The Professional Medical Journal
www.theprofesional.com
DOI: 10.17957/TPMJ/16.3061

ORIGINAL PROF-3061

AO EXTERNAL FIXATOR;
A TREATMENT OPTION FOR OPEN TIBIAL DIAPHYSEAL FRACTURES (TYPE II, IIIA)

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Article received on:
18/08/2015
Accepted for publication:
02/10/2015
Received after proof reading:
10/03/2016

ABSTRACT… Objectives: To appraise effectiveness of AO external fixator, a treatment method for open diaphseal tibial fractures (type II, IIIA). **Methods: Study Design:** Cross sectional study. **Setting:** Department of Orthopedic Surgery and Traumatology (DOST) Liaquat University of Medical & Health Sciences Jamshoro. **Period:** Two year from 2009 to 2011. Total 40 cases of open tibia fracture had selected all the cases with fresh open diaphyseal fractures of tibia and patient arriving within one week injury. And Grade II, IIIA had included. All the cases associated with head injury or abdominal injury, diabetic mellitus and liver or kidney disease had excluded. **Results:** Total 40 cases of open diaphyseal fracture of tibia were selected in this study based on inclusion criteria. The mean age was 33.1 $\pm$ 10.27 years. Out of 40 cases, 36(90.0%) were male. Majority of patients of RTA were injured due to motorcycle accidents 24(60.0%). Mean of union time was 18.1 $\pm$ 3.72 weeks. Wound became infected in 5(12.5%) cases, 5.0%, n = 40) were seen with late union, screw sites infection found in 5.0% cases, Knee stiffness was found in 10.0% cases, six 15.0% patients developed pain during walking. **Conclusion:** AO fixation is very safe, insignificant intrusive, get short surgical time, following by hospital duration, low infection rate and can be utilized as unequivocal and effective administration of open tibial fractures.

Key words: Open fractures, tibial diaphyseal, AO external fixation

Article Citation: Mirjat AH, Bhutto IA, Memon SA. AO external fixator; a treatment option for open tibial diaphyseal fractures (type II, IIIa). Professional Med J 2016;23(3):279-283. **DOI:** 10.17957/TPMJ/16.3061

INTRODUCTION

Fractures of tibia are most well-known fractures of long bone in body.[1,2] Open fractures are commonest in long bone particularly in the center of the length.[2] Inadequate blood stream and absence of delicate tissues in antero-average part of tibia length inclines tibia, open fracture toward the non-union and advancement of infection.[3] Treatment of fractures of tibia has augment amongst surgeon of the orthopedics.[4] At present, non-surgical methodology like utilizing throws, support or interventional endeavors like embeddings of plate, intramedullary nailing and EF are utilized for the management of its open fractures.[5] Assortment of every of the over usual technique are corresponded with specialist choice and monetary status of cases. At the North America, the greater part of specialists do reamed nailing used for treatment of tibial open / shut fractures.[5] In creating nations due to low offices and absence of restorative instruments, the determination of every strategy might differ.[6] Freshly, outer fixators like AO external fixator are utilized broadly as a part of creating nations however the rates of malunion and contamination are moderately high.[3,7] AO fixator is extremely prominent in treating sort 111A and B open fractures of the tibia in our set up due to it is effortlessly accessible ,practical, light weight, easy to apply, slightest awkward, giving insignificant agent injury, and great access to the soft tissue and monstrous contamination. It is especially helpful in sort 111A open breaks of tibia. This study was directed to assess the adequacy AO external fixator for treatment of tibial open fractures type II and IIIA.

MATERIAL AND METHODS

This cross sectional study was carried out in the department of Orthopedic surgery of Liaquat University of Medical and Health Sciences Jamshoro/Hyderabad. Total 40 cases of open

diaphyseal fractures of Tibia were included. All the adults' patients' with fresh open diaphyseal fractures of tibia and patient arriving within one week injury, and Gusstillo Grade II, IIIA were included. All the patients associated with head injury or abdominal injury, diabetes mellitus, associated liver or kidney condition, poly trauma were excluded. All the routine lab investigations and physical examination along with radiology were carried out. All the cases were underwent AO External Fixator, age group from 20 - 50 years were included. Introductory revival, splintage and essential watch over the injury was given in emergency, any bone pieces that were projecting out were secured with clean dressing. Every one of the cases was directed about condition of fracture, its significance and its complications. An early microbial swab, preoperative antibiotics, surgical can/wound debridement and obsession of fracture according to AO were carried out. Follow-up was carried out with prompt postoperative radiographs and clinical consideration. This follow-up was done by OPD week by week for one month, then monthly for three months. Follow up radiography and exchange dressings were done in OT. Record of the considerable number of cases was kept up in the proforma, as well as clinical and radiography, perspective of mending of wounds, fracture union and complications.

