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Dr. Uttam Kumar Sarkar
Resident Doctor, Department of Orthopaedic Surgery, District Government Hospital, Eluru, West Godavari, Andhra Pradesh, India

Corresponding Author:
Dr. Uttam Kumar Sarkar
Resident Doctor, Department of Orthopaedic Surgery, District Government Hospital, Eluru, West Godavari, Andhra Pradesh, India

Evaluation of management of proximal tibia shaft fracture with interlocking tibia nail through suprapatellar approach

Dr. Uttam Kumar Sarkar

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Abstract
The purpose of this study was to access the functional outcome of management of proximal tibia shaft fractures which were managed surgically. The results showed the functional outcome of 24 patients. 20 patients (83.33%) were excellent, 2 patients (8.33%) showed good and 2 patients (8.34%) showed fair functional outcome.

Keywords: Tibia fractures, proximal shaft, intramedullary interlocking nailing, through suprapatellar approach, semi-extended position of the knee

1. Introduction
Tibia fractures are the most commonest amongst the long bone fractures in the human body [1]. and are usually caused by high-energy trauma such as road traffic accidents and falling from a height. At present, intramedullary nailing has often been the treatment of choice for the majority of diaphyseal tibial fractures [2, 3, 4] because of its early rehabilitation and early weight-bearing after surgery [5].
An infrapatellar and patellar tendon splitting entry to the tibia with the knee joint flexed 90 degrees seems to be the preferred entry for tibial nailing. If the indications for nailing of proximal and distal tibial fractures are extended, this is a challenge for surgical techniques. With proximal fractures, there is a tendency for anterior malalignment of the proximal fragment from the pull of the patellar tendon, and this pull is increased further when the knee is flexed during nailing [6]. with nailing in a conventional manner, there is a risk of poor repositioning, suboptimal reaming, and poor placement of the nail. Tornetta and Collins [6] (1996) reported 25 patients in whom a partial medial parapatellar arthrotomy was performed with the knee in a semi-extended position (15-degree bend of the knee joint), with two-thirds of the retinaculum split. When the patella was subluxed laterally, the trochlear groove was used as a bed for the instruments and nails. The argument for this entry was that when the knee joint is maximally bent to 15 degrees, the pull of the patellar tendon on the proximal fragment is eliminated, and thus the fracture can be easily repositioned and fixed.
Morandi *et al.* [7] described a percutaneous lateral suprapatellar approach through a 1.5-cm transverse skin incision at the superolateral corner of the patella. Jakma *et al.* [8] used a 1-2 cm incision just above the patella and in line with the tibial shaft. They used unreamed nails and arthroscopy before and after the nailing revealed damage to the patellofemoral cartilage. A cadaver study has shown injuries to the medial meniscus and intermeniscal ligament with a suprapatellar entry [9].
Furthermore, proximal and distal tibia, which mainly consist of cancellous bone with a large medullary cavity, lack thicker cortical bone; therefore, infrapatellar intramedullary nailing can easily cause angulation and rotation displacement at the fracture ends due to the poor stability of inserted intramedullary nail [10].
Semi flexion tibial nailing (with the knee in 10–20° flexion) via medial parapatellar approach was initially developed by Tornetta and Collins for the treatment of proximal tibial fractures. On the basis of some researchers proposed to perform intramedullary nails via the suprapatellar approach [11, 12].

Jakma *et al*. have described the method of intramedullary nailing from the suprapatellar pouch on a technical note, with the advantage of easy performance and no risk of injuries to the patellar tendon and infrapatellar nerve [13].
Furthermore, the conventional tibial intramedullary nail is designed with two proximal and distal locking screws at both sides, respectively, and the most proximal and distal locking screws are both far away from the end of the intramedullary nail. During the fixation for fracture of the metaphysis and multi-segmental fracture, few screws and a uniplanar locking direction often aggravate the horizontal and rotation displacement of proximal and distal fracture fragments, and thereby supplemental plate fixation is usually required and thus increases the surgical trauma and costs [14]. In this study, a locked intramedullary nail and the matched locking screws were used. The current study aimed to retrospectively evaluate the efficacy of intramedullary nailing via a suprapatellar approach for proximal tibial shaft fractures.

