

Original Research Article

Comparative study of range of motion and anterior knee pain in parapatellar versus trans patellar approach in tibia nailing

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ABSTRACT

Background: Tibial shaft fractures are common traumatic fractures especially in road traffic accidents. Intramedullary interlocking nailing is considered treatment of choice tibial diaphyseal fractures, minimizing soft tissue injury and permitting early weight bearing and fracture healing. Anterior knee pain and reduced range of motion are some common complications that patients have to face in post-operative period.

Methods: The 60 patients of both sex with traumatic diaphyseal tibial shaft fractures were included in this study out of which 30 were operated with interlocking tibia nailing with trans patellar (tendon splitting) approach while 30 were operated with medial parapatellar approach for tibia nail insertion. Range of motion at knee joint (in degrees) and anterior knee pain (on visual analogue scale) was evaluated on post-operative day 1, 2 weeks, 1 month, 3-month post operatively and compared for both groups.

Results: Mean anterior knee pain was significantly lower in parapatellar approach group at 2 weeks, 1 month and 3 months while there was no significant difference on post-operative day 1. Mean range of motion at knee joint was more in parapatellar approach group on post-operative day 1 and 2 weeks while there was no significant difference in range of motion after 2 weeks.

Conclusions: In our study medial parapatellar approach is superior than tendon splitting approach with comparatively greater range of motion and lesser anterior knee pain. Thus, medial parapatellar approach should be encouraged for interlocking tibia nailing.

Keyword: Trans patellar, Parapatellar, Tibia fractures, Interlocking tibia nailing

INTRODUCTION

Tibial shaft fractures are common traumatic fractures especially in road traffic accidents. Intramedullary nailing is the gold standard treatment option for displaced closed or open tibial diaphyseal fractures.¹ By minimizing soft tissue injury and permitting early weight bearing and fracture healing, it is considered as treatment of choice for tibial shaft fractures in adults.² Intramedullary nailing acts as an internal splint and permits early weight bearing along with fracture healing.³

Several complications of the procedure have been described such as infections, deep vein thrombosis,

implant failure, malunion, nonunion out of which anterior knee pain and reduced range of motion are some common complications that patients have to face in post operative period in patients treated with tibia nailing. Anterior knee pain is the most common complication ranging from 31% to 86%.⁴⁻¹⁴

There are various approaches of tibia nail insertion, Trans patellar (tendon splitting) approach is preferred by many. In parapatellar approach patella tendon is left intact. In this study we will do comparative analysis of range of motion and anterior knee pain in trans patellar and Medial Parapatellar approach in tibia nailing.

METHODS

Design of study

This is a comparative type of study.

Place of study

This study was carried out in a tertiary center Krishna institute of medical sciences, Karad for a period of 1 year, from March 2021 to March 2022.

Sample size

Total 60 patients of both sex (42 males and 18 females) with traumatic tibial diaphyseal fractures were included in the study which fulfilled inclusion criteria.

Inclusion criteria

Patients with age group above 18 years, patients of any sex, open/ closed traumatic tibial diaphyseal fractures (transverse/ short oblique) with indication of tibia nailing and patients who have completed 3 months of follow-up were included in the study.

Exclusion criteria

Co-morbidities like DM, malnutrition, poly-trauma, previous fracture of same leg. Patients unfit for surgery and unwillingness to participate in study were excluded.

The 30 cases were operated with interlocking tibia nailing with trans patellar (tendon splitting) approach while remaining 30 were operated with medial parapatellar approach for tibia nail insertion.

Range of motion at knee joint (degrees) and anterior knee pain (VAS) was evaluated on post-operative day 1, 2 weeks, 1 month and 3 months follow up.

Ethics approval

Clearance was obtained from institutional ethical committee, Krishna institute of medical sciences, Karad

Statistical analysis

Data management and analysis were done using SPSS (Statistical package for social sciences) software version 20. The level of significance was set at $p < 0.05$.

RESULTS

There were 18 males and 12 females with mean age of 30.2 ± 4.62 in trans patellar group and 21 males and 9 females with mean age of 28.8 ± 5.76 in para patellar group. In Trans patellar group 26 patients had closed fractures and 4 patients had open fracture while in parapatellar group 25 patients had closed fractures and 5

patients had open fractures. There was no significant difference between 2 study groups with respect to mean age, sex distribution, etiology of trauma, sidedistribution, type of fracture (open or closed).