RESULTS

Total 40 cases of open diaphyseal fracture of tibia were selected in this study based on inclusion criteria. The mean age of the cases was 33.1 $\pm$ 10.27 years. Out of 40 cases, 36(90.0%) were males and 4(10.0%) were females. 24(60.0%, n = 40) cases of right tibia fractures and 16(40.0%, n = 40) were with left tibial fracture. The fractures were classified according to modified Gustilo Anderson classification. Most of the patients 28(70.0%, n = 40) were seen in GIIIA while 12 (30.0%, n=40) cases found with GII. Table-I.

The results of this study showed, majority of patients of RTA, following as; motorcycle accidents 24(60.0%), Pedestrian 6(15.0%), Bicycle 3(7.5%), Car 1(2.5%), while Fall from height 3(7.5%) and Machine Injury was found only in 1(2.5%) cases. Table-II

Basic Characteristics	N. of pt/ (%)
AGE	
Age (in years)	30.8 $\pm$ 7.76
GENDER	
Male	38(95.0%)
Female	2(5.0%)
GUSTILO CLASSIFICATION	
Grade II	16(40.0%)
Grade III A	24(60.0%)

Table-I. Basic Variable Distribution (N = 100)

Mode of injury	N. of pt/(%)
Pedestrian	4(10.0%)
Bicycle	3(7.5%)
Motorcycle	28(70.0%)
Car	1(2.5%)
Fall from height	3(7.5%) 0
Machine Injury	1(2.5%)

Table-II. Mode of Injury (n = 40)

Mean union time was 18.1 $\pm$ 3.72 weeks, mean hospital stay was 4.850 $\pm$ 1.5 days, Mean $\pm$ SD of time between injury and arrival was 3. 2.9 $\pm$ 3.54 hours, Mean $\pm$ SD, time of full weight bearing was 14.2 $\pm$ 4.9 weeks. Table-III

Results	N. of pt/(%)
Time b/w Injury and Arrival (hour)	2.915 $\pm$ 3.54
Time b/w Arrival & Primary Procedure (hour)	1.125 $\pm$ 0.24
Time b/w Primary Procedure & Fixation (hours)	1.70 $\pm$ 0.54
Time of partial weight bearing (in weeks)	2.25 + 0.63
Time of full weight Bearing	14.2 $\pm$ 4.94
Time of Dynamization	13.1 $\pm$ 2.53
Time of union	18.1 $\pm$ 3.72
Total follow up time (weeks)	41.5 $\pm$ 16.11
Hospital stay (in days)	4.850 $\pm$ 1.56

Table-III. Overall Results (n = 40)

Result are expressed as Mean + SD

Original wound became infected in 5(12.5%, n = 40) cases, 2(5.0%, n = 40) cases noted with prolonged union duration, infection of screw sites was in 2(5.0%, n = 40) cases, Knee stiffness was found in 4(10.0%, n = 40) cases, six (15.0%, n = 40) patients developed pain during walking.

Table-IV

Complications	N. of pt/(%)
Wound infection	4(10.5%)
Non union	0
Delay union	2(5.0%)
Infected Entry point	2(5.0%)
Screw site infections	2(5.0%)
Pin tract infection	0
Pin site inflammation	0
Pain during walking	4(10.0%)
Pin site osteolysis	0
Pin loosening	0
Pin site hyper granulation	0
Ankle stiffness	0
Knee stiffness	2(5.0%)

Table-IV. Complications (n = 40)

DISCUSSION

Administration of open fractures of tibia keeps on being a noteworthy remedial issue and a test to specialists. Open fractures by and large are a consequence of a high-vitality injury. The typical life systems of the tibia in conjunction with the unpredictability of the open fracture (fractures themselves and injury of the soft tissue are the elements which impact the way of fractures treatment, union period and the complications) made this category fractures hard to treat.[8]

