of surgery in nailing was group was 70 minutes (range, 60-130 minutes) whereas average duration of surgery in plating group was group was 88 minutes (range, 80-130 minutes). Average distance of fracture from articular surface was 6 cm in nailing group and 4 cm in plating group. The average time for union was 13.5 weeks for nailing group and for plating group it was 17 weeks.

Conclusions: Both intramedullary nailing and plating are the optimal methods of treatment. Plating is preferred in cases where fracture is close to articular area but requires more time than intramedullary nailing. There is little early union rate for nailing of 13.5 weeks as compare to plating of 17 weeks. Complication rates of plating like infection and wound complication are more than nailing because plating is open procedure than closed nailing procedure. Rest complication are comparable.

Keywords: distal, tibia, intramedullary, nailing, plating

Introduction

These types of fractures are unique in type. Axial and rotational forces on lower extremity typically results in fractures of distal tibia metaphysis and represents approximately 10% of the fractures of distal end of tibia [1, 2]. Distal tibia metaphyseal extra articular fractures are associated with great dilemma for operating surgeon. It is associated with high rate of delayed and non-union due to precarious blood supply and less muscle coverage. It has poor outcomes and high complication rates [3-6]. Soft tissue injury is higher in distal metaphyseal fractures than with shaft fracture [7]. This fracture can be treated by plating and intramedullary nailing.

We hereby want to evaluate the outcome of metaphyseal extra articular tibia fractures treated by locking plates and intramedullary nailing.

Methods

For this study, we included 39 patients with of metaphyseal extra articular tibia fractures who presented to Dr. Ulhas Patil medical college and Hospital Jalgaon Maharashtra. The study protocol had been submitted to and approved by the hospitals Committee for Ethics and Research 1 Month prior to start of study. In the period from October 2015 to January 2018,

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all patients presenting to hospital were included in study except patients having compound fracture and polytrauma. All patients were advised to stop smoking in post-operative period.

Results

Thirty nine patients included in study and they were divided into two groups as nailing group and plating group. Plating group included 15 patients whereas nailing group included 24 patients. (Table1).

Table 1: Master Chart

Cases	Age	Sex	Mode of Injury	modality	Time of surgery	Time of union	complications
Case 1	38	F	RTA	P	88	16 WEEKS	
Case 2	36	F	RTA	P	86	16 WEEKS	
Case 3	40	M	RTA	N	65	12 WEEKS	
Case 4	42	M	RTA	N	70	12 WEEKS	
Case 5	52	M	Self Fall	N	65	16 WEEKS	
Case 6	39	F	RTA	N	72	16 WEEKS	Maiunion
Case 7	40	F	RTA	P	100	-	Nonunion
Case 8	44	M	RTA	N	60	12 WEEKS	
Case 9	48	M	RTA	N	68	12 WEEKS	
Case 10	54	M	Self Fall	P	90	24 WEEKS	Delayed Union
Case 11	32	M	RTA	N	80	16 WEEKS	
Case 12	34	M	RTA	P	88	16 WEEKS	
Case 13	46	F	Sports	N	76	12 WEEKS	Malunion
Case 14	33	M	RTA	P	86	16 WEEKS	
Case 15	45	M	RTA	P	92	16 WEEKS	Infection
Case 16	37	M	RTA	P	94	16 WEEKS	Delayed Union
Case 17	40	F	RTA	N	66	12 WEEKS	
Case 18	46	F	Self Fall	N	74	12 WEEKS	
Case 19	28	M	RTA	P	85	16 WEEKS	Malunion
Case 20	30	M	RTA	N	79	12 WEEKS	
Case 21	43	F	RTA	N	72	16 WEEKS	
Case 22	34	M	RTA	N	80	16 WEEKS	
Case 23	26	M	RTA	P	88	16 WEEKS	
Case 24	38	M	Self Fall	P	92	16 WEEKS	
Case 25	32	M	RTA	N	70	12 WEEKS	
Case 26	44	M	Self Fall	N	65	12 WEEKS	
Case 27	40	M	RTA	N	78	12 WEEKS	
Case 28	36	M	RTA	P	90	16 WEEKS	Delayed Union
Case 29	36	M	RTA	N	68	16 WEEKS	
Case 30	30	M	RTA	N	66	12 WEEKS	
Case 31	46	M	Self Fall	P	80	24 WEEKS	Wound Dehiscence
Case 32	28	M	RTA	N	72	16 WEEKS	
Case 33	33	M	Sports	N	60	12 WEEKS	
Case 34	39	M	RTA	N	62	12 WEEKS	
Case 35	29	M	Sports	P	82	16 WEEKS	
Case 36	41	M	RTA	N	70	12 WEEKS	Malunion
Case 37	53	M	Self Fall	N	74	16 WEEKS	
Case 38	56	M	Self Fall	P	80	16 WEEKS	
Case 39	47	M	Self Fall	N	68	16 WEEKS	

