

Outcome of type III open tibial fracture

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Abstract

Introduction: During this automobile era Road traffic accident becoming more and more common. Approximately more than 4.5 million open fractures occur per year in India. Tibia is the commonest site of open fractures. These injuries often result in extensive damage to soft tissue and bone. Severe open tibia fractures when associated with vascular injuries, present major challenges in management. The decision to amputate or salvage can often be difficult one even for experienced surgeon. The use of metallic plate, external fixation and intramedullary nailing are under investigation and we are in process of involving consensus. The present study was conducted to find outcome of Gustilo Anderson's type-III open tibial fractures in term of union time, amputation rate and was carried out in department of Orthopaedics of Seth Nandlal Dhoot Hospital, Aurangabad. The study was planned to evaluate the results of 50 cases of Gustilo Anderson's type III open tibial fractures. **Conclusion:** Aggressive debridement, skeletal stabilization, early soft tissue coverage and timely bone graft are needed for type III open fractures of tibia to unite. As soft tissue injury increases bone union time and amputation rate increases. The choice of implant depends upon the condition of the soft tissue for skeletal stabilization. Gustilo Anderson classification gave good guide line for prognostic outcome of type III tibial fractures.

Key word: Gustilo Anderson's type III tibia, plate, nail, external fixator.

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Received Date: 10/09/2014 Accepted Date: 17/09/2014

Access this article online	
Quick Response Code:	Website: www.statperson.com
	DOI: 19 September 2014

INTRODUCTION

The beginning of the new century has been very impressive with lots of advancements coming into practice in the field of Science and Technology. Civil life has changed its gear to match with the speedy routine. Roads, Automobiles and Transport network show a modified look. But on the other side, the dizzying pace of vehicles and ignoring the importance of road safety measures have resulted in escalating the number of RTAs and loss of precious human lives. Approximately more than 4.5 million open fractures occur per year in India¹. Tibia is the commonest site of open fractures.² These injuries often result in extensive damage to soft tissue and bone³. Severe open tibia fractures when associated with vascular injuries, present major challenges in

management The decision to amputate or salvage can often be difficult one even for experienced surgeon^{4,5,6}. The use of metallic plate, external fixation and intramedullary nailing are under investigation and we are in process of involving consensus

The current strategy of open tibial fracture treatment is;

1. Broad spectrum antibiotic after taking culture swab
2. Early surgical debridement.
3. Early skeletal stabilization
4. Early, appropriate soft tissue coverage
5. Subsequent early bone grafting if required.^{7,8,9}

In present study was conducted in The Department of Orthopedics, Seth Nandlal Dhoot Hospital (SNDH), Aurangabad, Maharashtra, India. Duration of the study was from January, 2001 to December, 2008.

AIMS AND OBJECTIVE

1. To find outcome of Gustilo Anderson's type-III open tibial fractures
2. To observe Union time
3. To observe Amputation rate

MATERIAL AND METHODS

Present study was carried out in department of Orthopaedics of Seth Nandlal Dhoot Hospital,

Aurangabad. The study was planned to evaluate the results of 50 cases of Gustilo Anderson’s type III open tibial fractures. Retrospective and prospective analysis of outcome was done in various modalities of treatment

CLASSIFICATIONS

We used modified Gustilo-Anderson’s classification for classifying open fractures of tibia.

Type I: Clean wound less than 1 cm long

Type II: laceration more than 1 cm long but is without extensive soft tissue damage, skin flaps or avulsions.

Type IIIA: Extensive soft tissue laceration or flap but maintain adequate soft tissue coverage of bone, or they result from high energy trauma regardless of size of wound .these group includes segmental or severely comminuted fracture, even those with 1 cm laceration.

Type IIIB: Extensive soft tissue loss with periosteal Stripping with bone exposure. The usually are massive contamination.

Type IIIC: open fracture with arterial injuries that requires repair regardless of size of soft tissue wound.¹⁰

OPERATIVE MODALITIES

Interlock Nailing, Plating, External Fixator, Ilizarov’s Ring Fixator, Debridment, Split Skin Graft, Fasciocutaneous Flap, Muscle Flap, Cross Leg Flap

OBSERVATIONS

The present study consists of 50 cases of open tibia fractures. All those fractures were divided according to Gustilo Anderson’s into type IIIA, IIIB and IIIC. In all patients appropriate debridment , early skeletal stabilization, soft tissue coverage was done, union time amputation rate were calculated. The data of these cases had been compiled. All other associated injuries were taken care

Anatomical level of fracture shaft

Upper third shaft fractures were more common (46%)

Fixation modalities

Out of 50 patients, 9 patients underwent unreamed intramedullary interlocking nailing; Plate applied to 7 patients and in 17 patients primarily external fixator was used. 8 patients were such that required multiple implants or other than these implants, 9 patients underwent amputation



Table 1: Incidence of type III fractures according to Modified Gustilo – Anderson’s classification

Fracture type	Percentage
IIIA	30%
IIIB	38%
IIIC	32%

Table 2: No. of patients underwent amputations

Type	Primary	Secondary	Total
A	-	-	-
B	1	2	3
C	3	3	6

Total no of amputations done in our series was 9 (18%), out of these 4 patients (44%) underwent primary amputation and 5 (55%) underwent secondary amputation. Incidence of amputation was maximum (37.5 %) in type IIIC. Not a single patient of type III A underwent amputation.

