

# Comparison of Anterior Knee Pain Following Tibia ILN in Patellar Tendon Split and Retraction Insertion

MAQSOOD AHMAD<sup>1</sup>, TAHIR BASHIR<sup>2</sup>, MOHAMMAD ASLAM<sup>3</sup>

## ABSTRACT

**Aim:** To compare post operative anterior knee pain following interlocking nail of tibia with patellar tendon split and medial retraction for nail insertion.

**Methods:** Forty patients with tibia fractures operated by interlocking nail were included and divided into two equal groups. Group A with patellartendon was split and group B patellar tendon was retracted medially to insert the nail. In both groups nail insertion was kept extra articular. All patients were followed for one year and anterior knee pain noted on Visual Analogue Scale. Fracture healing, range of movement and other complications were observed.

**Results:** In group A, 10 patients had anterior knee pain of grade 4, maximum at 6 month follow up. Two patients had prominent nail to cause impingement on the patellar tendon. In group B with patellar tendon retracted, 7 patients had grade 3 pain, maximum at six month follow up and one patient had prominent nail. Prominent nail were removed in both groups after fracture healed. In both groups all patients were pain free at one year follow up.

**Conclusion:** Patients with patellar tendon retracted had better results compared to patellar tendon split group.

**Keywords:** Tibia mid shaft fractures, Interlocking Nail, Anterior Knee Pain

---

## INTRODUCTION

Tibia mid shaft fractures are the most common long bone fractures presented in the emergency and incidence of these fractures is high in young patients involved in motor bike accidents<sup>1,2,3</sup>. Medial surface of the tibia is subcutaneous throughout its length and have diminished blood supply in the distal one third. Fractures of the tibia range from undisplaced with minimal soft-tissue damage to traumatic amputations. Interlocking nail is most frequently used for close tibia shaft fractures and have low incidence of complications<sup>4,5,6,7</sup>. Gustilo has also reported interlocking nail in grade I and II open tibia fractures<sup>8,9</sup>. Interlocking nail is inserted by patellar tendon split, medial retraction or rarely by lateral retraction. Post operative knee pain is a common late complication. Proximal end of the nail in reference to the articular surface is important. Prominent nail causes impingement and pain while deep sinking is also not desired. Katsoulis has reported 47.4% and Court Brown 56.2% incidence of anterior knee pain after tibial nailing<sup>10,11</sup>. It usually begins few months after surgery and has different etiology. Toivanen reported patellar tendon or retro patellar fat pad damage the most common cause of anterior knee pain<sup>12</sup>. Among other causes are nail prominence, chondral injury,

damage to infrapatellar branch of sphenous nerve and post operative kneeling. Removal of the nail settles the pain if nail impinges over the patellar tendon<sup>13,14,15</sup>. In our study we compare anterior knee pain between patellar tendon split and medial retraction groups. Previously no local study available on this comparison and it will help to improve the nail insertion technique.

## MATERIAL AND METHODS

From April 2012 to June 2013, 40 patients of fracture tibia were treated by reamed intramedullary nails at Ch. Akram Teaching and Research Hospital Lahore. The study was approved from ethical committee of the hospital. All patients were admitted through emergency and OPD, treatment options discussed with the patients and written consent was taken from the patients. Inclusion criteria were age between 18 to 60 years and fractures with indication of intramedullary nailing. Open fractures presented within six hours were also included. Patients with immune deficiency, associated head injury or abdominal trauma, undisplaced fractures, pathological fracture and grade III Gustilo fractures were excluded. In close fractures soft tissue damage was considered and graded on basis of Tscherny classification. On presentation in emergency acute trauma patients were managed on ATLS basis, open fractures were irrigated, dressed and debrided in Operation Theater in the start of fixation. Patients were operated on orthopedic table and knee 90

---

<sup>1</sup>Assistant Professor of Orthopaedics Surgery

<sup>2</sup>Associate Professor of Surgery

<sup>3</sup>Professor of Surgery Azra Naheed Medical College Lahore/Chaudry Akram Teaching and Research Hospital Lahore.

Correspondence to Dr. Maqsood Ahmad Email: maqsodr1169@gmail.com

degree bent. All patients were operated with spinal anaesthesia using 25 gauge spinal needles. The entry portals were made by splitting the patellar tendon in group A and medial to patellar tendon in group B. The peri-tendinous sheath repaired in all cases in which patellar tendon was split and no stitch applied through tendon fibers. I/v antibiotics given during hospital stay which converted to oral on discharge to complete two weeks in grade I open fractures. While two doses i/v Cefuroxime given in close fractures. Passive movement of ankle and knee joint were started on third post operative day along with non weight bearing ambulation with crutches. All patients were discharged from hospital in average 3 to 7 days. Hospital stay, peri-operative complications and time span for fracture healing documented for all patients. Post operative anterior knee pain was graded from 0 to 10 according to Visual Analogue Scale after 2weeks, 1, 3, 6 months and one year with range of movements.

