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ORIGINAL ARTICLE

Outcome Of Unreamed Intramedullary Interlocking Nailing In Management Of Compound Tibial Fracture

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ABSTRACT

PURPOSE: To assess the clinical outcome of intramedullary interlocking nailing in open fractures of tibia, and to evaluate the incidence of complications in these open fractures as a result of the intramedullary nailing.

METHODS: Between FEB 2018 and FEB 2019, a total of 15 cases of open tibial shaft fractures were operated on with unreamed interlocking nails at zagazig university hospital, (6 females and 9 males) were available for study All fractures were classified according to Gustilo and Anderson system for open fractures. There were 9 (60%) type-I, 5 (33.3%) type-II,1 (6.7%) type-IIIA, . After thorough debridement under anesthesia, an interlocking nail was inserted. All nails were statically locked with two screw each proximally and distally.

RESULTS: The patients were followed up for a mean period of 12 months (range, 6-12 months) and union time were evaluated according to the R.U.S.T score Results were good to excellent Rust score was distributed as 11.26±0.96 with minimum 9 and maximum 12 which refers to full union. Of all 15 patient 8 cases (53.6%) were with no complication and Superficial wound infection was (13.3%) as Ankle stiffness 1 case (6.7%), Delayed union 1 case (6.7%) and anterior Knee pain were 3 patient with (20.1%).

CONCLUSION: This study demonstrates that grade I, II and III A open tibial shaft fractures can be treated with primary debridement and locked unreamed intramedullary nailing with good short-term results, a better biomechanical stability and early rehabilitations and infection rates as compared to other methods.

INTRODUCTION

Tibial fractures are the most common long bone fractures, with around 25% being open fractures. The majority of open tibial fractures result from high velocity trauma such as road traffic accidents and falls from height. The management of these fractures can be complex due to the relative lack of soft tissue coverage and blood supply of the shin bone shaft.[1]

Open fractures also result in high infection rate due to communication with the external environment. As such, antibiotic prophylaxis is usually administered before, during and after surgical fixation [2].

The management of these fractures requires a multidisciplinary approach in order to achieve quick healing and early ambulation for the patient. Various classification systems have been proposed in literature, in an effort to grade the extent of the initial injury, and to offer useful prognostic clues to aid in deciding on the optimal management. The most widely used is the Gustilo-Anderson classification, which describes three groups of increasing severity based on the size of the open wound,

the degree of contamination and the extent of the soft- tissue injury [3].

PATIEND AND METHOD

The study was done according to The Code of Ethics of the World Medical Association (Declaration of Helsinki) for studies involving humans. It was a prospective cohort study approved by Ethical committee of the Faculty of Medicine- Zagazig University and performed according to ethical guidelines in Declaration of Helsinki. All patients provided with informed consent before participation in the study. Between February 2018 and February 2019, a prospective study was done on fiftheen patients (15 type I and type II and IIIa open tibial shaft fractures) were treated with IMTN **(**INTRAMEDULLARY TIBIAL NAIL) as their primary treatment in zagazig university hospital . The age ranged between 18 to 60 years old with mean age 32 years. The interval between the injury and the surgery was 8-48 hours. All patient were classified according to the criteria of Gustilo and Anderson classification as type I were **9** patient and type II **5** cases type IIIa only **1** candidate **.**

Age, gender, types of fracture, and surgical outcomes were recorded at the time of surgery, during hospital stay, and during follow up. Postoperatively patients were followed clinically and radiologically up to one year.

Statistical analysis

Data collected throughout history, basic clinical examination, laboratory investigations and outcome measures coded, entered and analyzed using Microsoft Excel software. Data were then imported into Statistical Package for the Social Sciences (SPSS version 20.0) (Statistical Package for the Social Sciences) software for analysis. According to the type of data qualitative represent as number and percentage , quantitative continues group represent by mean ± SD , the following tests were used to test differences for significance;. difference and association of qualitative variable by Chi square test (X^2) . Differences between quantitative independent parametric groups by t test, correlation by Pearson's correlation. Agreement by Kappa. P value was set at <0.05 for significant results & <0.001 for high significant result.

