ORIGINAL ARTICLE

Early Management of Diaphyseal Gustelo Anderson Type II Open Tibial Fracture by Unreamed Intermedullary Nail Versus Narrow DCP as Bridge Plate

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ABSTRACT

The aim of the study was to compare the use of undreamed intramedullary nail with 4.5mm narrow dynamic compression plate (DCP) in management of open tibial Gustilo Anderson (GA) type II fracture presenting with in first 24 hours. This comparative study was conducted at Mayo Hospital Lahore from January 2015 to April 2017. A total of 60 patients were randomly divided into two groups. Group I treated with 4.5mm DCP while patients of Group II treated with undreamed intramedullary nail. Time of union and occurrence of infection was assessed. There were 24 (80%) male and 06 (20%) females in Group I while in Group II 26(86.67%) were male and 04(13.34%) were females. Mean duration of union in Group I was 9.67 weeks with full return to activity was at 24.33 weeks compared to Group II which was 27.72 weeks and return to full activity was 28.21 weeks. Four (13.34%) patients of Group I had delayed union and two (6.67%) had non-union who further need surgical debridement and application of external fixator whereas six (20%) patients in Group II had delayed union and none had non-union The overall union rate was 90% in group I and 96.66% in group II. Hence we conclude that treating GA type II open fractures of tibia with intramedullary nail yields better results in terms of union, onset of infection and early return to activity as compared to DCP.

Keyword: Tibial Fractures, Intramedullary nail, Dynamic compression Plates.

INTRODUCTION

Road traffic accident results in an increase in fractures and trauma and owing an increase in the road traffic accident in Pakistan, the incidence of fractures increases day by day. The most common bone to fracture is tibia and fibula in long bones.[1] In united states almost fifty million fractures of tibia and fibula are managed annually.[2] These fractures may be close open on the basis of soft tissue and skin injury and it may be simple or comminuted fracture[3,4].

Open fractures can be managed by external fixation using fixator or internal fixation using plate or intramedullary nail. Currently in treating such fractures in developed countries intramedullary nail is the treatment of choice but in developing countries lacking image intensifier usually platting is preferred and done.

Usually the tibial fracture surgery associated with some complications. No local studies had showed the advantages and disadvantages and comparison of the nail with DCP. So we conducted this study to compare the treatment of open fractures of tibia and fibula with intramedullary nail VS narrow DCP and also to assess the advantages and disadvantages of the two procedures.

METHODOLOGY

Using probability random sampling technique this randomized controlled trial was carried out at Mayo Hospital Lahore from January 2015 to April 2017. 60 patients were randomly divided into two equal groups using lottery method. Patients with Gustilo Anderson type II were included in this study. The patients not fit for anesthesia, uncontrolled diabetes, chronic kidney disease, liver disease, multiple fractures, close fractures and pathological fractures were excluded in the study. Group I patients were treated with open reduction internal fixation with 4.5mm narrow Dynamic Compression Plate (DCP) while patients of Group II treated with un reamed intramedullary tibial nailing.

Procedure: After taking informed consent and ethical consideration patient taken into the operation theatre and preoperative antibiotic given (ceftriaxone 2gm intravenous). In Group I patients the tourniquet was applied and narrow DCP was applied and in Group II the intramedullary nailing was done and tourniquet was not applied. We assessed time of union and infection. Post operatively patients were assessed for 2days and culture and sensitivity was sent for all wounds and antibiotics were given accordingly. Follow up period was 10th to 28th weeks and all patients were followed at two weeks intervals. Hammer et al criteria was used to assess the union.[5] and South Hamptons et.al. Criteria was used to assess infection.[6]

RESULTS

In Group I, the mean age of the patients was 33.9 years with minimum and maximum of 16 years And 60 years respectively. There were 24(80%) male and 6(20%) females. where as in Group II the mean age was 36.3 with minimum and maximum of 18 and 60 years respectively. There were 26 (86.67%) males and 4(13.34%) females.

