Original Article

Open Tibial Fractures

# Outcome of AO External Fixator for Open Tibial Fractures

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## ABSTRACT

**Objectives:** The purpose of the study was to evaluate the outcome of open tibial shaft fractures (Gustilo IIIA/B) with AO External Fixator & to document complications

**Study Design:** Perspective study

**Place and Duration of Study:** This study was conducted at DHQ teaching Hospital, Gujranwala& at Fazil Memorial Hospital, Gujranwala from November 2010 to November 2012

**Material & Methods:** 50 patients with open tibial shaft fractures were treated with AO External Fixator. Open fractures were classified according to Gustilo Anderson Criteria & wounds with IIIA & IIIB were selected. Outcome was determined by the rate of union, while nonunion, pin tract infection, pin loosening & osteomylitis were recorded as complications. The follow up period was 08 months.

**Results**: Out of fifty cases of open tibial shaft fractures, 38 (76%) were men & 12 (24%) were Ladies. Mean age was 35.2 (8-67), 22 (44%) had Gustilo IIIB wound while 28 (56%) had Gustilo IIIA injuries. Pin tract infection & pin loosening rate were 12% & 16% respectively. Nonunion was seen in 10% of the cases. In 41 (82%) of the cases fracture united and average union time was about 26.5 weeks. No case of osteomylitis seen.

**Conclusion:** External Fixator is simple & effective treatment for open tibial fractures.

**Key Words:** Open Tibial Fractures, External Fixator, Gustilo Anderson's Classification, Union

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## INTRODUCTION

Open fractures of the lower limb are potentially devastating. The incidence of open long bone fracture is around 11.5 per 100,000 persons per year in United Kingdom[1]. Open fractures can be classified in many ways but the classification devised by Gustilo & Anderson is most common and is used worldwidely[2]. Nonunion & infection is quite common in tibial fractures owning to deficient blood supply & soft tissue coverage, so the treatment is controversial [3, 4]. Open tibial fractures are one of the commonest, complex & unexpected injuries in orthopedic practice[5]. Commonest causes of these fractures are road traffic accidents, firearm injuries, fall from height, fall of heavy objects & industrial injuries [6]. Now the blast injuries are emerging as one of the leading cause in certain areas of our country[7]. Treatments allow anatomical realignment, early mobilization which helps to get early pre-injury status[8].

Treatment includes bony fixation as well as soft tissue management[9]. Fixation can be external or internal. External fixation is preferred treatment in open fractures, although internal fixation with interlocking nail can be safely done, if patient is operated within golden period [10, 11]. External fixator can be applied for comminuted closed tibial fractures. Due to subcutaneous location of tibia, fixator is easy to apply[12]. There are certain problems with external fixation which has outweighed its popularity. These are pin tract infections, pin loosening & osteomylitis[13].

The aim of the study was to determine the outcome of AO external fixator in the treatment of open tibial shaft fractures in term of union & to document complications i.e. pin tract infection, pin loosening, osteomylitis & nonunion.

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## MATERIALS AND METHODS

Study was conducted at DHQ teaching hospital, Gujranwala & at Fazil Memorial Hospital, Gujranwala between November 2010 to November 2012 (Two years). After taking informed consent, patients with Gustilo IIIA/IIIB were selected. Patients having other injuries or Gustilo IIIC fractures were excluded from the study. Demographic information including age, sex mode of injury i.e Road Traffic accident (RTA), fall from height (FH), fall of heavy object (FHO), Firm Arm injury (FAI), Blast (B) & industrial injuries (IND) were recorded.

All the information was recorded on a specified Proforma.

All patients were admitted through emergency where clinical evaluation done, wound washed & limb

splinted. Necessary laboratory & radiological investigations were carried out. Tetanus prophylaxis, analgesia & I/V antibiotics were given. Patients were operated within 24 hours of presentation. Fractures were fixed with AO external fixator & wound debrided . Post operatively check X-rays were obtained, daily dressing done, range of motion started & IV antibiotics given for three days. Patient discharged at third post operative day. Discharge instructions were given including daily dressing, care of pin site, range of motion at knee and ankle & walking with support. Flow up plan was every 2nd week till two months & then bimonthly. Radiographs were obtained at first day, first month & then on every follow up. On every visit patients were examined for union & complications i.e pin tract infection, pin loosening, nonunion & osteomylitis. Union was defined as bridging callus crossing three of the four cortices on both AP & lateral radiographs with no pain on pressure or weight bearing. Pin site/tract infection was determined by clinical signs of local erythema, swelling, tenderness, fever, pus discharge or positive bacterial culture. Pin loosening was documented when there was new onset of pain at pin site along with clinical and / or radiographic loosening (radiolucent line along the schanz entry). Nonunion was defined as an absence of bridging callus across a fracture site for expected time (last follow up in our study). Osteomylitis was defined as clinical signs of fever, swelling, reddness, pus discharge along with radiological evidence of sequestrum at fracture site or schanz entry site.

Data was entered & analyzed by SPSS version 10

## RESULTS

Out of fifty patients, 38(76%) were male & 12(24%) were female (figure 2). Youngest patient was of 8 years old & oldest person was 67 years old.