All the patients of this series were between 20 -50 years of age, mean age ± SD was 33.1 ± 10.27 in group A (NAEF) and in group B (AOEF) was 30.8 ± 7.76. Thakur and Patankar et al.[9] reported mean age as 38 years. Similarly Andrew N et al[10] reported ages average 36 years. We observed male in the majority 90.0% and 10.0% females; this may be due to the differences in the life style as: male are more involved in outdoor activities as compare to females; therefore they are more exposed to the risk of open fractures. As well as in a local study of Makhdoom A et al.[11] mentioned 88.24% males and 11.76% females. While S.K. Moda et al[12] also mentioned comparable male/female ratio. In the results of our study it is found that RTA is the common cause of open diaphyseal fracture, as 65.0% out of total cases. This may due to ignorance rules of the of traffic, rough uses of vehicles, on poor condition of roads in our society. Similarly some other authors also reported similar observation as, C.M. Brown etal[13] found TRA in 90% cases and Sultan S[14] found 87.6% cases with RTA. In our study we found mean time union as 22.6 weeks with the range of (13-32 weeks), while Nila C. etal[15] found union between 16-20 weeks, khan A et al[16] reported union time within 20 weeks and Thakar AJ et al[17] mentioned union duration within 20 weeks. Makhdoom A et al.[11] reported mean for fracture union within 19.87 weeks. We found wound infection in 10.0% of the cases. While Kumar P[18] and Ricardo J[19] reported 0% infection, S. Gopal etal[20] reported infection in 9.5% of the cases. There is not any patient of non union, while delay union was found in 5.0% of the cases in our series. As well as in some other studies of Bhandari M et al[21] mentioned 14.2% non union rate, M J Iqbal etal[22] and Khan MA etal[23] found 9.6% and 5% non union rate respectively. By a study demonstrated malunion 31%.[10] Henly et al[24] mentioned postponed union or nonunion were connected with broad tissues damages. Papaioannov[25] demonstrated nonunion in the 20% cases after treated by the AO fixator. They additionally demonstrated that nonunion rates with Gustillo II and III.

CONCLUSION

This study conclude that AO fixator is basic, safe, financially savvy, insignificant intrusive, less working time, short stay of Hospital, less union time, gives great access to soft tissue, and can be utilized as clear and effective administration of open tibial fractures unhesitatingly, joined with right on time bone uniting it gives best results.

REFERENCES

1. Cannada LK, Anglen JO, Archdeacon MT, Herscovici D Jr, Ostrum RF. **voiding complications in the care of fractures of the tibia.** Instr Course Lect 2009; 58:27-36.

2. Whittle AP, Wood II GW. **Fractures of lower extremity. In: Canale ST. Campbell's operative orthopaedics.** 10th ed. Philadelphia, 2003; 2754 - 73.

3. Bhandari M, Guyatt GH, Swiontkowski MF, Schemitsch EH. **Treatment of open fractures of the shaft of the tibia: A systematic overview and meta-analysis.** J Bone Joint Surg Br 2001; 83:62-8.

4. Webb LX, Bosse MJ, Castillo RC, MacKenzie EJ;

LEAP Study Group. **Analysis of surgeon-controlled variables in the treatment of limb threatening type-III open tibial diaphyseal fractures.** J Bone Joint Surg 2007; 89: 923-28.

5. Petrisor BA, Bhandari M, Schmitsch E. **Tibia and fibula fractures. In: Bucholz RW, Court-Brown CM, Heckman JD, Tornetta III P. Rockwood and Green's fractures in adults.** 7th ed. Philadelphia; Lippincott Williams & Wilikins 2010; 1867-1923.

6. Wani N, Baba A, Kangoo K, Mir M. **Role of early Ilizarov ring fixator in the definitive management of type II, IIIA and IIIB open tibial shaft fractures.** Int Orthop 2011; 35:915-23.

7. Hasankhani E, Payvandi MT, Birjandinejad A. **The Ilizarov ring external fixator in complex open fractures of the tibia.** Eur J Trauma 2006; 32:63-8.

