



MIDLINE TENDON SPLITTING VS LATERAL PARAPATELLAR APPROACH FOR INTRAMEDULLARY NAILING OF TIBIA – A COMPARATIVE STUDY

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Abstract

Aim: our aim was to compare functional outcomes in semi-extended lateral parapatellar approach and the hyper flexed patellar tendon splitting approach and to compare range of motion between the two approaches.

Methods: A total of 30 patients with extraarticular fractures of tibia presenting to Maharishi Markandeshwar Institute of Medical Sciences and Research (MMIMSR), Mullana-Ambala, were enrolled in the study. All the patients were above the age of 20 years and had closed or open type I or II fracture shaft tibia. Detailed history and physical examination were done. Relevant investigations and x-rays were done. The patients were divided into two groups- Group A- Patients treated with Lateral parapatellar approach and Group B- Patients treated with midline tendon splitting approach, with 15 patients each. Patients were followed up at 3 months and 6 months and post-operative functional scoring using visual analog scale and lysholm knee scoring scale was done to evaluate functional outcome at each visit.

Results: the demographic profile of the study subjects was comparable. The mean range of motion of the involved knee was $126.00^\circ \pm 8.06$ and $127.67^\circ \pm 7.29$ for those in group A and $124.67^\circ \pm 7.19$ and $126.33^\circ \pm 5.16$ for the patients in group B at 3 months and 6 months respectively. Lysholm knee score on follow up at 3 months and 6 months was statistically significant in both groups. Visual analog scale score during follow up at 3 months and 6 months were comparable in both the groups and difference between both groups was statistically insignificant.

Conclusion: Our study compared the functional outcome for extraarticular tibial fractures treated with intramedullary nailing through lateral parapatellar approach and midline tendon splitting approach in which a significant advantage of early joint motion, early weight bearing and less knee pain was observed in patients treated with lateral parapatellar approach.

Keywords: Tibia, Nailing, parapatellar, Infrapatellar, VAS, LYSHOLM

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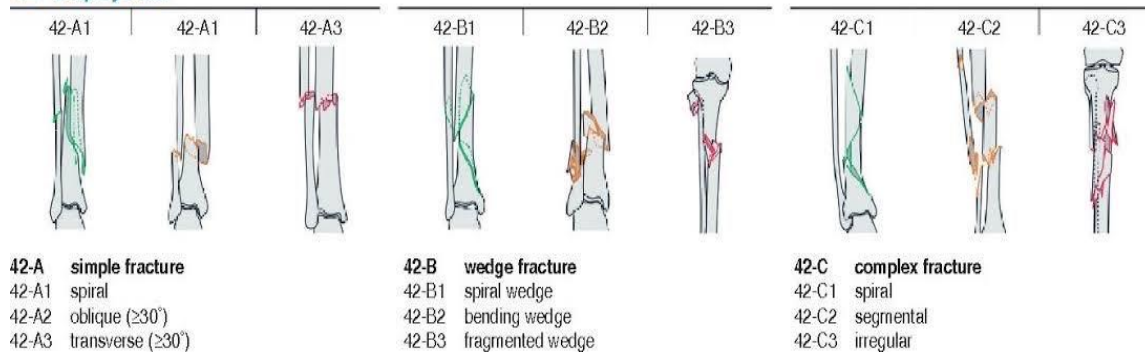
INTRODUCTION

In orthopaedic practice, tibial diaphyseal shaft fractures are among the most common types of long bone fractures. For the management of tibial shaft fractures, numerous studies have shown locked intramedullary nailing to be superior to casting.¹ Owing to a high rate of union, lower complication rates and good functional outcomes, intramedullary

nailing remains the preferred management for tibial shaft fractures.²

Tibial shaft fractures represent a relatively common injury, sustained by young patients as a result of high energy trauma.³ The incidence of tibial shaft fractures has been reported between 16 to 21 per 100,000 persons representing 2% of all fractures and up to 40% of all long bone fractures in adults.^{4,5}

42 diaphyseal



The exposed anatomical location of the tibia makes it vulnerable to the direct blow and high energy trauma as a result of motor vehicle accidents resulting in comminuted fractures, which are often open with significant loss of skin and soft tissues.⁷

When compared to the rest of appendicular skeleton, tibia has precarious blood supply due to inadequate muscular envelope. Tibial fractures may be associated with compartment syndrome, vascular or neural injury. The presence of hinge joints at the knee and the ankle leads to inadequate adjustment for the rotatory deformity after fracture. Various modalities are available for management such as conservative gentle manipulation and casting, open reduction and internal fixation with plates and screws, intra medullary fixation (including Ender Pins, intramedullary nails, and interlocking intramedullary nails with or without reaming), and external fixation techniques and the surgeon should be skilled to perform all these techniques and must weigh advantages and disadvantages of each one and opt for the best possible plan of management.^{6,7,8,9} Intramedullary nailing has become the gold standard treatment option for displaced closed or open (Gustilo Anderson Grade I-II) tibial diaphyseal fractures.¹⁰⁻¹³ It acts as an internal splint and permits early weight bearing along with fracture healing.¹⁴ It also favours minimal surgical dissection with preservation of the extra osseous blood supply at the fracture site. Moreover, this surgical implant offers adequate biomechanical stabilisation of fracture and acts as a load sharing device allowing

the patient to weight bearing early in the postoperative period.