Average age of patient for nailing and plating was 38 years (26-56 years). There were 5 females and 19 males patients in nailing group and 3 females, 12 males patients in plating group (Table 1).

The mode of injury was road traffic injury in 27 cases, followed by self-fall in 9 cases and sports related injury in 3 cases. (Table 1).

Average distance of fracture from articular surface was 6 cm in nailing group and 4 cm in plating group.

The average duration of surgery in nailing was group was 70 minutes (range, 60-130 minutes) whereas average duration of surgery in plating group was group was 88 minutes (range, 80-130 minutes).

The average time for union was 13.5 weeks for nailing group and for plating group it was 17 weeks (Table 1).

Discussion

Distal tibia metaphyseal extra articular fractures are associated with great dilemma for operating surgeon. It is

associated with high rate of delayed and non-union due to precarious blood supply and less muscle coverage. Axial and rotational forces on lower extremity typically results in fractures and represents approximately 10% of the fractures [1-2]. It has poor outcomes and high complication rates [3-6].

There are multiple various modalities of treatment for distal tibial metaphyseal extra articular fractures in the literature which compare them.

The various treatment options include plating, Nailing, AO external fixation, Ilizarov fixation to conservative treatment. Optimum treatment remains controversial although many studies compare the efficacy of each surgical method in the literature already.

In case of conservative treatment complications like delayed union, malunion and joints stiffness are very common which is used for stable fracture and comorbid patient [8,9].

Intramedullary nails are commonly used for treatment distal tibia metaphyseal extraarticular fracture where the fracture is away from the articular surface allowing two or more distal

locking bolts. It is less invasive than plating but difficult to achieve reduction and maintain it because of widened and characteristic of distal tibia anatomy [10-15]. The results have significantly improved with used of blocking screws and multiplanar locking bolts.

Whereas it is easy to achieve good anatomical reduction and maintain it with good rigid construction with locking plate fixation. It is also biochemically superior to intramedullary nailing however it results in extensive soft tissue dissection resulting in wound complications, hardware complications and infections. This can be warrant implant removal more frequently. With use of minimally invasive techniques the complications have significantly reduced [16-18].

Our study evaluated the outcome of distal metaphyseal extra articular tibia fractures treated by locking plates and intramedullary nailing. This study has shown that the average time for union was 13.5 weeks for nailing group and for plating group it was 17 weeks. In our study three patients were undergone malunion from nailing group but not much significant and no additional surgery was done.

Whereas from plating group one patient had infection which required implant removal, debridement and later external fixator. One patient undergone delayed union. One patient had malunion and one patient had nonunion for which additional surgery of bone grafting was done. One case had wound dehiscence for which debridement, daily dressing and later secondary suturing was attempted. [Table 1].

Conclusions

Both intramedullary nailing and plating are the optimal methods of treatment. Plating is preferred in cases where fracture is close to articular area but requires more time whereas intramedullary nailing is preferred for fractures away from tibial articular surface and requires less time.

There is little early union rate for nailing of 13.5 weeks as compare to plating of 17 weeks.

Complication rates of plating like infection and wound complication are more than nailing because plating is open procedure than closed nailing procedure. Rest complication are comparable.

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