Table 1: Demographic data.

Parameters	Trans patellar approach, n=30	Para patellar approach, n=30	P value
Gender			
Male	18	21	0.496
Female	12	9	
Mean age	30.2±4.62	29.4±5.76	0.555
Etiology			
RTA	22	24	0.674
Other trauma	8	6	
Type of fracture			
Open	4	5	0.638
Closed	26	25	
Site			
Right	12	16	0.284
Left	18	14	

Table 2: Mean pain score.

Variables	Trans patellar approach, n=30	Para patellar approach, n=30	P value
1 day post op	7.2 ± 1.21	6.7 ± 1.43	0.149
2 weeks post op	5.6 ± 1.33	4.8 ± 1.14	0.015
1 month post op	3.4 ± 1.62	2.6 ± 1.23	0.035
3 months post op	2.2 ± 2.31	1.1 ± 1.13	0.024

Table 3: Post operative ranges of motion.

ROM	Trans patellar approach, n=30	Para patellar approach, n=30	P value
1 day postoperative			
30-60	22	13	0.035
60-90	8	15	
>90	-	2	
2 weeks postoperative			
30-60	19	8	0.03
60-90	9	15	
>90	2	7	
1 month postoperative			
30-60	-	-	0.07
60-90	19	12	
>90	11	18	
3 months postoperative			
30-60	-	-	0.55
60-90	8	6	
>90	22	24	

Mean anterior knee pain was significantly lower in parapatellar approach group at 2 weeks, 1 Month and 3 Months while there was no significant difference on post-operative day 1 between the two groups. Mean range of motion at knee joint was significantly more in parapatellar approach group on post-operative day 1 and 2 weeks while there was no significant difference in range of motion after 2 weeks.

DISCUSSION

In a retrospective study done by Khan et al, 60 patients with tibial fractures were treated with interlocking tibia nailing by medial parapatellar and tendon splitting approach equally.¹⁵ The mean ages in trans patellar and parapatellar group were 32.83 ± 5.13 and 31.43 ± 5.42 respectively, while in our study they were 30.2 ± 4.62 and 29.4 ± 5.76 respectively. Male patients in the study were 56.6% and 73% respectively, while in our study it was 60% and 70% respectively.

The 16 patients in the trans patellar while 13 patients in the parapatellar group had open fractures, while in our study 4 and 5 patients in each group respectively had open fractures. Mean pain score (VAS value) at 3 months follow up was 4.53 ± 2.04 and 3.06 ± 1.83 respectively, while in our study mean VAS value at 3 months was $2.2 \pm 2.31 \pm 1.13$ respectively with $p=0.024$ (significant) (Table 2).

In a study done by Sadeghpour et al, 50 patients with tibial fractures were treated with interlocking tibia nailing by parapatellar and tendon splitting approach equally.¹⁶ Male patients were 92% in trans patellar and 84% in parapatellar approach. Three patients in trans patellar and 4 patients in parapatellar approach had open fractures. Mean pain score (VAS value) at 2 weeks were 6.64 ± 1.32 and 4.32 ± 1.14 respectively with $p=0.364$ (not significant) and at 3 months were 2.20 ± 2.31 and 0.72 ± 1.21 respectively with $p=0.013$ (significant). At 2 weeks and 3 months follow up, there was no significant difference in knee range of motion between two groups ($p>0.05$). In our study knee range of motion was found to be significantly greater on post-operative day 1 ($p=0.035$) and 2 weeks ($p=0.03$) follow up with no significant difference in subsequent follow ups at 1 month ($p=0.07$) and 3 months ($p=0.55$).

Limitations

Though in recent years relation between anterior knee pain and approach of tibia nail insertion has been proven, anterior knee pain in some patients may be because of different etiology.

As pain score scale is a subjective parameter it may vary and obtaining precise data is not possible.

In comminuted fractures of tibia, assessment of range of motion is not possible in early post-operative period. So, these cases were not included in this study.

CONCLUSION

Bases on results in our study, we conclude that the medial parapatellar approach is superior than the tendon splitting trans patellar approach with a comparatively greater range of motion and lesser anterior knee pain. Thus, medial parapatellar approach should be encouraged for interlocking tibia nailing in tibial diaphyseal fractures.

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Conflict of interest: None declared

Ethical approval: The study was approved by the institutional ethics committee

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