Table 3:

Type Method	A	B	C	Total
I.L. Nailing	5	3	1	9
Plating	3	2	2	7
External fixator	5	7	5	17
Combined/ others	2	4	2	8
Total	15	16	10	41

Table 4: Union time (months)

Type Method	A	B	C	Total
Nail	6.2	7.7	10	7
Plate	7.8	7.76	11.5	8.92
External fix.	9.88	23.76	16.2	13.4
Combined/ other	12.6	14.28	19.8	15.41
Total	7.37	11.74	15.35	11.67

The mean time of union in nailing group was app. 7 months, in plating group 8.92 months, in external fixator group 13.40 months In type IIIA, B and C it was 7.37 months, 11.74 months and 15.35 months respectively Mean union time in our series was 11.67 months.



Figure 1: Pre-op clinical photo and radiograph



Figure 2: Post debridement and with ex fix



Figure 3: Sequestrum



Figure 4: Fasciocutaneous cross leg flap



Figure 5: After division of cross leg flap



Figure 6: After bone union

DISCUSSION

Present study focus on 50 patients with fresh type III open tibial fractures which were classified by Gustilo-Anderson's in to type IIIA, III B and IIIC. 15 patients were type III A, 19 type B and 16 in type III C. Out of these 50 patients, 9 patients underwent amputation, 4 primary and 5 secondary. Of 41 patients, 9 underwent unreamed intramedullary interlocking nailing, Plate applied to 7 patients and in 17 patients' primarily external fixator used 8 patients was such which required multiple implants or other than these implants. Results of all these were compared with previous studies. As per age and sex distribution 75 % patients were in 2nd to 4th decade, 18 % patients were from 5th decade and maximum age being 69 year. These were compared with previous studies of Court-Brown Cm et al¹¹, Azam Q et al¹², Kesemenli CC et al¹³. There were 39 male and 11 female patients. Road traffic accident was most common mode of injury in 87% cases and males were more commonly involved. 2nd to 5th age group males form the active earning members of family and early uncomplicated outcomes make return to work early and minimize dependency ratio. As far as side concerned, in our study majority of fractures were right sided (70%) and Upper third tibia fracture were more common (46%) Amputation rate was calculated in our study. Over all amputation rate was 18% which were 0, 15.78 and 37.5% in type IIIA, B and C respectively which are compared with Gustilo RB et al¹⁴, Court-Brown Cm et al¹¹. Out of 9 patients 4 underwent primary amputation and 5 underwent secondary amputation. Multiple debridement, skin and bone grafting, various type of muscle flap was the various operations needed other than skeletal fixation. In type III C because of loss of blood supply and presence of nonviable tissue, healing process was slow and multiple procedures were needed to soft tissue coverage and bony union. In present study 70% patients got operated within 12 hrs. of injury. None of patient was operated after 48 hrs. Most of type IIIB and C patient got operated as early as possible after arrival to hospital. The delay in operation in type III B and C was due to time required to reach to hospital In our study mean union time was 11.67 months which in type IIIA, B and C were 7.37, 11.74, 15.35 months respectively which

were compared with Court-Brown Cm et al¹¹, Gustilo RB et al¹⁴, Ueno M et al¹⁵, Song KJ et al¹⁶, Sudhir babhulkar et al¹⁷, Inan M et al¹⁸. In nailing group mean union time was 7.0 month compare with Shannon FJ et al¹⁹, Henley MB et al²⁰, Inan M et al²¹, Kaftandziev I et al²², Kesemenli CC et al¹³, in plating group 8.92 months and in external fixator group it was 13.4 months. Compare with Ueno M et al²³, Strackee SD et al²⁴, Song KJ et al¹⁶, Inan M et al¹⁸. Maximum mean union time was 19.8 months in group of patients which required multiple implants in type IIIC. In previous report, Song K J et al¹⁶ in his 44 type III open tibia fractures average union time in IIIA was 9.2 months, IIIB was 11.0 months and III C was 13.8 months.¹ In Ueno M et al, study average union time was 14 months in type III B open tibia fractures . In 2007 Inon M et al¹⁸, found average bone union healing was 19 week (14-23week) for external fixator group and 21 week (16-36 week) for unreamed tibia nail group in 61 type IIIA patients. Kaftandziev I et al²², found mean time of union was 38.4 weeks in patients with external fixture group, and 32.8 weeks in unreamed tibia nailing group in 48 type IIIA and IIIB patients. In our study we got satisfactory results as compared to other studies in gustilo's type III A and B fractures even if we fixed it after golden paid (<6 hrs) when strick protocol such as aggressive debridement, prophylactic antibiotic coverage, early soft tissue reconstructive and timely bone and skin grafting done.

CONCLUSION

Aggressive debridement, skeletal stabilization, early soft tissue coverage and timely bone graft are needed for type III open fractures of tibia to unite As soft tissue injury increases bone union time and amputation rate increases. The choice of implant depends upon the condition of the soft tissue for skeletal stabilization. Gustilo Anderson classification gave good guide line for prognostic outcome of type III tibial fractures. For late cases the decision about primary amputation vs. limb salvage is important issue which is not fully explained by any of the current available guideline

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Source of Support: None Declared
Conflict of Interest: None Declared