

Original Article
Orthopaedics

OCCURRENCE OF ANTERIOR KNEE PAIN TRANSPATELLAR AND MEDIAL PARAPATELLAR TENDON APPROACHES IN FRACTURE TIBIA NAILING. A RANDOMIZED CONTROLLED STUDY

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Abstract:

Objective: Anterior knee pain is the most common complaint after intramedullary of the fracture shaft tibia. The incidence of anterior knee pain ranges from 9-74% and the exact etiology is unclear. Transpatellar tendon approach is commonly used for tibial intramedullary interlocking nailing because it is directly in line with medullary canal of tibia but it can also be done through medial parapatellar tendon approach. The objective of the study is to compare post-operative anterior knee pain after intramedullary nailing technique by transpatellar approach compared to medial parapatellar approach.

Methods: This randomized controlled trial was carried out in Department of Orthopaedics, Indian Naval Hospital Ship Asvini, Colaba, Mumbai, 400005, India, between March 2011 to September 2016. 350 patients who presented at emergency department for the treatment of tibial shaft fractures were included in the study. They were divided into two groups with 175 patients in each group, Group A containing patients operated through medial parapatellar approach while group B containing patients operated through transpatellar tendon approach.

Results: In Group A, 125 patients were male and 50 patients were female with a mean age of 27.69 ± 9.83 while in Group B, 114 were male and 64 were female with a mean age of 32.42 ± 14.95 . The main causes of tibial

shaft fractures were RTA followed by sports and fall. In Group A mean anterior knee pain was 3.2 while in Group B, it was 2.9 with a p-value of 0.09.

Conclusion: Our study is no significant association of anterior knee pain using either medial parapatellar tendon approach or transpatellar approach, however latter is more easy for insertion of nail as it is aligned with medullary canal of tibia.

Key words: Tibial shaft fractures, Transpatellar tendon approach, Medial parapatellar approach, Intramedullary tibial nailing

Introduction

Tibial shaft fracture is one of the most common bone fractures especially due to road traffic accident. Mostly these fractures are sustained during high energy trauma, such as motor vehicle accidents, pedestrian accidents, fall from height, sport related injury. The incidence of tibia fracture in US is 109 per 100,000 per year.¹ Intramedullary interlocking nailing is the standard treatment for tibial shaft fracture.² Intramedullary interlocking nailing is done in Gustilo Anderson type I, Type II and type IIIA open tibial shaft and closed tibial shaft fracture. The advantage of Intramedullary nailing of tibia is that it preserve the soft tissue sleeve surrounding the fracture site, acts as internal splint and allows early weight bearing.³ In the intramedullary interlocking nail both proximal and distal locking is done which provides control of length, alignment and rotation in unstable fracture.³ In Tibial shaft fracture treated with intramedullary interlocking nail union can be expected in over 95% of cases.⁴ Main complications of intramedullary interlocking nail are superficial wound infection, deep wound infection, compartment syndrome, deep vein thrombosis, anterior knee pain, delayed union, non-union and implant failure. Nailing is usually avoided in patient with open physes, anatomical deformity, wound or infection over the portal entry and most of the type IIIC fracture.

For locking of nail two screws were inserted proximally and two distally under image intensifier. An inappropriate entry point can cause misalignments of fracture reduction, patellar tendon damage, nail protrusion and friction, difficulty in nail insertion or iatrogenic fracture.⁵ The optimal

entry point should be in the line of the medullary canal and should not damage the articular cartilage of the knee joint and patellar ligament.⁶ For entry two approaches can be used, transpatellar tendon approach and medial parapatellar approach. In transpatellar tendon approach incision is given over the patellar tendon and patellar tendon is spilt. In medial parapatellar tendon approach incision is given along the medial border of the patellar tendon. Anterior knee pain is the most common complaint after intramedullary nail of the tibia.⁷ In a study conducted by Song SY et al (36%) had mild pain and 13 (28%) had moderate to severe pain, Tegner activity score was significantly lower in the pain group than in the other two groups ($P = 0.008$), and there were statistically significant intergroup differences in the modified Lysholm score ($P < 0.001$)⁸, and showed that mean anterior knee pain score after 3 months on Visual analogue score was 2.20 ± 2.31 and 0.72 ± 1.21 for transpatellar and medial parapatellar tendon approach. Tahririan et al stated that there is no statistically significant difference in terms of knee pain between transpatellar tendon and medial parapatellar tendon approach. [9] The incidence of anterior knee pain ranges from 10–86% and the exact etiology is unclear.⁹ Alireza et al showed that anterior knee pain after intramedullary interlocking nail of tibia is related to approach (Transpatellar tendon and medial parapatellar tendon).¹ Tahririan et al shows that there is no relation of anterior knee pain after intramedullary interlocking nail to approach.⁹ After a thorough Literature review, it seems that there still exists a controversy regarding use of transpatellar tendon and medial para patellar tendon

approach related to anterior knee pain after intramedullary interlocking nail.

The objective of our study was to solve the controversy whether there is any relationship exist between approach (transpatellar tendon and medial parapatellar tendon) after intramedullary interlocking nail in terms of anterior knee pain on the basis of visual analogue score. Moreover other causes of Anterior knee pain like osteoarthritis, iatrogenic injury to knee and post-operative prominent nail are the major confounding factors which were excluded.

