REAMED VERSUS UN REAMED INTERLOCKING INTRA MEDULLARY NAILING FOR THE FRACTURE SHAFT TIBIA

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ABSTRACT
Objective: *To compare the results of Reamed Interlocking Intra Medullary Nailing versus Un Reamed Interlocking Intra Medullary Nailing in fracture shaft tibia.*
Study Design: *Comparative study conducted from July 2006 to June 2008.*
Setting & Duration: *Department of Orthopaedic, Unit II, Dow University of Health Sciences and Civil Hospital, Karachi.*
Methodology: *Sixty patients with fracture shaft tibia were included. Patients of either sex between 15-60 years of ages were included.The patients were randomly assigned in 2 groups i.e. Group A and Group B having 30 patients of each group. Group A patients were managed with Reamed Interlocking Intra Medullary Nailing and Group B managed with Un-reamed Interlocking Intra Medullary Nailing.*
Results: *Among the 60 patients, 278 were male and 32 female, with ages varying from 15-60 years, the average age of the patients was 42.6 years in Group A and 34.4 years in Group B. Results were evaluated for clinical and radiological data. We were able to complete the follow up of all the patients. Satisfactory union achieved in 96% of Reamed Nailing and 40% patients under went with non union/delayed union/mal union with Un Reamed Interlocking Intra Medullary Nailing in fracture shaft tibia.*
Conclusion: *Reamed intrelocking intramedullary nailing is the best method of fixation for fracture of shaft tibia.*

KEY WORDS: *Shaft Tibia, Reamed, Un-reamed, Interlocking, Intra Medullary*

INTRODUCTION

Fracture of tibial shaft is the commonest dypheseal fracture in adults, 50% occur with motor vehicle[1] accident, followed by sports injuries while 24% of the fractures are open injuries. Most fractures usually unite within 6 months.[2] Fracture shaft tibia can be successfully treated non operatively by close technique that requires three months immobilization[3] of extremity, have obvious disadvantages. Prolong hospital stay, joint stiffness, mal union, delayed union and non union may occur. Diaphyeseal fractures involve a wide spectrum fracture configuration and management of every patient by conventional technique is not possible.[4,5]

The unattainably perfect method of fracture treatment would safely fix the fracture so firmly that soft tissues and joints could be mobilized early and weight bearing could be permitted. A method closely approaching this perfection is the closed interlocking intra medullary nailing. The advent of closed locked intermedullary nail has been a major break through in the management of such fractures,[6,7] regardless of amount of communation. Fracture extending from the proximal to the distal metaphysis can be stabilized with interlocking nails. It is no longer necessary to select patients for this method of stabilization on the basis of either location of the fracture or fracture pattern. Moreover, the technique of closed nailing preserved the soft tissue attachment of the fracture fragments and fracture haematoma allowing rapid healing with abounded callous formation.[8-10]

Inter locking intra medullary nailing[11] (ILIMN) of the tibia greatly improves rotational stability and can be used to fix auxiliary unstable fractures located below 7 cm below knee joint to 4 cm above ankle joint. These

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are the reasons that over the past 50 years, Inter Locking Intra Medullary Nail technique for fracture fixation has gained universal acceptance. Closed Interlocking Intramedullary nail fixation is the procedure of choice for tibial shaft fractures[12], especially in poly trauma patients. It is the ideal technique with less complication. The purpose of the present study was to evaluate and compare the results of the Reamed ILIMN with Un-reamed ILIMN in fracture shaft tibia. The only pre-requiste to adopt this procedure is availability of image intensifier.[13]

METHODOLOGY

This comparative study was conducted in Orthopaedic Unit II, Dow University of Health Sciences and Civil Hospital, Karachi from July 2006 to June 2008 on 60 patients between 15 to 60 years of age of either sex who presented with history of Road Traffic accident having closed fractures of tibial shaft. Patients were divided into Group A and B having 30 patients in each. Group A patients were managed with Reamed ILIMN, while Group B patients were treated with Un-reamed ILIMN.

Exclusion criteria were patients having open injury[14], having pathological fracture and suffering from chronic diseases like diabetes, active tuberculosis etc.

Outcomes like time of union, non union, malunion, screw breakage and joint stiffness in both type of treatment were compared. Union[15] was taken as positive when there was no tenderness at the fracture site, and loading produced no pain, their was no motion at fracture site and radio logically union was evident. Fracture was labeled as having delayed union[16] when it occured after 6 month. Non-union was considered when a minimum of 9 months[15] had elapsed and fracture showed no visible healing. A fracture that healed with unacceptable amount of angulation, rotation, overriding and resulted in shortening was defined as mal-union[17] when union time is more then six months it termed as delayed union.[15]

The outcome of two groups were seen immediately after surgery and all patients having good Intra medullary nailing position and with screw fixation radiologically. The patients were allowed out of bed from next day on walker with partial weight bearing. Patient were encouraged knee bending and quadriceps exercises. Patient were followed after 10 days in ward for removal of stitches and then fortnightly in out patient department for one year.

