

(RESEARCH ARTICLE)



A study of supra patellar versus infra patellar intramedullary interlocking nailing in tibial diaphyseal fractures

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Abstract

Introduction: Tibial shaft fractures are a common traumatic injury. Traditional infra patellar intra medullary nailing is a popular surgical procedure used in the treatment of tibia shaft fractures. Recently, the supra patellar approach has attracted the attention of orthopedic surgeons, as it seems to offer fewer complications and re-operations.

Material and methods: The total of 30 patients with tibial diaphyseal fractures and underwent Intra medullary interlocking nailing, in which 15 with supra patellar approach and 15 patients with infra patellar approach.

Results: There was a statistically significant difference in the final outcome in patients undergoing Intra medullary interlocking nailing through Supra Patellar and infrapatellar approach with better functional outcome in the former.

Conclusion: we conclude that supra patellar approach had a better clinical outcome compared to Infra patellar approach for tibial diaphyseal fractures with relation to duration of surgery, Intra operative bleeding, Fluoroscopy time, Post-operative anterior knee pain and Knee functional outcome.

Keywords: Tibia fractures; Supra patellar approach; Inter locking nailing; Anterior knee pain

1 Introduction

- Tibial shaft fractures are a common traumatic injury. Traditional infra patellar intra medullary nailing is a popular surgical procedure used in the treatment of tibia shaft fractures [1].
- Recently, the supra patellar approach has attracted the attention of orthopaedic surgeons, as it seems to offer fewer complications and re-operations.
- It is shown to facilitate reduction in knee fractures in a semi-extended position, and the extended position of the lower leg allows for easier fluoroscopic imaging.

Aim

To study the efficacy of supra patellar intra medullary nailing over infra patellar intra medullary nailing in tibial diaphyseal fractures.

Objectives

To study the outcome factors like duration of surgery, intra operative bleeding, fluoroscopy time, post-operative anterior knee pain, knee functional outcome.

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2 Materials and methodology

This prospective study was carried out in NRI General Hospital and Ortho care, Vijayawada from august 2019 to September 2021. Patients with tibia diaphysis fractures attending the emergency department of our institution. The total of 30 patients with tibial diaphyseal fractures and underwent Intra medullary interlocking nailing, in which 15 with supra patellar approach and 15 patients with infra patellar approach.

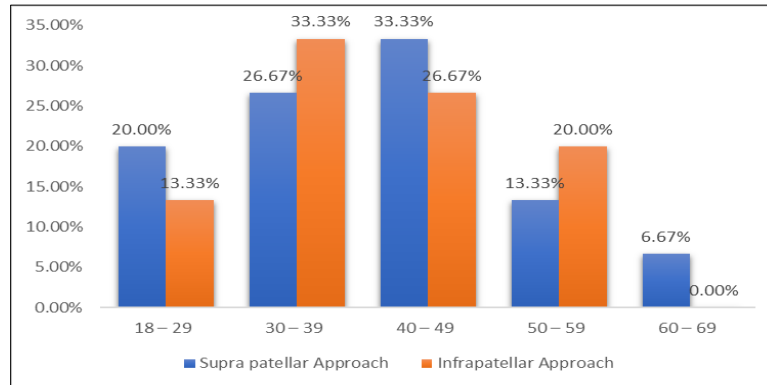


Figure 1 Age distribution

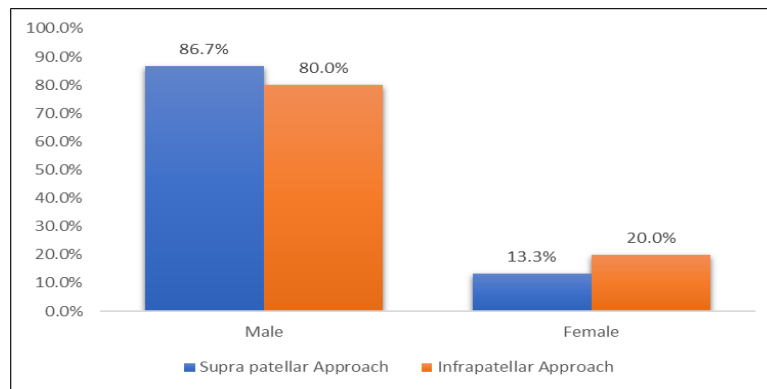


Figure 2 Gender incidence

2.1 Inclusion criteria

- Patients with tibial diaphyseal fractures.
- Patients who are 18 years and above and willing to give written informed consent.
- Gustilo-Anderson type I, II and IIIA

2.2 Exclusion criteria

- Patients with upper one third and distal one third fractures of the both bones of the leg
- Compound grade IIIB, IIIC fractures
- Pathological fractures
- Co morbid conditions not permitting major surgical procedures
- Un cooperative patients and patients who are not willing for surgery

2.3 Treatment

- ATLS protocol was followed in the emergency department for all cases. Neurovascular status assessed. X-rays AP & LATERAL view entire leg were taken. Debridement for open wounds was done within 6 hours. Routine surgical profile were done along with physician fitness for surgery in all cases. Surgery was done by either supra patellar or infra patellar approach.

