

Prevention Of Malalignment In Interlocking Nailing For Distal Tibia And Fibula Fractures With Poller Screws And Fibular Plating

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Abstract:

Background: Fractures involving distal Tibia and Fibula are prone for soft tissue complications, malunion and post traumatic arthritis of ankle and subtalar joints. Most of these fractures require surgical stabilization after indirect reduction techniques. The two commonly employed techniques to aid reduction are poller screws and plating of the distal fibula fracture. These two methods are compared for functional and radiological outcomes.

Materials and Methods: In this prospective study, Tibial Interlocking Nailing with two indirect reduction methods, namely, poller screws and supplementary fibular plating were employed in twenty cases each. Patients were followed up with clinical and radiological evaluation for fracture union and ankle range of movements.

Results: The average period of fracture union was 13.4 weeks in Fibular plating group and 12.6 in Poller screw group. The mean post operative varus/valgus alignment was 4 degrees in fibular plating group and 5 degrees in Poller screw group.

Conclusion: Both indirect reduction methods, Poller screws and Distal fibula fracture plating were effective in reducing the incidence of malunion in distal tibia diaphyseal fractures treated with interlocking nails.

Key words: Distal tibia Diaphyseal fractures, interlocking nailing, poller screws, fibular plating, malalignment prevention

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I. Introduction:

With ever increasing number of two wheelers on our roads, the Orthopaedic surgeons of the Indian subcontinent are facing more challenging fracture patterns complicated with violent soft tissue injuries. Most of them involve the distal leg.

Fractures involving the distal Tibia and Fibula are notorious for complications like delayed union, non union, malunion, soft tissue compromise, delayed surgical wound healing and post traumatic arthritis of the ankle and subtalar joints.

With the advent of new fixation devices like Interlocking nails with more locking options, anatomically precontoured locking compression plates, Hybrid external fixators and new techniques such as Less Invasive Skeletal Stabilization systems, the management of these fractures have become more rewarding than in the past.

Yet, maintaining the fracture alignment and the prevention of surgical wound complications are still a daunting task.

II. Aim of the study:

Various studies have shown that malunion of distal Tibia and Fibula is more poorly tolerated than malunion of upper or middle parts of tibia and Fibula.

Supra malleolar fractures of the distal Tibia and Fibula at the same level are very difficult for the surgeon to maintain the reduction till completion of internal fixation.

Of the various methods advocated to maintain the reduction achieved by closed methods, fibular plating and the use of Poller screws are the commonly employed.

Our study aimed to analyse the radiological and functional outcomes of Fractures of Distal Tibia and fibula managed with closed reduction and internal fixation with Tibial Interlocking nail supplemented with Poller screw or Fibular plating.

III. Materials and Methods:

This was a prospective study conducted in Government Mohan Kumaramangalam Medical College, a tertiary care teaching hospital, Salem from January 2017 to June 2019. Forty skeletally mature patients with closed or Grade I open fractures of distal Tibia and Fibula were studied. Patients with polytrauma, severe osteoporosis and Grade II or III open fractures were excluded. Patients who required open reduction of the fracture were also excluded later.

Twenty patients were fixed with ILN Tibia with Poller screw and another twenty with supplementary fibular plating.

All cases were done under spinal anaesthesia and without Tourniquet.

After achieving closed reduction with respect to length, anteroposterior and mediolateral angulation and alignment and rotation with manual traction and handling the distal fragment under C arm guidance, in the Poller screw group, 4.9mm locking bolt is applied in antero posterior direction either in the medial or the lateral metaphyseal region depending on the fracture geometry and deforming tendency.

In the fibular plating group, through posterolateral approach, fracture fibula is exposed. While the assistant holding the Tibial reduction achieved as in the other group, Fibula is fixed with Small DCP with minimum six cortical purchases in either fragment. In too distal fractures of fibula, small locking plate is applied after contouring with two locking screws in the distal fragment.

Then, all the distal tibial fractures are fixed with widest possible Tibial interlocking nails with two mediolateral and one anteroposterior locking bolts.

Postoperatively, the legs were kept elevated, active mobilization of knee and ankle encouraged. Wounds were examined at appropriate intervals and sutures removed at the end of two weeks.

Non weight bearing mobilization was continued till 4 weeks. Protected and Toe touch down weight bearing started from fifth week onwards. Full weight bearing was withheld until fracture union.

Xrays were taken immediately after surgery and then every 4 weeks till union and at 6 and 12 months.

IV. Observations and Results:

Of the forty patients, fifteen were females and the rest, males. The mean age was 34.5 years. Eight patients had Grade I open injuries. The average duration between injury and surgery was 5.4 days.

Clinically, knee and ankle range of movements, pain at the fracture site, wound healing and foot and ankle edema were assessed.

All the patients in the Poller screw group had uneventful wound healing. In the Fibular plating group, eight patients had wound gapping of the fibular plating site in the immediate post operative period. Two of them ultimately required flap cover. Others were managed with secondary suturing.