Various routes have been described for intramedullary nailing of tibia, infrapatellar (including transtendinous, medial paratendinous, lateral paratendinous) route being the most common. Several anatomic structures around the knee are prone to injury during nail insertion, including the patellar tendon,¹⁵ menisci, articular cartilage, the infrapatellar branch of the saphenous nerve and the infrapatellar fat pad.¹⁶ These structures have been implicated as potential sources of post operative knee pain. Additionally, the presence of prominent hardware, surgical approach relative to the patellar tendon and muscle weakness has been described as etiological factors for knee pain.¹⁷



Figure 1: Incision site for lateral parapatellar approach

Compared to the paratendinous approach of nail insertion, transpatellar approach was associated with a higher prevalence of anterior knee pain.¹⁸This is because the transpatellar approach's incision results in a retro-tendinous fat pad injury, which is highly innervated. There shouldn't be any tissue damage when parapatellar method because the patellar tendon, the retropatellar fat pad and the tissues are all retracted.¹⁹⁻²¹

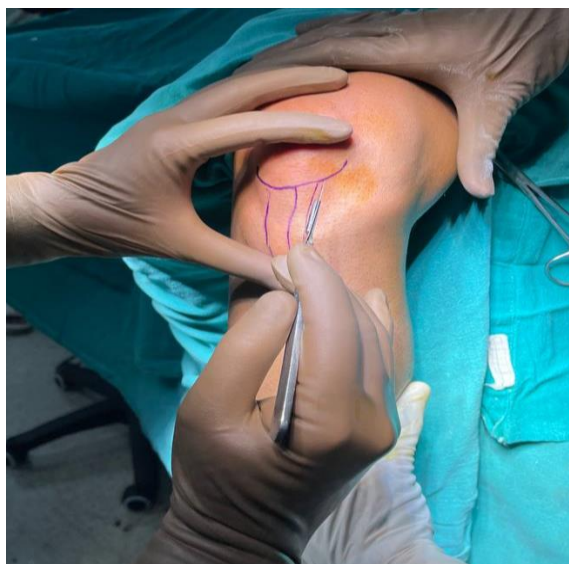


Figure 2: Incision site for midline tendon splitting approach

The successful management of tibial fractures requires the accomplishment of three objectives. The control of infection, the establishment of bony union, and the restoration of function.

In comparison to other types of internal fixation, closed nailing causes the least disruption to soft tissue, fracture hematoma, and the natural process of bone healing

METHODS:

Our study was conducted on 30 patients (males and females above 20 years of age) with tibia

RESULTS

Table 1: total score correlation of LKS at before treatment, 3 months and 6 months after treatment

Total LKS	Group A		Group B		t	p-value
	Mean	SD	Mean	SD		
Before treatment	70.67	3.20	71.00	2.80	-0.303	0.764
After 3 months	72.13	4.26	60.60	6.14	5.979	0.001
After 6 months	80.27	4.03	70.87	5.25	5.503	0.001

After 6 months score was found better in lateral parapatellar approach, but was comparable with Midline tendon splitting approach, however at 3 months there was a significant difference.

diaphyseal fracture in the Department of Orthopaedics, MMIMSR during a study period of 2 years. After taking the written informed consent of each patient, detailed clinical history was taken and general physical, local examination was done. All patients were prospectively followed for tibial shaft fracture after surgical treatment with statically locked reamed intramedullary nail with two interlocking bolts at both ends of nail for a period of one year with visual analog scale and The Lysholm Knee Scale (LKS) questionnaire. Allocation of groups - Out of 30, 15 patients were selected in group A and were operated by semi-extended lateral parapatellar approach and 15 patients in group B, and were operated by hyper flexion patellar tendon splitting approach.