Methods and Methodology

This was a prospective study for the study of the clinical, radiological and functional outcome and complication for proximal tibial shaft fractures treated with intramedullary nailing through suprapatellar approach in semi extended position of the knee in 24 patients, in the period of JULY 2019 to JUNE 2021 at Department of Orthopaedics Surgery, District Government Hospital, Eluru, West Godavari District, Andhra Pradesh, India.

Inclusion criteria consists of:

1. Age greater than or equal to 18 years.
2. Closed fractures of both bone legs.
3. Segmental fractures of the tibia.
4. Proximal one-third of the tibia and mid-shaft fracture.
5. Ipsilateral femoral fractures.
6. Open diaphyseal fracture of tibia type I and II.

Exclusion criteria

1. Pediatric fractures of the tibia.
2. Age more than 71 years.
3. Associated comorbidities with unfit for surgery.
4. Intra articular extension fracture.
5. Open diaphyseal fractures of tibia type III.

Aims

To evaluate the functional outcome of intramedullary interlocking tibia nail through suprapatellar approach for management of proximal tibial shaft fractures.

Objectives

To assess the efficacy in:

1) Preventing angular malalignment.
2) Preventing procurvatum deformity.

To study

1) Average time for weight bearing with return to normal functional activity.
2) Rates of associated post-operative complications.

Suprapatellar approach

Position of patient

The patient was placed supine on a radiolucent table with a bump under the ipsilateral hip to help prevent the natural tendency of the limb to externally rotate at the hip. A bolster was kept under the knee joint to maintain 15-20 degrees of knee flexion. The increased tension across the extensor mechanism could be neutralized by placing the leg in the semi-extended position on a relatively flat surface perpendicular to the floor, thus limiting the risk of procurvatum deformity. Semi-extended position allowed the fracture reduction to be obtained and be maintained easily.
Fluoroscopy was placed on the contralateral side of the patient's injured limb.

Fig 1: 45^0 hip flexion and knee 15^0 flexion

Fig 2: skin incision

Incision and the entry point

A 1.5-2 cm longitudinal surgical skin incision was made 1 cm from the superolateral pole of the patella. The quadriceps tendon was split longitudinally. Then, index finger was inserted through the surgical incision, which should freely pass below the patella and reach the anterior border of the tibial tubercle, where the entry point of the tibia was to be made.

Fig 3: Index finger placement for free space below patella and reach the anterior border of tibial tubercle

The ideal starting point of the suprapatellar approach was just medial to lateral tibial spine. The ideal entry point seen on anteroposterior view was located 9 mm lateral to the center of the tibia plateau and slightly lateral to the tibial tubercle. On the lateral view, the entry point was anterior to the articular margin.