8. French, B., Tornetta, P. **High-energy tibial shaft fractures Orthop Clin** N Am 2002*;* 33: 211–30.

9. Thakur AJ, Patankar J. Open tibial fractures. **Treatment by uniplanar external fixation and early bone grafting.** Journal of Bone and Joint Surgery 1991; 73-; 3:448-51.

10. Andrew N. Pollak, M.D. Melissa L. McCarthy, SC.D., O.T.R. Andrew R. **Burgess, M.D. and the lower extremity assessment project (LEAP) study groups. Short – term wound complications after application of flaps for coverage of traumatic soft tissue defects about the tibia.** JBJS 2000;82;12

11. Asadullah Makhdoom, Muhammad Ayoob Laghari, Pir Abdul Latif Qureshi, Professor Khaleeque Ahmed Siddiqui. **Management of open diaphyseal fractures of tibia treated by Naseer Awais external fixator. Journal of Pakistan orthopaedic association** 2006; 18;1.

12. S.K. Moda; G.S. Kalra; R.S. Gupta; N.K. Maggu; R.K. Gupta; M.K. Kalra. **The role of early flap coverage in the management of fractures of both bones of leg.** Injury 1994; 25:83-86.

13. Court-Brown CM. Wheel Wright EF, Christ J, Mcqueen MM. **External fixation for type 111 open tibial fracture.** J Bone Joint Surg 1990; 72; 801-4.

14. Shahid Sultan and Ali Asghar Shah. **Management of open tibial fractures at Ayub teaching hospital Abbotabad.** J Ayub Med Coll 2001; 13; 22-23.

15. Tornetta P 3rd, Bergman M, Watnik N, Berkowitz G, Steuer J. **Treatment of grade-IIIb open tibial fractures. A prospective randomised comparison of external fixation and non-reamed locked nailing.** J Bone Joint Surg Br 1994; 76(1):13-9.

16. Khan MA, Khan SW, Qadir RI. **Role of external fixator in the management of type 11 & 111 open tibial fractures.** J Postgraduate Med Inst. 2004 (18)1: 12-17

17. Thakur AJ, Patankar J. Open tibial fractures. **Treatment by uniplanar external fixation and early bone grafting**. J Bone Joint Surg Br 1991; 73(3):448-51.

18. Kumar P, Shoba S. Arora, Singh GK. **Treatment of open fracture of tibial shaft .Comparison of external fixator versus intramedullary nailing as the primary procedure.** J. Orthopaedic 2004:1(3). http://www.jortho.org/2004/1/3/e3

19. Ricardo J. Pacheco and Michael Saleh: The role of external fixation in trauma. Trauma 2004; 6:143-160.

20. Gopal S, Majumder S, Batchelor AG, Knight SL, De Boer P, Smith RM. **Fix and flap: the radical orthopaedic and plastic treatment of severe open fractures of the tibia.** J Bone Joint Surg Br 2000; 82(7):959-66.

21. Bhandari M, Guyatt GH, Swiontkowski MF, Schemitsch EH. **Treatment of open fractures of the shaft of tibia: A systematic overview and meta-analysis.** J Bone Joint Surg Br. 2001; 83:62–8.

22. Iqbal MJ, Cheema GM, Akhtar S, Awais SM, Akhtar NM. **Complications of the AO external fixator in open type 111 tibial fracture.** Pak J Orthop Surg.July-Sept.1996; 12(3); 120-123.

23. Khan MA, Khan SW, Qadir RI. **Role of external fixator in the management of type 11 & 111 open tibial fractures.** J Postgraduate Med Inst 2004; (18)1: 12-17

24. Henley MB, Chapman JR, Harvey EJ, Whorton AM, Swiontkowski MF. **Treatment of type II, IIIA and IIIB open fractures of the tibial shaft: A prospective comparison of undreamed interlocking intramedullary nails and half-pin external fixators.** *J Orthop Trauma* 1998; 12:1-7.

25. Papaioannou N, Mastrokalos D, Papagelopoulos PJ, Tyllianaksi M, Athanassopoulos J, Nikiforidis **PA Nonunion after primary treatment of the tibia fractures with external fixator.** *Eur J Orthop Surg Traumatol* 2001; 11:231-35.

"Difficult roads lead to beautiful destinations."

Unknown

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