Material and Methods

This randomized controlled trial was carried out in the Department of Orthopaedics, Indian Naval Hospital Ship Asvini, Colaba, Mumbai, 400005, India, between March 2011 to September 2016. Total 350 patients of either sex between age 19 and 72 years who presented to the emergency department with closed or Gustilo Anderson type 1 & 2 open tibia shaft fractures were included. Type 2 open fracture was included because they were presented within 02 hr of injury and immediately wound debridement and primary undreamed nailing was done. Whereas patients with polytrauma, open (type 3) tibial fractures, tibial shaft with tibial condyle fracture, knee osteoarthritis were excluded from the study. All the patients were informed about the procedures and objectives of the study and informed written consent were taken. The patients were divided into two groups by lottery method, group A containing patients operated through medial parapatellar tendon approach while group B containing patients operated through transpatellar tendon approach. Every patient underwent pre anesthesia check up before surgery.

Nailing was done at the earliest opportunity after getting clearance from the anaesthetics. At follow ups patients were asked about the severity of pain using VAS scale.

Patients were specifically asked whether they had knee pain. If patients complained of knee pain they were asked to localize the pain. Only pain over the anterior portion of the knee was taken as a positive response for knee pain. If the patients specifically points to pain over fracture site or screw head it was excluded. Patients were asked to grade the pain as per VAS scale, a 10 visual-analogue scale, with 0 denoting no pain and 10 denoting the worst pain that the patient could imagine. Anterior Knee Pain was assessed by visual analogue score after 4 months of surgery in both groups. The collected data was entered and analyzed by using SPSS version 17.

Results

Our study include 350 patients were divided into two groups by lottery method, and patients were divided into two groups by lottery method, group A containing patients operated through medial parapatellar tendon approach while group B containing patients operated through transpatellar tendon approach. In Group A, include 175 patients were 113 were male and 62 were female and in Group B, include 175 patients were 104 were male and 71 were female patients. Both Group A and Group B shows no statistical difference in terms of age (Table-1). Out of 350 patients 48.5% of patients had right tibia fracture, 43% had left tibia fracture while remaining 08%

had bilateral tibia fracture. (Table 2)

Table-1: Demographic details of age of patients

Groups	No patients (n)	Sex		Mean	SD	p-value
		M	F			
A	175	113	62	22.57	12.564	.094
B	175	104	71	25.87	12.834	.094
Total	350					

Table 2: Frequency of mechanism of injury

Mechanism of injury	No patients (n)	%	Side of tibia		
			Rt	Lt	B/L
RTA	179	51%	85	78	16
Sports	101	28.8%	39	58	04
Fall from height	65	18.5%	45	12	08
Others	5	01%	01	04	
Total	350		170 (48.5%)	152 (43%)	28 (8%)

Table-3: Appearance and Frequency of anterior knee pain

Groups	No patients (n)	Sex		Mean		Average	SD		p-value
		M	F	M	F		M	F	
A	175	113	62	3.12	3.44	3.28±.12	0.432	0.451	.076
B	175	104	71	2.83	2.45	2.64±.14	0.353	0.364	.083
Total	350	217	133						

The frequency of etiology, 51% of patients having fracture due to road traffic accident, 28.8% due to sports 18.5 % fall from height and remaining 01% due to some other cause.(Table 2) In Group A, mean anterior knee pain in male patients was 3.12 (\pm .432) while in female it was 3.44(\pm .451) , average 3.28 (\pm .12) whereas mean anterior knee pain in Group B in male patients was 2.83 (\pm .353) while in female it was 2.45(\pm .364) average 2.64 (\pm .14) with a *p*-value of .076 and .083 respectively (Table-3).

Discussion

Intramedullary nailing of tibial fractures has evolved since 1940s. 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.¹⁴ Because of advancement in metallurgy and nail designs, more so, early demands of mobilisation and fracture configuration, the indications of IM Nailing in the management of tibial shaft fractures has expanded. However the approach to tibia nailing involves two main approaches, i.e., transpatellar tendon and medial parapatellar tendon approach. Anterior knee pain is the most common complaint after tibia nailing, incidence ranges from 10–86% and the exact cause of anterior knee pain after intramedullary interlocking nail is unknown.⁸ Transpatellar approach is more likely to associated with knee pain in the post operative due to its incision through the tendon, to the retro-tendinous fat pad-injury, which

is highly innervated when parapatellar approach is used, the patellar tendon, the retropatellar fat pad and the tissues are retracted and, theoretically there would be no tissue injury.⁹ In Group A (medial parapatellar tendon approach) mean anterior knee pain was 3.28 (\pm .12) while in Group B (transpatellar tendon approach) was 2.64 (\pm .14) which was statistically insignificant while in Alireza et al in his study showed that mean anterior knee pain score after 03 months on Visual analogue score was 2.20 \pm 2.31 and 0.72 \pm 1.21 for transpatellar and medial parapatellar tendon approach.¹ Similar to our study many studies in literature support that there is no statistically significant difference in terms of knee pain between transpatellar tendon and medial parapatellar tendon approach.⁹⁻¹¹ Song and Darabos in their study concluded that the aetiology of anterior knee pain is multifactorial and it may be due to protrusion of the nail.¹² Leliveld MS linked anterior knee pain with damage to the infrapatellar branch of saphenous nerve.¹³ Andrija in this study showed the anterior knee pain with damage to intra articular structure like fat pad.¹⁴

Conclusion

Based on our study we can say that the anterior knee pain is not related to either medial parapatellar tendon approach or transpatellar tendon approach. 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. Both approaches are equally good depends on surgeon preference and are unrelated to anterior knee pain provided no other structure has been damaged during nailing.

Conflicts of interest: None

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