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Can isolated tibia intramedullary interlocking nailing in fracture distal 1/3rd both bone leg prevent fracture malalignment: will concurrent fibula fixation help?

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ABSTRACT

Background: Different stand point prevails till date concerning fibular osteosynthesis in distal third both bone fracture fixation. This study was done to assess the post op alignment of distal third both bones fracture without fixing Fibula.
Methods: A total of 30 patients who had distal 1/3rd extra articular tibia and fibula fractures were included in the study from July 2016 to April 2019. Tibial nailing was done in all cases with care is taken particularly to prevent malalingment of distal fragment. Radiological malalignment were assessed post operatively.
Results: Of 30 patients, 5 patients had excellent results and 21 patients had good results, only 4 patients had fair results with valgus and varus malalignment, however these patients did not have any clinical problems associated with these malalignment at one year follow up. No patients had poor results. Valgus tibial malalignment is observed more frequently when fibular fracture is at proximal level.
Conclusions: The level of Fibular fracture is important to determine when the fixation of this bone is indicated. Fixing ipsilateral tibial fracture with intramedullary interlocking (IMIL) nailing without fibular synthesis produce no gross change in alignment provided adequate care is taken for intra operative centering of the nail in both AP and lateral views.

Keywords: Distal 1/3rd both bone leg fracture, Tibia IMIL, Radiological alignment

INTRODUCTION

The incidence of fracture of tibia and fibula has been increasing caused by severe trauma due to high speed road traffic accidents, more mechanization of day to day activities.[1]

Extra articular fractures of distal end of tibia called supramalleolar fractures were inconsistently associated with fibular fractures at different levels.[2-4] In the treatment of combined fractures of the distal-third of tibia and fibula, there is no definite consensus over the necessity of fibular stabilization leading to oscillations amongst conservative, quasi-systematic or fixation.[5-14]

Varsalona and Liu et al, underlined increased morbidity and additional trauma of internal fixation of the fibula. They concluded that in distal metaphyseal tibial fractures without involvement of syndesmosis or ankle mortise,

stabilization of tibia with intramedullary nail or with an external fixator alone is sufficient.[15]

Strauss et al and Bonnevialle et al, based on biomechanical studies, showed that the surgical fixation of the fibula increased the overall implant stability and helped in achieving a more anatomical reduction when nailing of tibia was done.[16, 17]

Many other studies have shown considerable issues of posttraumatic arthritis of the ankle that occurs following malalignment of a healed distal-third tibial-shaft fracture. Maldistribution of articular surface pressures caused by malalignment causing a deformity predispose to premature osteoarthritis.[18-20]

This study was done to assess the alignment of distal third both bones fracture without fixing fibula.

METHODS

A prospective and retrospective study done at Sri Ramachandra Institute of Higher Education and Research, Chennai, consisting a total of 30 patients of age group 19 to 65 years who presented between the period July 2016 and April 2019 with closed distal 1/3rd extra articular tibia and fibula fractures were included in the study. Patients with pathological fractures, distal 1/3rd intra articular tibia and fibula fractures and open fractures were excluded. Surgery was done under spinal anesthesia.

Technique of interlocking nailing of the tibia

Tibial intramedullary interlocking (IMIL) nailing was done in the usual manner in all the cases. Care was taken to make an entry centered over the proximal tibia. Pollers screws were used to maintain the guide wire in centre-centre in both AP and lateral views in both fragments under c arm guidance. Valgus or varus malalignment is prevented during reaming and insertion of the nail by reduction of the fracture under c arm guidance. Proximal and distal locking screws were done sequentially

Postoperatively, every patient received the same rehabilitation protocol. In bed mobilization of the knee and ankle was started in the immediate postoperative period. Depending upon the fracture pattern weight bearing was started, partial weight-bearing was started on day 1. Full weight bearing mobilization was started on approximately 6th week.

Radiographs were taken at 1, 2, 3, 12 months. X-rays views studied consolidation and varus-valgus deformity. The degree of tibial angulation (varus or valgus) was measured on the antero-posterior radiograph by determining the angle formed by the intersection between the perpendicular lines drawn from the tibial plateau and the tibial plafond (Figure 1 and 2).[21]

As reported By Pravad et al, the grade of varus or valgus deformity was classified as: excellent (0-1°), good (2-5°), fair (6-10°), poor (>10°).[22]

Figure 1: Radiological evaluation of the degree of tibial angulation.

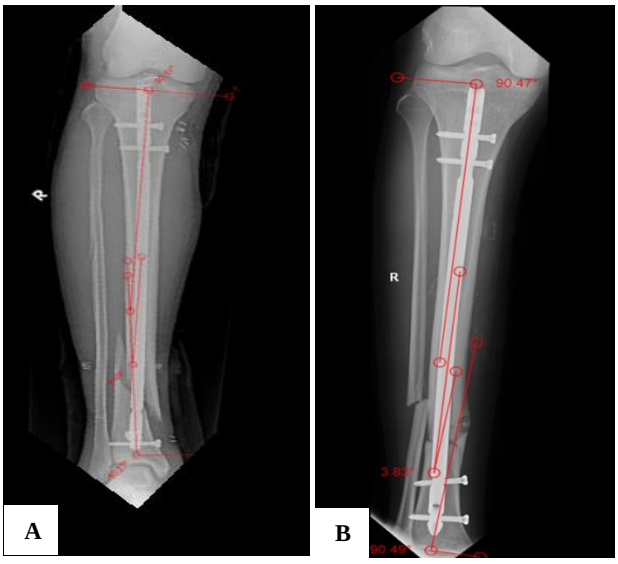

Figure 2: (A) Depicts varus tibial angulation of 6.09°and (B) depicts valgus tibial angulation of 3.83°.