RESULT

Fiftheen patients given informed consent to enrolled in the study Age was distributed as **36.0±14.79** with minimum 18 and maximum 60, male were 60%, 20% of them were smoker and 40% with comorbidity[table 1]

The patients were followed up for a mean period of 6 months (range, 6-12 months) and union time ranged from (4 to 10) month with mean time of 6 month[table 2]

Function score

Functional outcome was done using the Klemm and Borner M criteria, at 6 months taking into account the following pain, gait, deformity, shortening, range of motion of knee and ankle and, neurovascular disturbances, In our series, 66.7% (10 patients) have got excellent result, 26.7% (4 patients) have good and 6.7%(1 patients) with fair functional outcome[table 5]

Table (1): Age and Demographic characters of studied group distribution among studied group (N=15)

		Age	
Age	Mean± SD	36.0±14.79	
	Median (Range)	32.0 (18-60)	
Gender	Female	6	40.0
	Male	9	60.0
Smoking	No	12	80.0
	Yes	3	20.0
Comorbidities	No	9	60.0
	DM	3	20.0
	HTN	2	13.3
	HTN, DM	1	6.7

		Age	
Comorbidities	Not	9	60.0
	Yes	6	40.0
	Total	15	100.0

Table (2): Union and follow up time

	UNION-TIME	FOLLOW-UP
Mean± SD	6.20±1.78	7.06±1.66
Median (Range)	6.0 (4-10)	6.0 (6-12)

Table (3) Complication distribution

		Frequency	Percent
Complication	No	8	53.6
	Ankle stiffness	1	6.7
	Delayed union	1	6.7
	Anterior Knee pain	3	20.1
	Superficial wound infection	2	13.4
Complication	Not	8	53.6
	Complicated	7	33.3
	Total	15	100.0

Table (4): R.U.S.T score distribution

	RUST-SCORE
Mean± SD	11.26±0.96
Median (Range)	12.0 (9-12)

Table (5): Function score among studied group

Function score	N	%
Excellent	10	66.7
Good	4	26.7
Fair	1	6.7
Total	15	100.0

DISSCUSION

The use of reamed intramedullary nails in the management of open tibial fractures is contentious. While reamed nails offer an improved stability to the fractures, their use carries the theoretical risks of increasing infections and non unions as a consequence of the disturbed endosteal blood supply . The use of intramedullary nails without reaming may compromise the stability at the site of the fractures. The numerous methods which are used for treating open fractures of the tibia are an evidence of the ongoing efforts which are being made to improve the outcomes of the treatment of these fractures and of the continuing pursuit of more efficient and advanced methods for treating these fractures [4].

The commonest cause of tibial diaphyseal fractures in most areas is road-traffic accidents, and the most difficult tibial fractures occur in motorcyclists—over 60% of all such tibial fractures are open[5]. Sports injuries are the second commonest cause of tibial fractures in Great Britain, but the fractures are relatively benign, including a high percentage of isolated tibial injuries without a fibular fracture,[6]. Amongst elderly people, a simple fall is usually the mechanism for a tibial shaft fracture. The treatment of open tibial fractures is complex and successful outcomes is dependent on multiple variables. The long-term complications

include non-union, chronic osteomyelitis and amputation[7].

In developing countries, lower limb fractures are very common due to the large number of pedestrians and users of two-wheelers, who are mostly the young active patients In this study, the cause of trauma was one case due to direct trauma (6.7%) and one case due to gun shot (6.7%) Three patient due to fall down(20.1%) and the vast majority of cases were due to road traffic accident (RTA) it was the main cause of the open leg fractures in 10 cases (66.7%) . Regard fracture type transverse fracture (26.7%) Comminuted, Oblique and spiral fracture were (20%) and segmental fracture was (13.3%). all fracture classified according to Gustilo grading the majority were GI with 9 patient GII 5 patient GIIIA 1case. These results are comparable to those reported by Ganesh et al.[7] who showed that 90% tibia fracture due to road traffic accident, and they also reported that simple transverse tibia fracture were 23.33%, spiral 16.66%, and 20% oblique type. In Radhakrishna et al study reported 30% of open tibial fracture was transverse and oblique fractures.