**RESULTS**

In group A; age of the patients was from 23 to 60 with an average of 41years. 13 were males and 7 were females. Right tibia in 12, left tibia in 7 while one had both tibia fractures. Based on location, 3 had proximal 1/3<sup>rd</sup>, 16 mid shaft and 1distal 1/3<sup>rd</sup> fractures. Six patients had open fractures, Grade I in 4 patients and Grade II in 2 patients. Based on comminution, one line fracture in 6 patients, type 1 in 2, type 2 in 5, type 3 in 6 and type 4 in 1. All fractures healed in 12 to 24 weeks. In this group 10 patients had anterior knee pain 3 to 4 on Visual Analogue Scale. 6 patients needed analgesics for one to two months and had limitation of flexion. Anterior knee pain subsided at 6 month follow up except in 2 patients with prominent nail and it settled after removal of the nail at one year follow up.

In group B; age of the patients was from 21 to 58 with an average 43 years. 12 were males and 8 were females. Right tibia in 11 and left in 9 patients. Proximal 1/3<sup>rd</sup> fracture in 2, middle 1/3<sup>rd</sup> in 13 and distal 1/3<sup>rd</sup> in 5 patients. 5 patients had open fractures all were Grade I. Based on comminution, non comminuted fracture in 7, type 1 in 2, type 2 in 3, type 3 in 6 and type 4 in 2 patients. 7 patients had anterior knee pain, grade 3 in six patients at 3 months and grade 4 in one patient. Analgesics used in all patients and pain settled at 6 month follow up. 9 patients had limited flexion in which restored with physiotherapy. Except in one patient with prominent nail was removed after fracture healing.

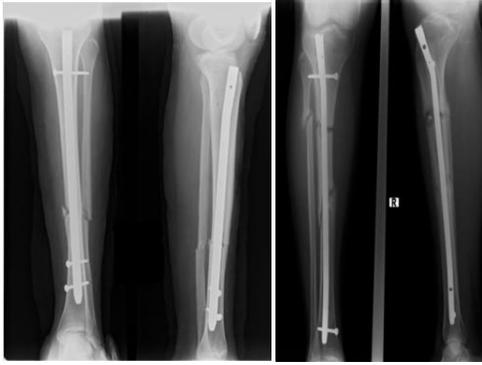
Patients with patellar tendon retracted medially in group B had better results regarding anterior knee pain at nail insertion site.

Group A		n
Gender	Male	13
	Female	7
Side	Right	12
	Left	7
	Bilateral	1
Site	Prox. 1/3 <sup>rd</sup>	3
	Middle 1/3 <sup>rd</sup>	16
	Distal 1/3 <sup>rd</sup>	1
Gustilo (open fr.)	Type 1	4
	Type 2	2
Comminution	One line fracture	6
	Type 1	2
	Type 2	5
	Type 3	6
	Type 4	1
Anterior knee pain	Grade 3	4
	Grade 4	2
	Analgesics required	6
Range of movements	Limitation of flexion	6
	Nail prominence	2

Group B		n
Gender	Male	12
	Female	8
Side	Right	11
	Left	9
	Bilateral	0
Site	Prox. 1/3 <sup>rd</sup>	2
	Middle 1/3 <sup>rd</sup>	13
	Distal 1/3 <sup>rd</sup>	5
Gustilo (open fr.)	Type 1	5
	Type 2	0
Comminution	One line fracture	7
	Type 1	2
	Type 2	3
	Type 3	6
	Type 4	2
Anterior knee pain	Grade 3	6
	Grade 4	1
	Analgesics required	7
Range of movement	Limitation of flexion	9
	Nail prominence	1

On post operative x-ray distance from tip of the nail and anterior cortex of tibia, from tip to tibia plateau and subsidence of nail tip were documented.





## DISCUSSION

Intramedullary (IM) nailing fixation is the gold standard for displaced tibial fractures. Controversy exists on different issues like reamed or unreamed nailing in open fractures, entry of nail by split in the patellar tendon or parapatellar entry, size of the nail and number of locking screws<sup>16</sup>. Incidence of wound infection is higher in nails of open fractures compared to close tibia fractures. In our study one patient had superficial wound infection which recovered with oral antibiotics in two weeks and daily dressings. Toivanen presented incidence of infection 1.8% in Gustilo type I open fractures patients with tibial fractures treated by primary reamed nailing within six hours. Nail was inserted by tendon split or medial retraction in most studies and only Y.A. Weil had used lateral patellar retraction in his study on anterior knee pain<sup>17</sup>. Anterior knee pain was common complication after intramedullary nailing of the tibia by O-Vaisto due to the damage of patellar tendon or retropatellar fat pad<sup>18</sup>. Proximal nail entry may cause chondral injury and prominent nail impinges the tendon<sup>19</sup>. In his study the incidence of anterior knee pain is low over long term 8 year follow up. While in our study follow up is short and high incidence of anterior knee pain. Difference between two groups of nail entry is not much which indicates that dissection of patellar tendon and its sheath is not sole cause of anterior knee pain. A paratendinous approach for tibia nail insertion compared with a transpatellar tendon approach does reduce the incidence of chronic anterior knee pain. A.H. Karladani and T.O. Boerger in two different studies stated that removal of nail does not necessarily settle the pain<sup>20, 21</sup>. In our study prominent nail were removed in both groups leading to pain relief at one year follow up.