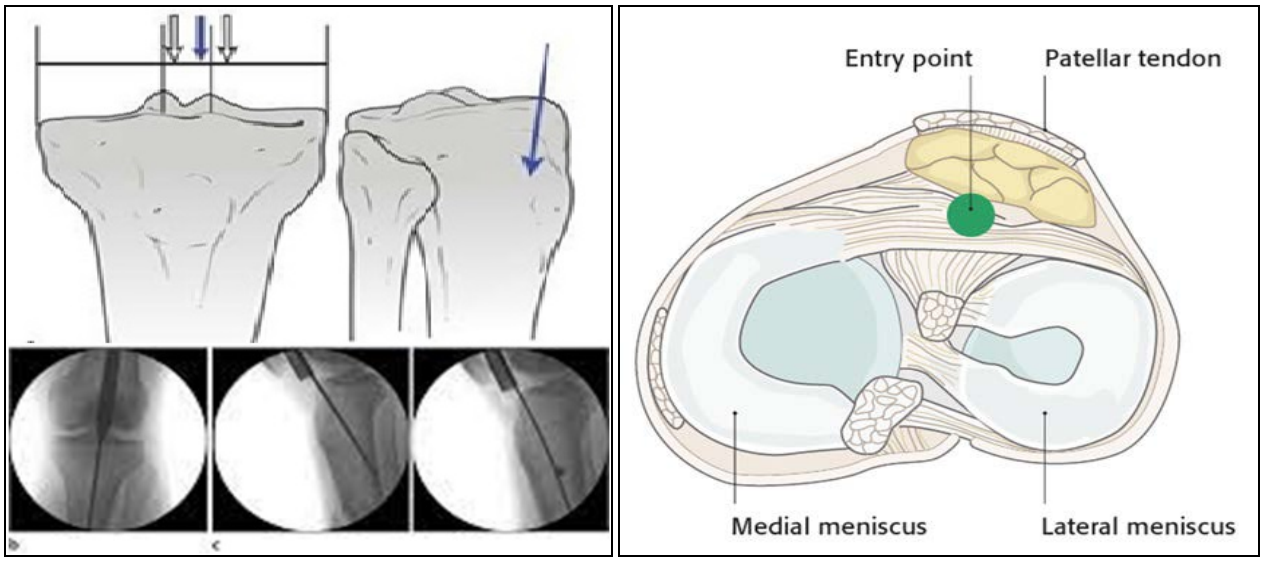


Fig 4: Images show ideal entry point in AP and Lateral View and Superior View

Insertion of Guide Wire

The cannula and the trocar was then inserted into the knee, with the cannula slided down the trochlear groove until that went in contact with the anterior tibia at the junction of the anterior cortex and the articular surface. The blunt trocar was then exchanged for a multi-holed guide pin sleeve. A 3.2mm non-threaded guide pin was passed into the central hole and drilled into the tibia approximately 4–6 cm but not to penetrate the posterior cortex of the tibia. AP followed by Lateral Fluoroscopic view under c-arm fluoroscopy was taken to determine the position, close reduction performed. Then a 3mm diameter ball tip guide wire was inserted. The appropriate position should be medial to lateral tibial spine in line with the Tibial shaft on the AP view at the junction of the anterior cortex and the articular surface on the Lateral fluoroscopic view. The guide wire was passed through the fracture side; the guide wire should reach the distal metaphysis of the tibia. The wire was kept in center to the medullary canal under c-arm guidance with an anteroposterior and lateral view.

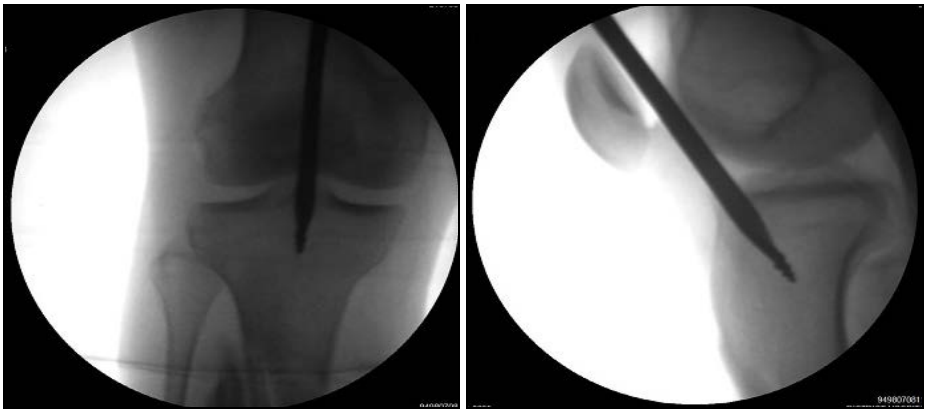


Fig 5: Images show C-arm AP and Lateral View of entry of guide pin

Procedure of reaming

Once the ball tip guide wire was placed in acceptable position, the multi-holed sleeve was removed, and an entry reamer was introduced through the cannula to open the canal. We directed the reamer to assure proper placement of the nail.

Fig 6: Image shows C-arm guided reaming during the procedure

The reamer was then passed across the fracture side only after fracture was reduced. If the reduction was required, then the reamer was removed, and a reduction tool was inserted through the cannula to reduce the fracture. Because the leg was laying flat on the operative table, gravity was not an issue; thus the fracture could be easily reduced. If the fracture were highly comminuted, reduction forceps, clamps, blocking (poller) screws were used to assist the reduction. A blocking (poller) screw was inserted lateral to the central axis of the tibia to prevent recurvatum, valgus deformity and procurvatum deformity of the tibia.