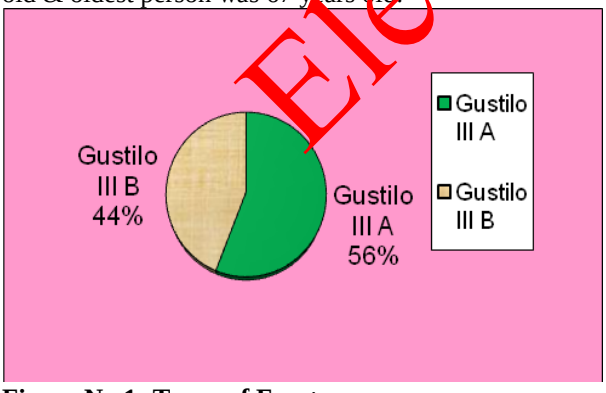


**Figure No.1: Types of Fractures**

Average age was 35.2 years (8-67). Road traffic accidents were the leading cause in our study with thirty two 32 (64%) Cases. Other injuries include firearm injuries (FAI) 8 (16%), fall from height 5 (10%), Fall of heavy object 2 (4%) while 3 (6%) cases were industrial injuries (figure 3). Pin tract infection was in 6 cases, 12% & pin loosening was in eight patients, 16%. All pin loosening occurred after three months. Nonunion was seen in 5 subjects (10%) & no case of osteomylitis seen. 22 patient had Gustilo IIIB injuries while 28 patients had Gustilo IIIA injuries (figure 1). Union achieved in 82% of the cases while 8% of the cases developed malunion.

**Table No.1: Gustilo and Anderson classification[2,14]**

| Gustilo Grade | Definition |
|---|---|
| I | Open fracture, clean wound <1 cm in length |
| II | Open fracture, wound > 1 cm but < 10 cm in length without extensive soft-tissue damage, flaps, avulsions. |
| III | Open fracture with extensive soft-tissue laceration (>10 cm) damage, or an open segmental fracture. This type also includes open fractures caused by firearm injuries, fractures requiring vascular repair, or fractures that have been open for 8 hours prior to treatment. |
| IIIA | Type III fracture with adequate periosteal coverage of the fractured bone despite the extensive soft- tissue laceration or damage |
| IIIB | Type III fracture with extensive soft-tissue loss and periosteal stripping and bone damage, Usually associated with massive contamination. Will often need further soft-tissue coverage procedure (i.e free or rotational flap) |
| IIIC | Type III fracture associated with an arterial injury requiring repair, irrespective of degree of soft-tissue injury. |

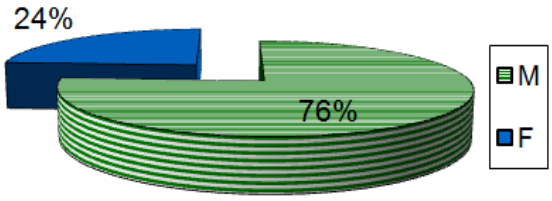


**Figure No.2: Gender Distribution**

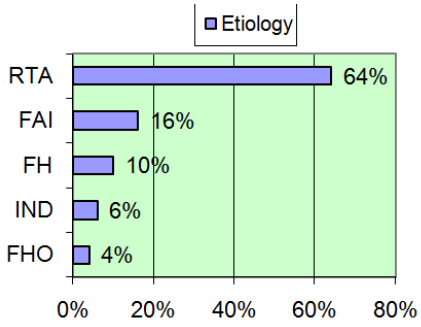


**Figure No.3: Etiology**

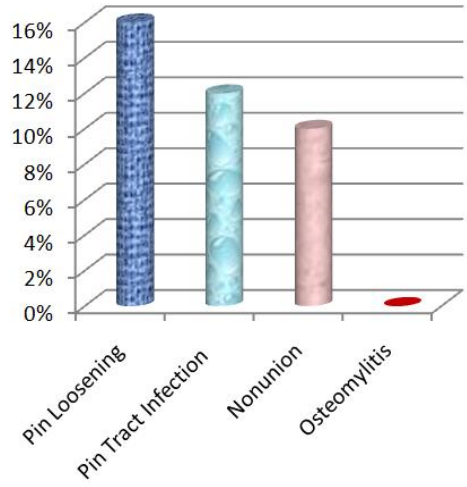


**Figure No.4: Complications**

## DISCUSSION

Our study showed 76% of the male involvement which other studies also have proved (fig 2) [14,15,16,17]. Operative treatment of the tibial shaft fractures usually leads to healing without any consequences on life & working ability[12]. The most common methods used in treating tibial shaft fractures are intramedullary nail, AO plates & external Fixator[18].

The external fixator in open tibial fractures not only solves the problem of managing soft tissue injuries but also provide a reasonable fixation for bone to heal. With AO fixator it is possible to adhere to safe & effective fixation techniques, avoid damage to vital structures, have access to wound & adjust the fixator so that it is biomechanically compatible with fractures[19].

Mean age in our study was 35.2 years which was quite comparable with other studies. All these studies have shown that these injuries occur in younger age group[20,21,22,23]. Mean time of fracture healing in our study was 26.5 weeks. Tucker et al[24] and schaztker[25] in separate studies reported union time of 25.6 weeks and 21.9 weeks respectively. Similarly Wheelwright, Court-Brown [26] and Adrover et al [27] reported a union time of 27.5 weeks & 26 weeks respectively. The union & nonunion rate in our study was 82% & 10% respectively. Kaftandziev[28] in his study produced union in 71.1% while Bratislav stojkovic [29] reported a union rate of 83.68% in his 49 patients.

In our study pin site/ tract infection rate was 12% & pin loosening was 16% (fig4). In a study by Parameswarma AD et al infection rate was 11.2% in 285 fractures. The incidence of Pin tract infection for the unilateral fixator group and the hybrid fixator group were not significant different[29, 30]. In another study average age of union was 21 weeks, Infection was 8%, nonunion was 11%, these results were produced in 1438 subjects by song k et al[31]. Shalamon J et al in his study proved that most of the Pin tract infection are mild and can be treated by local or systemic antibiotics. Loosening did not require a change of method of stabilization[32].

## CONCLUSION

External fixator is simple& effective mean of treating open tibial fractures.

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