## CONCLUSION

Parapatellar tendon approach for tibial nail insertion compared with transpatellar approach reduce the incidence of anterior knee pain.

## REFERENCES

1. Edwards P: Fracture of the shaft of the tibia: 492 consecutive cases in adults: importance of the soft tissue injury. *ActaOrthop Scand Suppl* 1965; 76:1.
2. Oni OOA, Hui A, Gregg PJ: the healing of closed tibial shaft fractures. *J Bone Joint Surg* 1988; 70B:787.
3. Busse JW, Morton E, Lacchetti C, Guyatt GH. Current management of tibial shaft fractures:a survey of 450 Canadian ortho trauma surgeons. *ActaOrthop* 2008;79: 689
4. Lefavre KA, Guy P, Chan H, Blachut PA. Long-term follow-up of tibial shaft fractures treated with intramedullary nailing. *J Orthop Trauma* 2008;22:525–9.
5. Blachut PA, O'Brien PJ, Meek RN, Broekhuysen HM: Interlocking intramedullary nailing with and without reaming for the treatment of closed fractures of the tibial shaft. *J Bone Joint Surg Am* 1997, 79(5):640-6.
6. Ekeland A, Thoresen BO, Alho A: Interlocking intramedullary nailing in the treatment of tibial fractures: a report of 45 cases. *Clin Orthop Relat Res* 1988; 231:205.
7. Hamza KN, Dunkerley GE, Murray CMM: Fractures of the tibia: a report on fifty patients treated by intramedullary nailing. *J Bone Joint Surg* 1971; 53:696.
8. Gustilo RB, Anderson JT. Prevention of infection in the treatment of one thousand and twenty-five open fractures of long bones: retrospective and prospective analyses. *J Bone Joint Surg Am* 1976;58:453–8.
9. Bhandari M, Guyatt GH, Swiontkowski MF, Schemitsch EH. Treatment of open fractures of the shaft of the tibia. *J Bone Joint Surg Br* 2001;83:62–8.
10. E. Katsoulis, Court-Brown. Incidence and aetiology of anterior knee pain after intramedullary nailing of the femur and tibia; *J Bone Joint Surg Br*, 88 (5) (2006), pp. 576–580
11. C.M. Court-Brown, T. Gustilo, A.D. Shaw; Knee pain after intramedullary tibial nailing: its incidence, etiology, and outcome; *J Orthop Trauma*, 11 (2) (1997), pp. 103–105
12. Toivanen JA, Väistö O, Kannus P, Latvala K, Honkonen SE, Järvinen MJ. Anterior knee pain after intramedullary nailing of fractures of the tibial shaft.A prospective, randomized study comparing two different nail-insertion techniques. *J Bone Joint Surg Am* 2002;84:580–5.P.
13. Hernigou, D. Cohen; Proximal entry for intramedullary nailing of the tibia. The risk of unrecognized articular damage; *J Bone Joint Surg Br*, 82 (1) (2000), pp. 33–41
14. T. Bhattacharyya, K. Seng, N.A. Nassif, I. Freedman; Knee pain after tibial nailing: the role of nail prominence; *ClinOrthopRelat Res*, 449 (2006), pp. 303–307
15. N.A. Ebraheim, A.O. Mekhail; The infrapatellar branch of the saphenous nerve: an anatomic study; *J Orthop Trauma*, 11 (3) (1997), pp. 195–199
16. M. Bhandari, G. Guyatt, P. Tornetta III, E.H.; Randomized trial of reamed and unreamed intramedullary nailing of tibial shaft fractures *J Bone Joint Surg Am*, 90 (12) (2008), pp. 2567
17. Y.A. Weil, M.J. Gardner, S. Boraiah, D.L. Helfet, D.G. Lorch; Anterior knee pain following the lateral parapatellar approach for tibialnailing; *ArchOrthop Trauma Surg*, 129 (6) (2009), 773
18. O. Vaisto, J. Toivanen, T. Paakkala; Anterior knee pain after intramedullary nailing of a tibial shaft fracture: an ultrasound study of the patellar tendons of 36 patients; *J Orthop Trauma*, 19 (5) (2005), pp. 311–31623,
19. Bhattacharyya T, Seng K, Nassif NA, Freedman I: Knee pain after tibial nailing. The role of nail prominence. *Clin Orthop Relat Res* 2006, 449:303-7
20. A.H. Karladani, P.A. Ericsson, H. Granhed. Tibial intramedullary nails-should they be removed? A retrospective study of 71 pts; *Acta Orthop*, 78 (5) (2007), 668–671
21. T.O. Boerger, G. Patel, J.P. Murphy; Is routine removal of intramedullary nails justified; *Injury*, 30 (2) (1999), pp. 79–81.