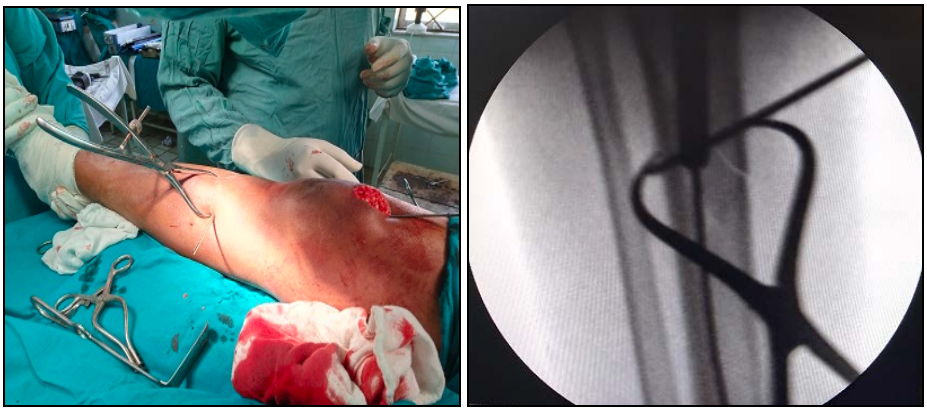
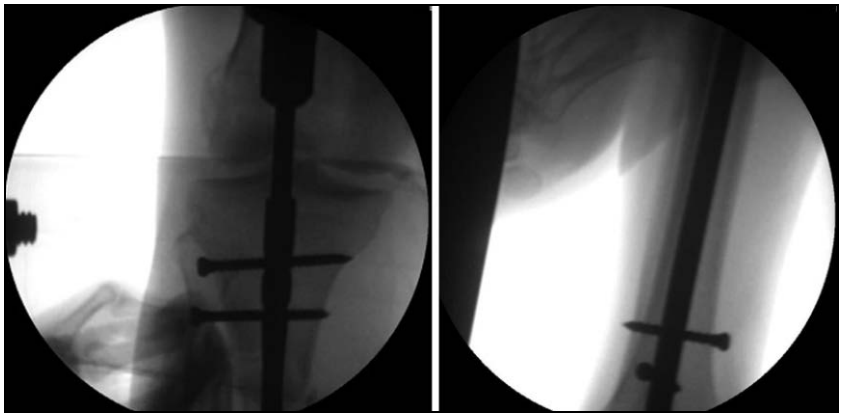


Fig 7: Poller screws and percutaneous clamp to reduction of fracture and prevent recurvatum, valgus and procurvatum deformity.

Placement of nail

Intramedullary serial reaming were done by gradually increasing sizes of reamers. Nail diameter was determined by the reamer size (1-2mm less than reamer size). Then properly selected nail was placed. Both anteroposterior and lateral alignment were monitored continuously. The nail was passed through the fracture site, distal positioning and proximal setting, all were best seen in lateral fluoroscopy view, which were easily obtained due to the fact that the leg was in the extension position.

First, proximal interlocking screws were placed, followed by distal interlocking screws, which was applied by the free hand technique. If more compression was required at the fracture site, distal screws were placed first and back-slapping of the sliding hammer were applied under fluoroscopic guidance.



Proximal locking Distal locking image shows complete nail and screw fixation

After final fluoroscopic views were obtained, the zig was removed, the knee joint was washed with saline to remove bone debris, blood, and any foreign metal bodies from instruments used inside. A full range of movement of the knee was checked for verification of patellar tracking. The wounds was closed in layers (first quadriceps followed by subcutaneous followed by skin).

