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Management of open fractures of shaft of tibia in adults using interlocking intramedullary nailing

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ABSTRACT

Open fractures of tibia remain a formidable injury in today's motorized society for two reasons- they are common and they can be very challenging fractures to care for. Treating the spectrum of bone and soft tissue injuries that accompany open fractures of the tibia requires experience and judgment; an inadequate or inappropriate treatment can lead to severe complications. Open tibial fractures, particularly those with more severe grades of soft tissue injury have been associated with high rates of malunion, non-union and deep infection. Hence controversy remains regarding the optimum method of treatment of these fractures. A study was done on 23 Patients with open tibia fractures Treated with interlocking intramedullary nailing and assessment of time required for union of fracture with intramedullary nailing, complications during course of management of open fractures with intramedullary nailing and their functional outcome was analyzed Intramedullary nailing was found to be an excellent method and can be used safely in Gustillo Anderson Type I and II open fractures of the tibia. The patients treated with this method had good functional outcome and minimal complication.

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1. Introduction

Open fractures of tibia remain a formidable injury in today's motorized society for two reasons- they are common and they can be very challenging fractures to care for. Treating the spectrum of bone and soft tissue injuries that accompany open fractures of the tibia requires experience and judgement; an inadequate or inappropriate treatment can lead to severe complications. The prolonged nature of treatment of open tibial fracture frequently results in disruption of all aspects of patient's life and their expectations for improved functional outcome from treatment continues to challenge the treating surgeon. The fundamentals of management of open fractures of tibia are ; immediate wound. exploration, irrigation and debridement, bony stabilisation, use of antibiotics and early soft tissue coverage as reported in various

published series by Burgess AR [1], Chapman [2], Gustillo RB [3], Rhinelander [4] etc. The methods of bony stabilisation continue to be topic of controversy. Restoration of structural stability, maintenance of acceptable mechanical axis for tibial shaft with maximal functional restoration and avoid further soft tissue damage are criteria of successful treatment. The options include cast immobilisation, open reduction and internal fixation with plates and screws, external fixation and intramedullary nailing. In this study, an assessment of time required for union of fracture with intramedullary nailing was done. Also to determine the complications during course of management of open fractures with intramedullary nailing and analyse their functional outcome

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2. Material and Methods

This study was done in K.S.Hegde hospital, Deralakatte, between the period of 2010 and 2012. All fresh cases of open tibia fracture treated in Dept. Of orthopaedics were taken for study. Intramedullary nailing was chosen as the primary mode of fracture stabilisation in this study. 23 cases were taken for study. Patients with open tibia fractures irrespective of method of treatment adopted were admitted as inpatients, evaluated for general condition and treated accordingly. Blood transfusions are carried out if required and antibiotics started.

Patients were taken to OT at the earliest and wound examined for extent of skin loss and soft tissue coverage under anaesthesia. All fractures were treated by early and thorough wound toilet and the fracture was reduced and fixed with intramedullary nailing. 16 type I and 7 type II compound fractures were treated by interlocking nailing. Fractures closer than 5 cms to the knee and 3 cms to the ankle were not considered for intramedullary nailing. A longitudinal incision over the patellar tendon was used for nail insertion. A parapatellar approach was used to gain access to intramedullary canal. The nail was statically locked with 2 screws proximally and distally. The compound wound left open and dressing done regularly. Skin grafting performed at later date. Range of movement exercises started for knee and ankle post operatively and mobilised with crutches interval for fracture union. Patients followed up at 6 weeks. Full weight bearing started once fracture united. Dynamisation was done in 6 patients. Functional outcome was evaluated using a criteria suggested by Karlstrom and Olerud⁽⁵⁾.