Clinical outcome was evaluated at 3, 6months respectively using the visual analog scale and The Lysholm Knee Scale (LKS) questionnaire with a follow up period of 6months

• LYSHOLM KNEE SCORING SCALE

Section 1- LIMP(0,3,5)

Section 2- USING SUPPORT FOR WALKING (0,2,5)

Section 3- LOCKING SENSATION IN THE KNEE(0,2,6,10,15)

Section 4- GIVING WAY SENSATION FROM THE KNEE(0,5,10,15,20,25)

Section 5- PAIN(0,5,10,15,20,25)

Section 6- SWELLING (0,2,6,10)

Section 7- CLIMBING STAIRS (0,2,6,10)

Section 8- SQUATTING (0,1,4,5)

Interpretation: A score of 100 means no symptoms or disability. Scores are categorized

- Excellent (95–100)
- Good (84–94)
- Fair (65–83)
- Poor (<64)

Graph 1: total score correlation of LKS at before treatment, 3 months and 6 months after treatment

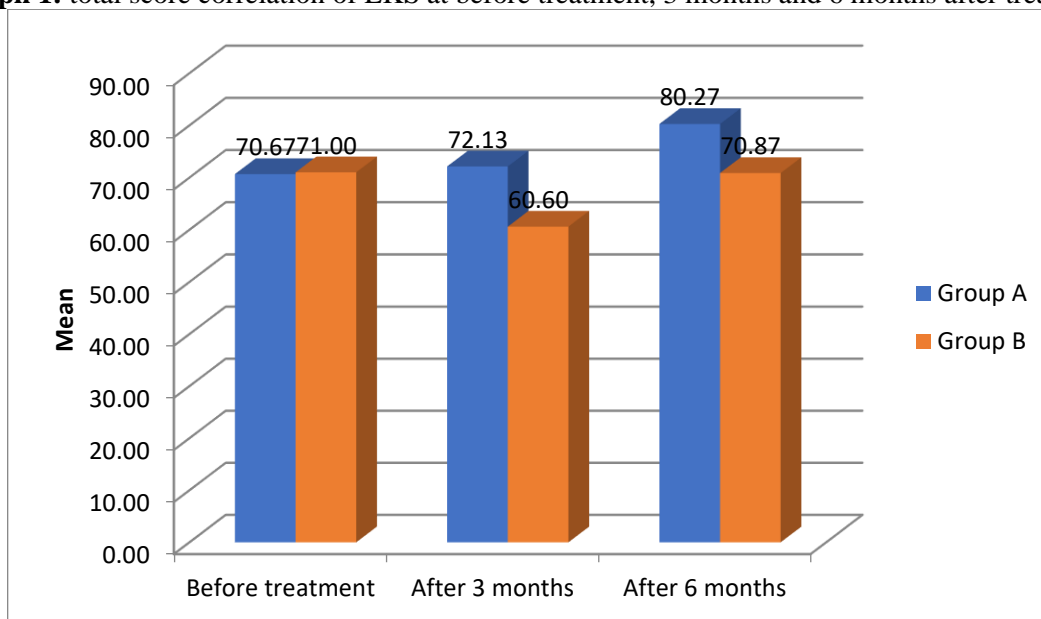


Table 2: comparison between mean of Visual Analogue Scale in both approaches.

VAS	Group A		Group B		t	p-value
	Mean	SD	Mean	SD		
Before treatment	9.00	0.93	8.87	1.06	0.367	0.716
After 3 months	4.73	0.80	5.20	0.86	-1.538	0.135
After 6 months	2.20	1.37	2.33	1.40	-0.264	0.794

Graph 2: comparison between mean of Visual Analogue Scale in both approaches.