Fig 7: Intraoperative images

Post-operative protocol and follow ups

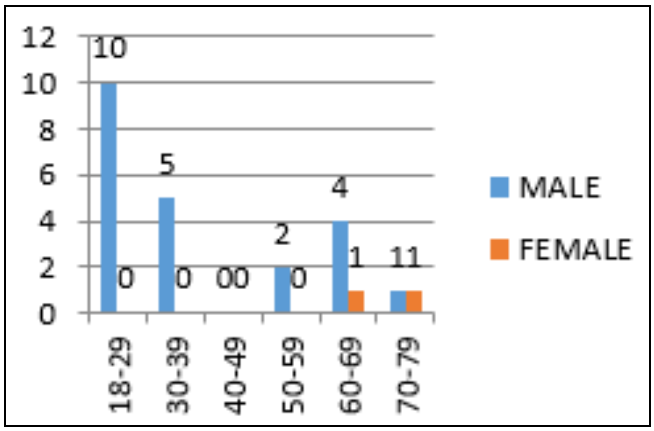
1. Nil per oral 4-6 hours postoperatively.
2. Intravenous fluids and Intravenous antibiotics
3. Intravenous or intramuscular analgesics to decrease pain.
4. Limb elevated over pillows.
5. Active toe movements.
6. Check X-ray on the next day after the operation.
7. Exercise to encourage the knee and ankle range of motion with active quadriceps strengthening exercise should be initiated as soon as possible
8. Suture removal on the 2nd week (10 to 14 days).
9. Weight-bearing was determined by the axial stability of the fracture pattern. If there was good axial stability as seen in a non-comminuted diaphyseal fracture pattern, then immediate weight-bearing was as much tolerated.
10. Non-weight bearing with crutches or walker for at least 6 weeks after discharge for highly comminuted fracture pattern.
11. Partial weight bearing till radiological union.
12. Patients were followed at 1,2,3,6, and 12 months after surgery. Anterior and lateral X-ray films are taken at each follow-up for evaluations of fracture healing, implant position, and the general condition of the fracture site.

Observation and results

This study was done in the District Government Hospital, Eluru, West Godavari District Andhra Pradesh; 24 patients with fracture proximal shaft of the tibia were treated with closed intramedullary interlocking nailing. The results are observed here.

Table 1: Age distribution according to sex

Age	Male	Female
18-29	10	0
30-39	5	0
40-49	0	0
50-59	2	0
60-69	4	1
70-79	1	1
Total	22	2

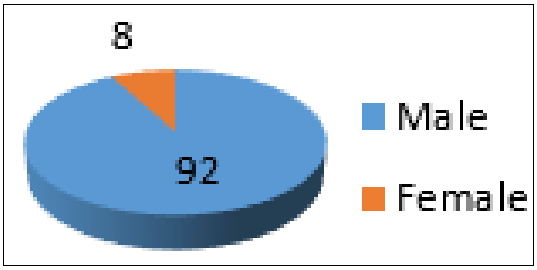


Graph 1: Age distribution according to sex

In my study, the minimum age of the patient was 18 years. The average age of the patients in the study was 41.6 years. The tibial shaft fractures were common in the age group of 18-29 years.

Table 2: Sex Distribution

Sex	Cases	Percentage
Male	22	92
Female	2	8
Total	24	100.00

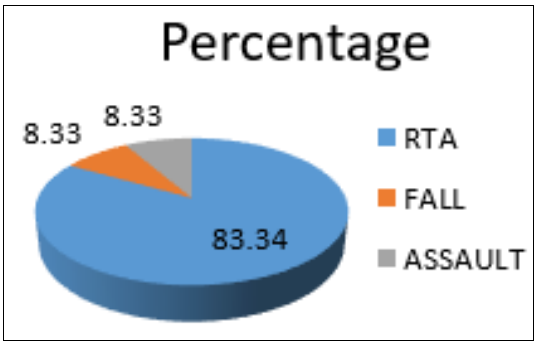


Graph 2: Sex Distribution

In my study, males predominate the female sex. The present study were 92% males and 8% females.

Table 3: Mode of injury

Mode of injury	Number of patients	Percentage
RTA	20	83.34
Fall	2	8.33
Assault	2	8.33
Total	24	100.00

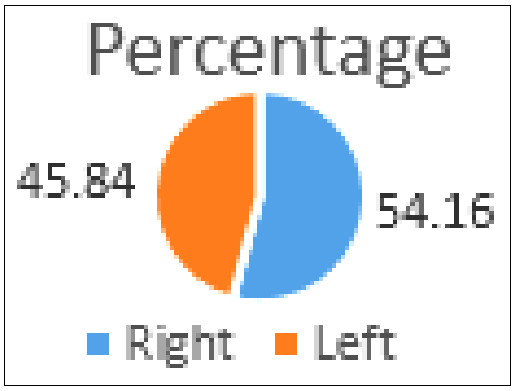


Graph 3: Mode of injury

In this study, road traffic accidents were the most common mode of injury-causing tibial shaft fractures in 20 patients (83.33%) out of 24 patients, assaults were the cause in 2 (8.33%) patients and self-fall were seen in 2 (8.33%) patients.