RESULTS

There were 24 males and 06 females in Group A and in Group B there were 23 males and 7 females. In the age group of 20-30 years, there were 4 patients in Group A and 12 patients in Group B. There were 12 patients in Group A and 10 patients Group B, in the age group of 30 to 40. In 41 to 50 years age group, there were 12 patients, in Group A and 04 patients in Group B, while in the age group of 51 to 60 years. There were 2 patients in Group A and 4 patients Group B.

The mean hospital stay of Group A was 5.6 days and 8.4 days in Group B after surgery. The minimum hospital stay for Group A after surgery was 4.7 days while 6.9 days was observed for Group B, while the maximum hospital stay was 11 days for Group B.

Regarding the final out come of IM nailing in Group A was stable throughout the healing period except in two patients in which there was distraction present at

Table I. Complications

Complications	Reamed Interlocking Intramedullary Nailing	Un-reamed Interlocking Intramedullary Nailing
Screw Breakage	1	11
Delayed Union	6	12
Mal Union	-	4
Nonunion	1	5
Joint Stiffness	1	4
Bone Grafting	1	5
Reinsertion of Nail	-	2
Total	30	30

Results	Reamed Interlocking Intramedullary Nailing	Un-reamed Interlocking Intramedullary Nailing
Good	25	18
Fair	4	8
Poor	1	4
Total	30	30

Table II. Clinical Outcome

the time of initial fixation of IM nail which needs dynamization and union was achieved satisfactory. Regarding Group B i.e. unreamed nails had a high rate of non union and implant failure, 40% patients underwent implant failure with screw breakage, mal union, delayed union, joint stiffness and non union with rotational instability.

DISCUSSION

The intra medullary nail stabilization of fracture shaft tibia has several advantages. The insertion point is distant from the traumatized tissues at the injury site. The nail works at a mechanical advantage by being at the axis of load bearing although the rotational and axial deformities can be corrected. There is no need for precise reduction of individual fracture fragments. Intramedullary nail have locking mechanism, locking screws passing through hole in the nail thus prevent rotation and firmly fix nail.

Reaming of the canal allow insertion of larger diameter nail, which significantly increases the mechanical strength. Most authors record to over reamed 01-1.5mm to allow easy and safe insertion. Reaming may increase periosteal blood follow, so fracture heals much rapidly. Unless the fracture is extremely stable after reduction and fixation, muscular or weight bearing forces through these locking screws soon produce metal failure. Some authors recommended post operatively cast or period of non weight bearing after Un-reamed nailing. The locking screws may become prominent and un comfortable in long term, they can be removed when fracture heals.

In results from this study union was accomplished in 96% of cases treated with Reamed ILIMN, while it was surprisingly 60% in Un-reamed ILIMN which is comparable with study by Johnson.[18] In Campbell's experience[19] of 300 tibial fracture reamed intra medullary nailing the rate of non union was 2%, which supports the finding of the study. It was also found that delayed union occured in 20% of cases of Reamed Intra Medullary nailing as compared to 40% in Un-reamed Intra Medullary nailing.

Due to mechanical weight bearing in loose nail i.e. IM Nailing screw breakage was found in 12 cases, as compared to 2 in reamed IM Nailing. Dynamization was preferred in about of 50% of Reamed IM Nailing and good union achieve in proper time i.e. 4-6 months. But in Unreamed IM Nailing dynamization was done in 4 cases because of loose IM Nail and fear of rotational deformity. Malunion was found in 4 cases in Un-reamed IM Nailing but no patients had malunion in Reamed IM Nailing in this study, because the correct use of both proximal and distal screws virtually abolish shortening and angular or rotational deformities.[19] Bone grafting was performed in one case of Reamed IM Nailing while 5 cases had bone grafting in Un-reamed IM Nailing. Haines grafted[20] 18.6% of closed fractures at 16 weeks. Revision of IM Nailing was done in 2 cases of Un-reamed IM Nailing while no revision of procedure was needed in Reamed IM Nailing.

Review of the literature shows union time between 15.3[21] weeks and 19.4 weeks[22] for fracture shaft tibia treated with POP cast. Functional bracing has been reported to show union time between 14.1 weeks to 16.7 weeks.[19] The time of union following AO plating are reported to be between 12 weeks and 16.4 to 19.7 weeks, depending on type of close fracture.[23] De Bastiani[24] reported a mean union time of 15.6 weeks using dynamic axial fixation for closed tibial fracture. Wiss[25] found a mean of 16 weeks using Enders nail Count Brown[26] reported a mean time of 16 weeks using Close IM Nailing in Grade I and close tibial shaft fractures.[27] Other authors also reported union time for 15 to 16 weeks.

Mean time for union in this study was 80 days (11.5 weeks) this is the satisfactory time (2 weeks less) as compared with European authors, as they suggested dynamization is required for union after Reamed IM Nailing technique. Dynamization was done in Reamed IM Nailing in 20 cases where screw was removed in 6 weeks time, the purpose was to avoid rotational stability

but when dynamization was done in Un-reamed IM Nailing complications like non union, delayed Union and Rotational instability were seen.

CONCLUSION

Reamed intrerlocking intramedullary nailing is the best method of fixation for fracture of shaft tibia, which is evedent in this study and supported by international literature.

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