3. Results:

The high incidence of tibia fracture was noted in 4th decade of life and the incidence was predominant in males. Majority of cases were due to road traffic accidents and least common were domestic or sports injuries. Right sided tibia are commonly fractured. Out of the 23 cases, 16 were type I GA open fractures and 7 were type II. 21.7% of cases were allowed full weight bearing by end of 4 months. By the end of 5th month it raised to 60.9% and by 6 months it was 91.3%. Infection rate was low as 8.69% in this study group. 2 patients had superficial infection, 4 patients required skin grafting, 2 patients went for delayed union and one for malunion. No mortality as such and no incidence of non union and limb length discrepancy.



4. Discussion:

Open tibial fractures, particularly those with more severe grades of soft tissue injury have been associated with high rates of malunion, non-union and deep infection. Hence controversy remains regarding the optimum method of treatment of these fractures.

Spiegel and Vander Schilden [6] pointed out that plate and screw fixation has significant complication rate by stripping the periosteum and further devascularising the bone causing weakening under the plate and not allowing early weight bearing. Burwell reported high incidence of osteomyelitis in open fracture of tibia treated by plate and screw.

Several authors like Kessler et al [7] advised against reamed nails in open fractures of tibia because there is minimal soft tissue envelope surrounding the tibia to supplement the periosteal blood supply. This envelope is injured with open fractures and the further disturbance of intramedullary blood supply by reaming can lead to significant complication. All patients in the series were treated by early and thorough wound debridement, broad spectrum antibiotics were started and effort was made in early soft tissue coverage. Primary debridement done in all patients within 6-8 hours of admission to hospital. Minimal soft tissue handling and thorough debridement was the aim during the operative procedure. Thorough irrigation with ringier lactate solution proved to be useful. Wound was not sutured primarily, daily aseptic dressing of the open wound was done. Delayed primary closure was done in 7 cases and split thickness skin grafting over healthy granulation tissue was done in 10 cases which could not be sutured.

Majority of the cases in the study were in the third and fourth decades of life comparable to other series like J.F.Keating [8], Eric L. Feedman [9], G.P Whitelaw [10]. This may be due to nature of activity and exposure to accident during middle age. Open fractures are predominantly seen in males during the study. Similar observations were made by authors like J.F Keating [8] and CM Court Brown [11]. Majority of fractures were due to road traffic accidents resulting from poor road conditions and lack of traffic discipline. Similar results were observed by J.F Keating [8] and CM

Brown [11]. Majority of fractures were due to road traffic accidents resulting from poor road conditions and lack of traffic discipline. Similar results were observed by J.F Keating [8] and CM Court Brown [11]. High velocity injuries were frequently complicated by associated injuries like Colle's fracture, fracture ribs and ipsilateral femoral shaft fracture. No abdomen injuries or head injuries in the current study group.

Patients were discharged on suture removal once incision site was healed. During the study duration of hospital stay was less in treating with intramedullary nailing. Patients were discharge in mean duration of 19 days. Range of movement exercises of knee and ankle were started as early as possible and patients were mobilised with crutch support. The average time to union of open fracture treated by intramedullary nailing was 21.4 weeks. A.J Edge [12] reported average time to union of 26 weeks in open fractures treated conservatively with plaster cast. Clifford et al [13] reported an average time of 24 weeks in patients treated with plate and screw fixation. J.F Keating [8] noted average of 24 weeks with IM nailing.

Functional outcome was good in 90% of patients treated with IM nailing. The incidence of delayed union was the least (8.69%) in the interlocking group which healed with bone grafting. Incidence of infection was 8.69% in the study group. Malunion was noted in one patient in the study group, who had an external rotation deformity of 5 degree which was due to surgical error during interlocking screw fixation. Keating et al [8] reported a 6% incidence of malunion in their series treated with intramedullary nailing.

5. Conclusion

Intramedullary nailing was found to be an excellent method and can be used safely in Gustillo Anderson Type I and II open fractures of the tibia. The patients treated with this method had good functional outcome and minimal complication. The average time of union in patients treated with intramedullary nailing was found to be lower in this study. Although surgical management gives good functional outcome, we conclude that the choice of treatment in the management of open fractures of tibia depends on the type and grade of injury.

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