Table 4: Side Incidence

Side incidence	Cases	Percentage
Right	13	54.16
Left	11	45.84
Total	24	100.00

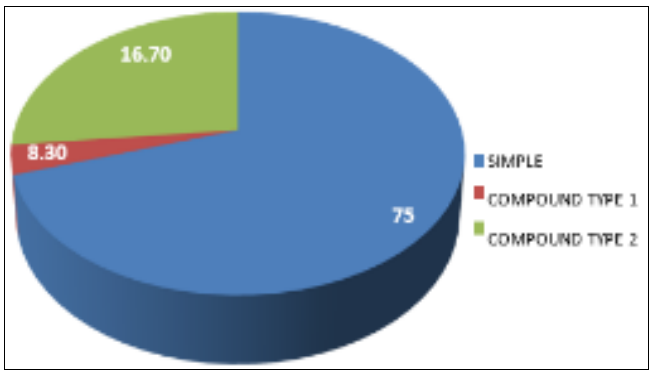


Graph 4: Side Incidence

In this study, the right tibia was affected in 54.16% and the left tibia in 45.84%.

Table 5: Fracture Pattern

Type of injury	Number of patients	Percentage
Simple	18	75
Compound type 1	4	16.70
Compound type 2	2	8.30
Total	24	100

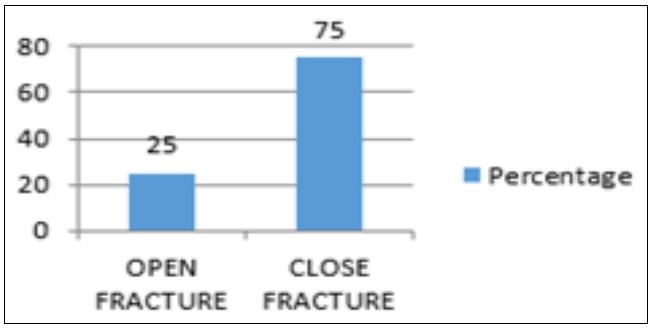


Graph 5: Fracture Pattern

In this study, 18 fractures were simple (75%), 4 were compound type 1 (16.70%) and 2 were compound type 2 (8.30%).

Table 6: Fracture types

Type of injury	Number of patients	Percentage
Open Fracture	6	25
Close Fracture	18	75
Total	24	100

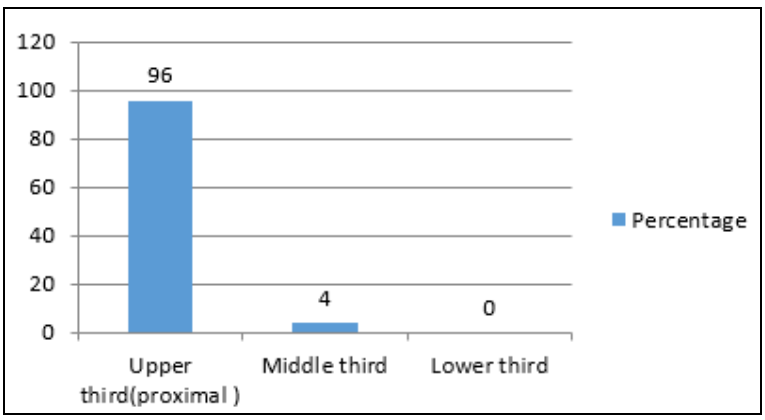


Graph 6: Fracture types

In this study, 18 fractures were close fractures (75%), and 6 fractures were open fractures (25%).