RESULTS

Thirty patients were operated for distal 3rd both bone fractures between July 2016 and April 2019.

The mean age group is 40 years (19-68 years) is with 20 males and 10 females. All fractures occurred following Road traffic accidents in this study. 22 of 30 had fibular

fractures at the same level of tibial fracture with remaining 6 above the level and 2 below the level of tibial fracture.

20 of 30 patients have valgus deformity; 10 of 30 patients have varus. No significant procurvatum or recurvatum deformity was noted (Figure 3).

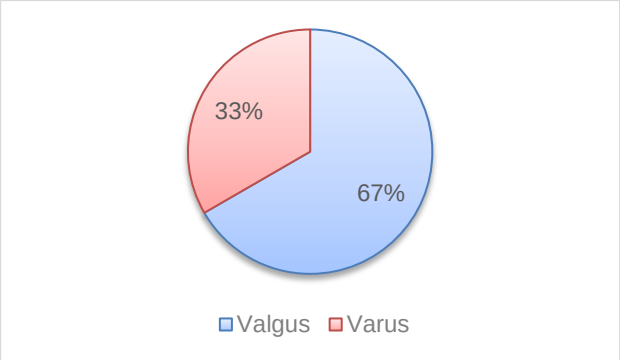

Figure 3: Postoperative tibial angulation.

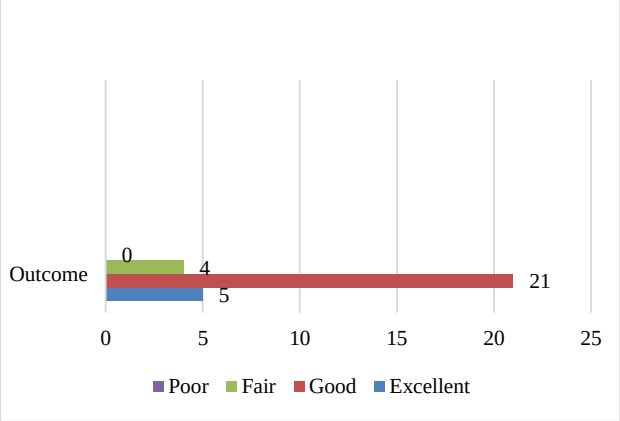

Figure 4: Radiological outcome.

The average valgus or varus deformity of the tibia was 3.51°.

Out of 30 patients, only 4 patients had fair results radiologically but the patients did not have any clinical problems associated with it. 5 of 30 patients had excellent results and the remaining 21 patients had good results. No patients had poor results (Figure 4).

Out of 4 patients with fair results 3 had fibular fracture at the level proximal to tibial fracture.

DISCUSSION

The consensus of surgical management of distal tibial with fibula fractures are not clear till date and remains controversial.[5-14,22-24]

The distal tibia and fibula fractures most commonly occurs as the result of high velocity injuries that occurs during road traffic accidents, however fractures due to fall, industrial mishaps were also associated.[25] In our study all the fractures occurred due to road traffic accident. Twisting type of injury usually results in Spiral fracture which in our study we encountered two of in our patients.

From an anatomical point of view, 1/6th of the load is transmitted to the fibula and it also provides tension band effect against the medially directed bending forces on a fractured tibia.[26-29] Bonnevialle et al stated that fibular and tibial fractures should be seen as a single pathological and biomechanical entity, and proposed the usefulness of both bone fixation as a complement to stability and an aid to tibial reduction.[17]

Ruedi et al, espoused that attaining the fibular length is the first step in reconstruction of both bone leg fractures. However, in our study we did fixation of tibia alone without fibular fixation.[30,31]

Prasad et al, {cadaveric study} in their different studies concluded that a IMIL nailing of distal tibia fracture with fibular fixation improved the stability of fracture fixation and reduced malrotation and malalignment but in our study we found that even without fixing the fibula, patients had valgus or varus deformity within acceptable limits. Nailing was done using expert tibial nail.[22]

Pogliacomi et al in their study established the importance of level of fibulae fracture in distal both bone fracture and the indication of fibular fixation. In our study, we have noted from our results that both supra and trans syndesmotic fibular fractures has higher incidence of malalignement but within the acceptable limits.[32]

However, some studies have shown that fixation of fibula may prevent adequate reduction of tibial fracture and makes the fixation too rigid, thus facilitating higher rates of delayed union and nonunion.[23,33] This was attributed to the associated communition of Fibula or the failure of approximation of fibula leading to inadequate reduction of tibia which was not encountered when tibial nailing alone were performed

Vallier et al and Varsalona et al, underscored ipsilateral Fibular fixation due to significant rate of nonunion, additional soft tissue damage, and higher risk of late malunion due to improper reduction and fixation of the Fibula which all were in coherent with our study.[15,34]

Limitations in our study are that, this is an observational study with absence of randomization and with small number of subjects included in the study.

CONCLUSION

In conclusion, the level of fibular fracture is important to determine when the fixation of this bone is indicated. Fixing ipsilateral tibial fracture with IMIL nailing

without fibular synthesis produce no gross change in alignment provided adequate care is taken for intra operative centering of the nail in both AP and lateral views.

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