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The mode of injury in Group I was 21(70%) patients had RTA due to motorbike, six (20%) had car accident while three (10%) had history of fall from height where as in Group II, 23(76.67%) had RTA due to motorbike, four (13.34%) had RTA with car and only three (10%) patients suffered trauma due to fall from height.

The mean duration of surgery in Group I was 71.32 minutes with minimum and maximum of 47 to 126 minutes respectively while in Group II it was 68.50 minutes ranged from nine minutes to 127 minutes. The duration of surgery was statistically significant between two groups (p=0.047). Mean duration to achieve union in Group I was 9.56 weeks and return to full activity at 24.33 weeks whereas in group II, the mean time of union was 27.72 weeks, weight bearing at 13.85 weeks and return to full activity at 28.21 weeks.

Delayed union and non-union was seen in Four (13.34%) patients and two (6.67%) patients in group I, nonunion requiring another surgery (removal of DCP, application of external fixator and wound debridement) while the patients with delayed union achieved union at last follow-up. whereas .in group II only six (20%) patients had delayed union none had non-union.

The mean follow-up time in Group I was 17.63weeks comparing with group II, i.e. 13.33 weeks. The overall union rate was 90% in group I and 96.66% in group II.

DISCUSSION

Nail.[1,7,8] despite of the controversies some studies still showed no significant difference in reamed and un reamed tibial nailing in terms of union rate, malunion and infection.[9] However it is proven that reamed nail provide more stability than undreamed one.[10,11,12] As un-reamed nail provides less stability so considered biomechanically weaker so it's still debatable that implant failure occurs in un-reamed nailing or not.[13,14]

In our current study the un-reamed nail for tibial fracture management gave better results rather than narrow dynamic compression plate in terms of union, infection and early return to activity.

Im et.al. in 2005 published a study comparing intramedullary nailing with dynamic compression plate in diapheseal tibial fracture in 64 patients. The patients were divided in two groups. Group I treated with intramedullary nailing while group II with DCP. In their study the duration of surgery in group I was 72 minutes comparing with group II which was 89 minutes. The mean time period of union achieved in group I was 18 weeks while in group II it was 20 week. They had a single patient with superficial infection in group I while had six patients with superficial infection and one patient with deep infection in group II. They concluded that intramedullary nails provided good stability and advantage in surgical time, wound management and union rate comparing with DCP[15]. Their results are consistent with our results and favors our results as in our study the duration of surgery was less in group I comparing with group II i.e., 71.32 and 68.5 respectively. Similarly the patients in group II had union rate of 96.66% and group I had 90% and the complications were also less in group II as compared to group I. In our study the implant failure was very high in group I as compared to group II.

In our study we had unremarkable blood loss in patients of both groups. Group I patients had no loss during surgery because of tourniquet however it was associated with soft tissue damage comparing with group II patients. The patients in group I also underwent multiple surgeries comparing with group II. However, in patients with intramedullary nailing we faced some difficulty in distal locking and the surgery took place under image intensifier. The patients of group II returned to the daily routine activities earlier than the patients of group I.

In 1998 Utvåg SE et.al., published a study on rats and assessed the effect of healing on degree of healing in segmental fractures in rats. Their study showed that reaming damages the blood supply of the bone and un reamed nailing preserve the blood supply so it is less associated with infection, but reamed nail provides biomechanically more stability than un reamed nailing[16]. So this may be the cause of the better results and low infection in un reamed nail in our study comparing with DCP.

Hence our study proved that undreamed intramedullary nailing in open tibial fracture is better than DCP provided that the availability of the facilities like C-arm, surgical approach and post op care. We further believe that more studies are required to evaluate the stability of the un reamed nail and to compare the stability of un reamed with reamed nail.

CONCLUSION

We concluded from the study that in treating Gustilo Andersson Type II fracture of tibial shaft the intramedullary nailing yields better outcome comparing with Dynamic Compression Plate (DCP) in terms of outcomes, union, surgical approach and surgical time.

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