Table 7: Anatomical location of fracture

Anatomical location of the fracture	Number of patients	Percentage
Upper third (proximal)	23	96
Middle third	1	4
Lower third	0	0
Total	24	100.00

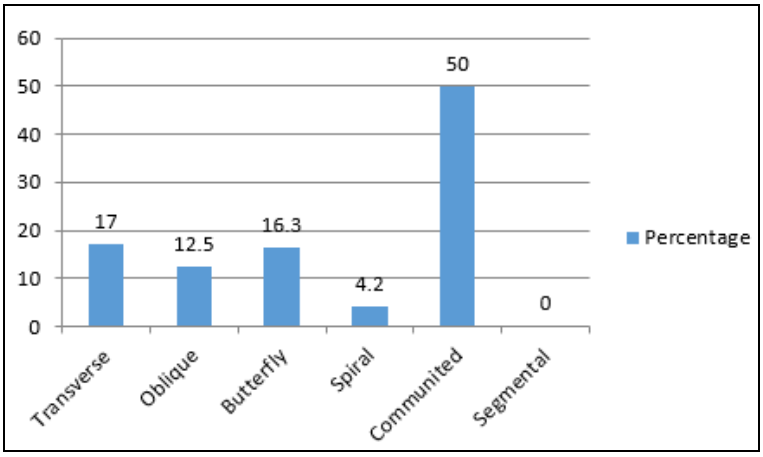


Graph 7: Anatomical location of fracture

The commonest anatomical location of fracture were at the proximal 1/3 of the tibia. This were constituted 96% of tibial shaft fractures and middle third were 4%.

Table 8: Type of fracture

Type of fracture	Number of patients	Percentage
Transverse	4	17
Oblique	3	12.5
Butterfly	4	16.3
Spiral	I	4.2
Comminuted	12	50
Segmental	0	0
Total	24	100.00

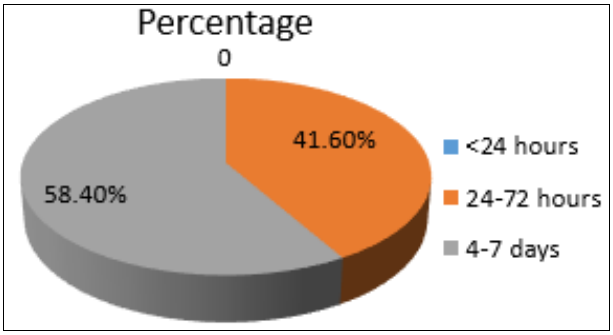


Graph 8: Type of fracture

In this study, comminuted fractures were seen in (50%) of patients, followed by transverse fractures in (17%) of patients, Butterfly fractures followed by in (16.3) of patients. Oblique fractures were seen in (12.5%) and spiral fractures were seen in (4.2%) of patients. Comminuted fractures (50%) had common, because of high-energy trauma.

Table 9: Duration from injury to surgery

Duration	Number of cases	Percentage
<24 hours	0	0
24-72 hours	10	41.6%
4-7 days	14	58.4%