No patient developed infection.

Regular True AP and Lateral X rays were taken regularly and compared with the normal side. Apart from signs of fracture union, angulation, Tibiotalar joint lines, Lateral distal Tibial angle (AP view) and Anterior distal Tibial angle (Lateral view) are noted.

The average period of fracture union was 13.4 weeks in Fibular plating group and 12.6 in Poller screw group.

The mean post operative varus/valgus alignment was 4 degrees in fibular plating group and 5 degrees in Poller screw group. The mean anterior angulation was 3 and 5 degrees respectively. The mean Lateral distal tibial angle was 87 and 85 degrees respectively. The mean Anterior distal Tibial angle was 82 degrees in both the groups.

V. Discussion:

The expected period for union of fracture distal tibia is 12 to 20 weeks. All patients had uneventful union of tibia.

The accepted angulation is less than 5 degree varus or valgus angulation and less than 10 degree of anterior angulation. All the cases had union within acceptable angulation. No patient had rotational malalignment.

Tarr et al and Puno et al have shown that angular deformities of the distal Tibia are poorly tolerated than that of more proximal fractures.

Both intramedullary devices and plating by less invasive techniques are used for distal tibial fractures. But, even fixation with low profile plates applied through minimally invasive technique have encountered late soft tissue complications, forcing the surgeons for early implant exit. The Intramedullary locking nails have less incidence of soft tissue complications when applied by closed methods. They provide good mechanical environment for the fracture to heal.

When using interlocking nails for distal Tibial fractures, at least three locking bolts should be applied in at least two different planes. Now nails with distal most locking hole near the tip of the nail are available for the fixation of distal tibial fractures.

Being a metaphyseal region with wide diameter, varus and valgus malalignments are common in distal Tibia. This can be addressed by either Poller screw or Fibular plating.

Poller screw offers advantage of limited incision, limited blood loss and less operative time when compared to fibular plating. But, placement of Poller screw requires a learning curve.

Fibular plating is a simple technique offering good control over alignment and rotation and better overall stability. To counter the deforming forces, small DCPs are preferred over Tubular plates or Reconstruction plates.

The major disadvantage of supplementary fibular plating in Distal Tibial fractures are the soft tissue complications which can be avoided by delaying the surgery till the appearance of wrinkles and meticulous tissue handling.

VI. Conclusions:

The Distal Tibial fractures can be managed successfully with Tibial Interlocking nails supplemented with Poller screws or Fibular Plating to aid the reduction till union.

Both of them produce comparable clinical and radiological fracture union rates and parameters.

Open fixation of Fibular fractures has the disadvantage of producing wound complications.

References:

- [1]. Campbell's Operative Orthopaedics, 11th edition.
- [2]. Rockwood and Green's Fratures in Adults, 8th edition.
- [3]. Shahul Hameed et al ;Technique for precise placement of poller screws with intramedullary nailing of metaphyseal fractures of the femur and the tibia - Injury 2011 Feb;42(2):136-9.
- [4]. L.Dodd et al : Poller Blocking Screws and Intramedullary Nailing in Tibial Malunion - Ann R Coll Surg Engl. 2007 Nov; 89(8): 816-818
- [5]. Mugundan et al: Distal Tibial Metaphyseal Fractures: Does Blocking Screw Extend the Indication of Intramedullary Nailing? ISRN Orthop. 2014; 2014: 542623
- [6]. Kenneth et al; Does fibular plating improve alignment after intramedullary nailing of distal metaphyseal tibia fractures? – J Orthop Trauma 2006, 20: 94-103
- [7]. Puno et al :Long-term effects of tibial angular malunion on the knee and ankle joints. J Orthop Trauma. 1991;5(3):247-54.
- [8]. C. Krettek et al: "The use of poller screws as blocking screws in stabilising tibial fractures treated with small diameter intramedullary nails," *The Journal of Bone and Joint Surgery*, vol. 81, no. 6, pp. 963-968, 1999.
- [9]. S. E. Nork et al: "Intramedullary nailing of distal metaphyseal tibial fractures," *The Journal of Bone and Joint Surgery*, vol. 87, no. 6, pp. 1213-1221, 2005.
- [10]. K. A. Egol et al: "Does fibular plating improve alignment after intramedullary nailing of distal metaphyseal tibia fractures?" *Journal of Orthopaedic Trauma*, vol. 20, no. 2, pp. 94-103, 2006.
- [11]. T. G. Weber et al: "The role of fibular fixation in combined fractures of the tibia and fibula: a biomechanical investigation," *Journal of Orthopaedic Trauma*, vol. 11, no. 3, pp. 206-211, 1997.
- [12]. M. Tyllianakis et al: "Interlocking intramedullary nailing in distal tibial fractures," *Orthopedics*, vol. 23, no. 8, pp. 805-808, 2000.

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