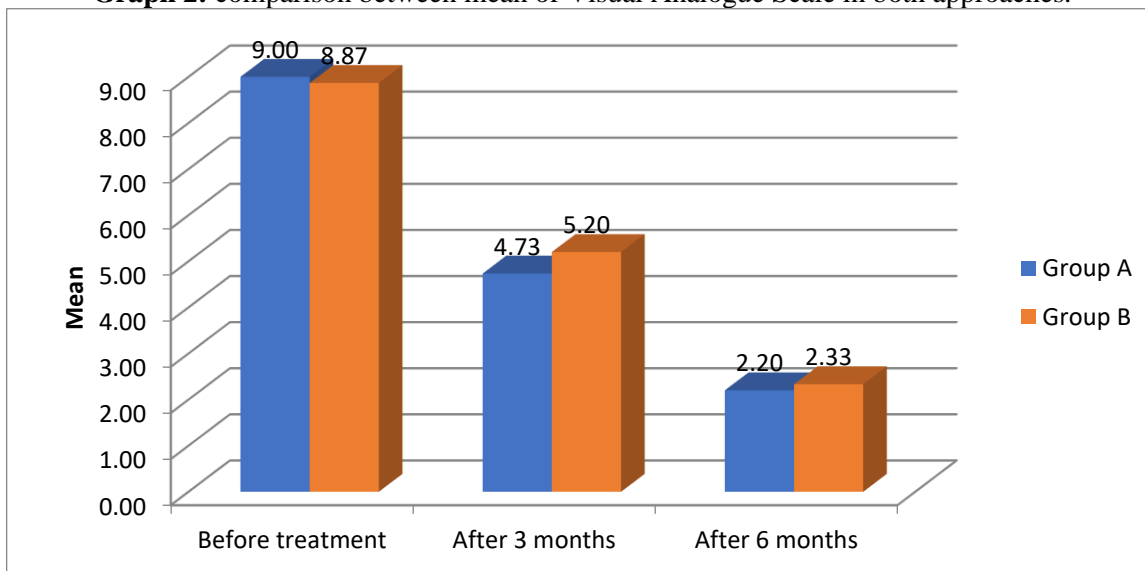
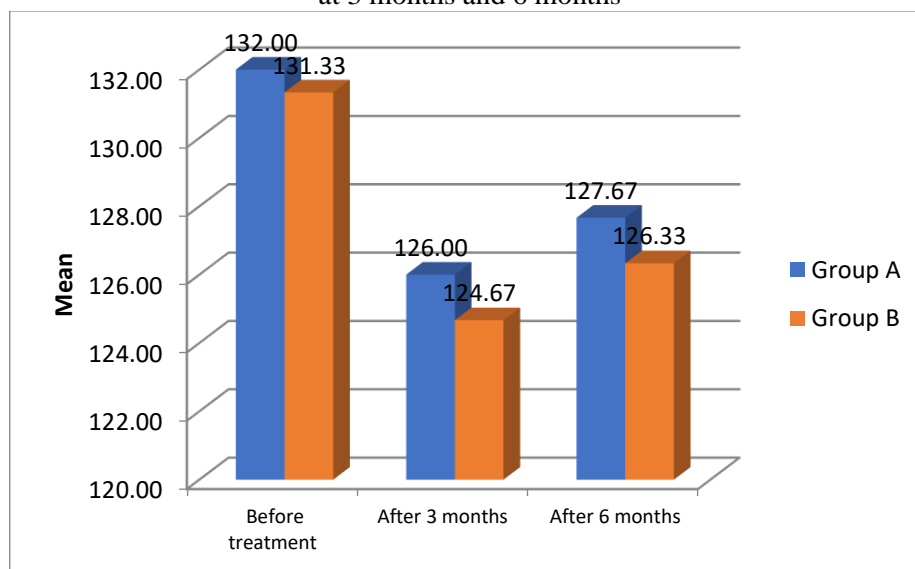


Table 3: comparison between both the approaches for range of motion before treatment and after treatment at 3 months and 6 months

There was difference of 1 degree ROM at 3 months and 6 months.

Range of Motion at Knee Joint	Group A		Group B		t	p-value
	Mean	SD	Mean	SD		
Before treatment	132.00	5.61	131.33	5.81	0.320	0.752
After 3 months	126.00	8.06	124.67	7.19	0.478	0.636
After 6 months	127.67	7.29	126.33	5.16	0.578	0.568

Graph 3: comparison between both the approaches for range of motion before treatment and after treatment at 3 months and 6 months



DISCUSSION

In current series 30 cases of closed fracture of shaft of the tibia were treated by closed reamed interlocking intramedullary nailing by midline tendon splitting and lateral parapatellar approach over a period of two years.

They were followed up for an average of 6 months. The purpose of this study was to evaluate the end results of treatment in these patients.

The average age of all the cases in our study was 49 years for midline tendon splitting and 50 years for lateral parapatellar approach. Overall, for both approaches combined average age was 49 years.

There were 21 male and 9 female patients corresponding to 70% male and 30% female population, showing a male predominance.

Majority of patients in our study had left side involvement as compared to right side, corresponding to 53% and 47% respectively. The mean follow-up Lysholm activity score at 3 months and 6 months are 60.60 ± 6.14 and 70.87 ± 5.25 points for the patients treated with the transtendinous approach and 72.13 ± 4.26 and 80.27 ± 4.03 points for those treated with the paratendinous approach respectively, whereas between group difference = 11.53 and 9.40 points respectively for 3 months and 6 months.

The mean range of motion of the involved knee was $124.67^\circ \pm 7.19$ and $126.33^\circ \pm 5.16$ for the patients treated with the transtendinous approach and $126.00^\circ \pm 8.06$ and $127.67^\circ \pm 7.29$ for those treated with the paratendinous approach at 3 months and 6 months respectively. However, ROM at knee joint is affected by number of causes, mainly osteoarthritis in old age.

CONCLUSION

In present study it was concluded that lateral parapatellar intramedullary approach is better than midline tendon splitting approach. A significant advantage of lateral parapatellar approach in addition to early joint motion is early weight bearing and less knee pain which allows patient to return to work earlier. The study had limitations like small sample size with limited duration of study which limits the generalization of study results to larger geographical locations. In the future, larger-scale prospective randomized trials will facilitate more reliable investigation of the efficiency of the lateral parapatellar approach and greatly enhance the conclusions of this study.

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