On the other hand study conducted by Saied et al.[8]. showed that the fractures were simple in 34 patient (61.8%) and comminuted in 21 patient(38.2%) . The causative trauma was motor car accident in 25 case (45.5%) , fall from a height in 19 (34.5%) cases, direct trauma with heavy object in nine (16.4%) cases, and gunshot injury in two (3.6%) cases, 17 cases were grade II fracture, 14 cases grade IIIA[9].

In our study, the majority of the patients were in the age group of 18-60 years.. The average age of the victims was 32 years and the male incidence was 60 % while Female incidence was 40%. In the study conducted by and McBirnie mean age 37 year and Sakaki MH etal [10]reported average age 32.75 year. The incidence of male is higher because they are more involved in outdoor activity and thus more prone to MVA. Court-Brown and McBirnie etal [5]. In their study noted the male incidence to be around 81.3 % while Female incidence to be around 18.7%. marcos etal.[10] reported 90.9% male and 90.1% patient in their study.

Furthermore in our study the operative time was ranged from (40 to 90) min with mean time of 60 min .The hospital stay ranged between (3 to 8) days with mean time of 4 days in comparable to study of Koval et al. [11]. who reported that operative time (Range 30-60 minutes). The Impact of tibia IM interlock nailing intervention was evident through early discharge from hospital, early weight bearing, early healing and early return to pre-morbid status. Hospital stay for patients done IM locked nail (3-7 days; mean 5 days) was remarkably reduced compared to the patients treated by traditional methods of traction (42-84 days; mean 62 days).

One of the primary goals in the management of open tibial fractures is to achieve bony union. This is dependent on multiple host, injury and surgical factors, and the presence or absence of infection. Steinberg etal[12]. studied 25 patients of open tibial fracture with average union time of 15.4 weeks with no infection, malunion, non-union or delayed union. In our study the union time ranged from (16 to 40) weeks with mean time of 24 weeks while the follow up period ranged between (6 to 12) month with 6 month as mean period, In comparison to the average union time in Pandurangaiah and Shaikh[13] study was 29.02 weeks, while follow up period of minimum of one year.

Despite a thorough debridement and an adequate soft tissue coverage Infection rates was directly proportional to the severity of injury as defined by the Gustilo-Anderson classification as well as the host comorbidities [14]. Superficial infection usually resolves and respond well to iv antibiotic and wound dressing [15]. Our study show no result of deep infections. . Multiple studies reported superficial infection rates following intramedullary nailing of open tibial fractures Study of Larsen etal.[16] in operative treatment of open tibia fracture showed infection rate of 13% , while in study of Pandurangaiah S and Shaikh superficial infection rate was 7%.. Seron etal [17] reported Superficial infection developed in 10.8%of cases. Gustilo etal.[18] reported a 2-

16% incidence of superficial infections, a majority of which were type III compound injuries, while the results in this study show a superficial infection in 2 patient with rate of 13.3% and treated with IV antibiotic .

Regarding other complication in this study Delayed union observed in 2 cases with 13.4% and anterior Knee pain in 3 patient with 20.1% plus Ankle stiffness observed in 1 case 6.7% .In comparison with Study of Larsen etal[16] in operative treatment of open tibia fracture showed delayed union in 3% of cases treated with IM nail. Sanjay R and Vivek reported a delayed union in 10.8% of patients in Gustillo type II and 14.2% in type IIIa[19]. Another research conducted by Ganesh K etal [20] showed 4% ankle stiffness in his patients. while Muhammad etal.[21] reported a 36% incidence of anterior knee pain and they advocated the techniques of using a more proximal and medial entry point, hyper flexing the knee during the nail insertion and extending the knee during the screw insertion to lessen the irritation of the overlying tendons.

CONCLUSION

Overall, these results show that in the grade I and II open tibial fractures, a primary unreamed intramedullary nailing can be safely done, with minimal complications and excellent functional results. For the grade III open fractures of the tibia, the modern techniques of management, combined with the skills of experienced orthopaedic and plastic surgeons, can consistently restore excellent limb functions in a very high proportion of patients.

Conflict of interest: the authors declare that they have no conflict of interest.

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