2.4 Surgical steps

- Patient should be positioned in supine position with a roll under the knee joint which is flexed in 30 degrees.
- 1.5-2 cm skin incision is made 1cm above the patella.
- Longitudinal incision of quadriceps tendon is made.
- Finger should be able to fit into the joint. Partial medial or lateral arthrotomy should be done if there is any difficulty.
- Guide wire is introduced on top of the tibia. Entry point on AP view is 9mm lateral to centre of tibia plateau, on lateral view anterior to anterior articular margin.
- Trocar and drill sleeve inserted along with an elastic nail insertion sleeve over guide wire.
- Reaming is performed and nail is placed and fixed with proximal and distal locking.
- Before the end of the surgery it is important to flush the knee joint carefully of blood and debris.



Figure 3 Intra operative images

Follow up was done and x rays were ordered post operatively at 0, 6 weeks and 6 months .Pain and knee functional outcome are measured at each time point by using visual analogue score and LYSHOLM knee functional outcome score respectively.



Figure 3 65 year old male with tibia diaphysis fracture treated with IMIL nailing through supra patellar approach(Immediate and 6 months follow up)



Figure 4 Knee ROM after 6 months



Figure 5 55 year old male with distal one third tibia fracture treated with IMIL nailing through infra patellar approach (Immediate and 6 months follow up)



Figure 6 Knee ROM after 6 months

3 Results

In our study, the mean duration of surgery was 110.33 ± 19.07 minutes with supra-patellar approach and 128.6 ± 11.87 minutes with infra patellar approach (P value 0.003).

The mean fluoroscopy time among the patients with supra-patellar approach was 101.53 ± 21.14 seconds whereas among the patients with infra-patellar approach was 146 ± 51.86 seconds (P value 0.004).

The mean post-operative anterior knee pain score on day 1 was 5.4 ± 1.45 among the patients with supra-patellar approach whereas 6.40 ± 1.29 among the patients with infra-patellar approach (P value 0.06). The mean post-operative anterior knee pain score after 1 month of surgery was 2.4 ± 0.98 among the patients with supra-patellar approach whereas 3.53 ± 0.91 among the patients with infra-patellar approach. (P value 0.002).

The mean knee functional outcome of 130 ± 10.4 whereas among the patients with supra patellar approach and 121.33 ± 9.72 with infra patellar approach. (P value 0.02).

Fracture union among the patients with supra-patellar approach, majority of patients (66.7%) had union of fracture by 12 to 16 weeks followed by 33.3% of patients had union fracture by 17 to 20 weeks whereas among the patients with infra-patellar approach, majority of patients (46.7%) had union of fracture by 17 to 20 weeks followed by 33.3% of patients had union of fracture by 12 to 16 weeks and 20% of patients had union of fracture by 21 to 24 weeks (P value 0.04).

Table 1 Results of Both Approaches

RESULT	Supra Patellar (n=15)	Infra Patellar (n=15)	p value
Duration of surgery	110.33+/-19.07	128.6+/-11.87	0.003
Fluoroscopy time	101.53+/-21.14	146+/-51.86	0.004
Postoperative anterior knee pain			
Day 1	5.4+/-1.45	6.40+/-1.29	0.006
Day 30	2.4+/-0.98	3.53+/-0.91	0.002
Functional outcome	89.3+/-1.4	87.2+/-1.8	0.002

4 Discussion

In our study we went with 30 patients with tibial diaphyseal fractures who attended the emergency department of our institute. 15 patients underwent intra medullary interlocking nailing through supra patellar approach and remaining 15 were treated with infra patellar approach.

The advantage of supra patellar approach was the extended position of the knee during surgery.

In the proximal one third of tibial fractures, with infra patellar approach, there will be a chance of anterior mal alignment of proximal fragment whereas in supra patellar approach [2], patient's knee will be in semi extended position so that we can eliminate this complication.

In conventional infra patellar approach most of the surgeons preferred patellar splitting approach [5].

The most common complication due to this approach is anterior knee pain [3]. so that in case of supra patellar approach we can eliminate this complication also.

A potential criticism of this approach is intra articular involvement and the potential for patellar or trochlear chondral injury [4].

Although this approach transverses the patella femoral joint, the entry sleeve is in the place at all times, protecting the chondral surface during reaming.

5 Conclusion

In our study we conclude that Supra patellar approach had a better clinical outcome compared to Infra patellar approach for tibial diaphyseal fractures with relation to duration of surgery, Intra operative bleeding, Fluoroscopy time, Post-operative anterior knee pain and Knee functional outcome.

A larger prospective trial with long-term follow-up is needed to improve statistical power and establish if any late sequelae exist.

Compliance with ethical standards

Authors contribution

Dr. Koduru Satya Kumar – made substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data; or the creation of new software used in the work, approved the version to be published.

Dr. Shaik Riyaz Babu – conceptualization, design, acquisition of data, drafting, and review of this article

Dr. Sateesh Kumar Pasunuri – drafted the work or revised it critically for important intellectual content.

Disclosure of conflict of interest

On behalf of all authors, the corresponding author states that there is no conflict of interests.

Statement of informed consent

Written and informed consent was obtained from all individual participants included in the study.

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