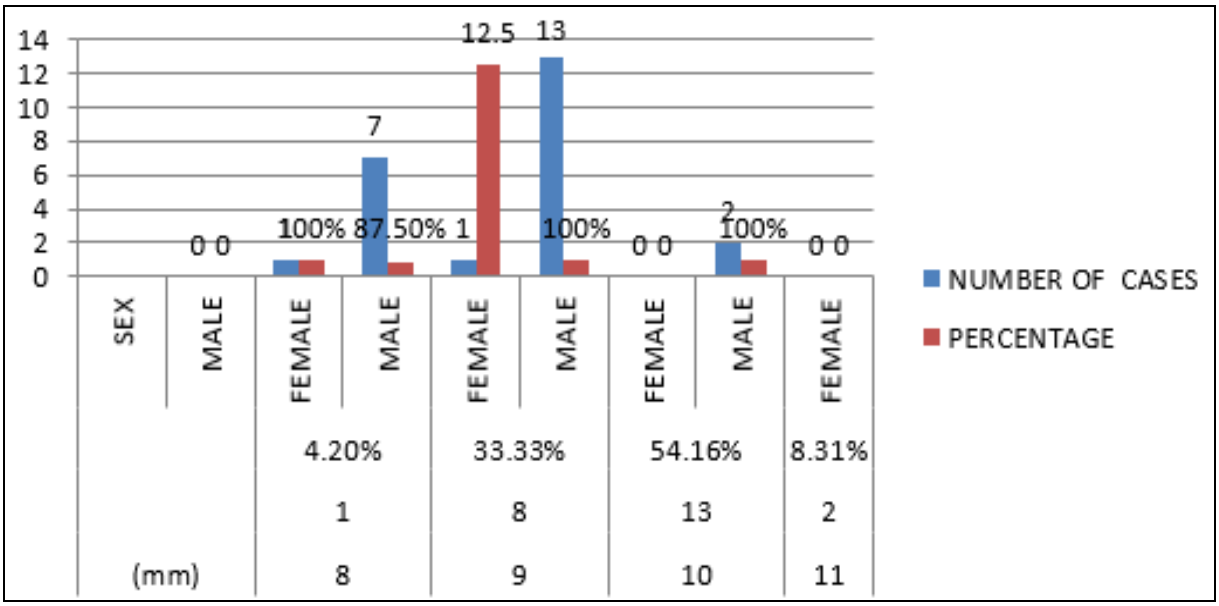


Graph 9: Duration from injury to surgery

The majority of the patients (14 patients) were operated on within 7 days of injury in my study. The average duration from injury to surgery was 4.6 days.

Table 10: Nail diameter

Nail Diameter	Number of Cases	Percentage	Sex	Number of Cases	Percentage
8	1	4.2%	Male	0	0
			Female	1	100%
9	8	33.33%	Male	7	87.5%
			Female	1	12.5
10	13	54.16%	Male	13	100%
			Female	0	0
11	2	8.31%	Male	2	100%
			Female	0	0

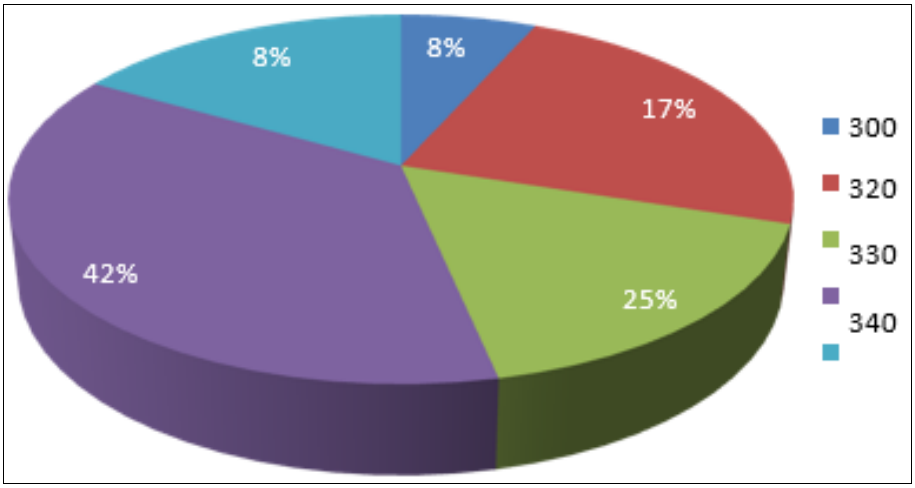


Graph 10: Nail Diameter

In the majority of cases in my study, we used 10 mm nail size in 13 patients. In female patients, we used 8 and 9 mm nail sizes because they had decreased the size of the medullary cavity.

Table 11: Nail length

Nail length	Number of cases	Percentage	Sex	Number of cases	Percentage
300	2	8.33%	Male	0	----
			Female	2	100%
320	4	16.66%	Male	4	100%
			Female	0	0
330	6	25%	Male	6	100%
			Female	0	0
340	10	41.70%	Male	10	100%
			Female	0	0
360	2	8.31%	Male	2	100%
			Female	0	0

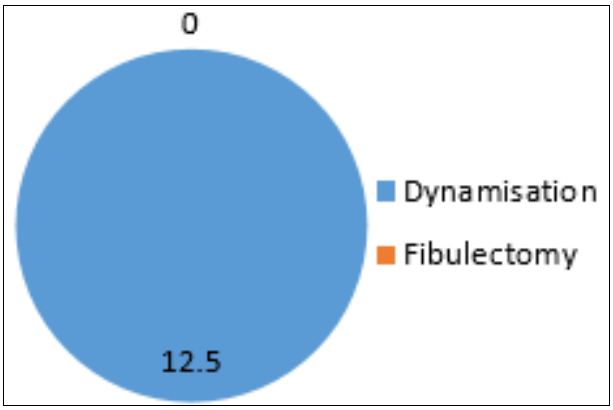


Graph 11: Nail length in MM

In the majority of cases in my study, I used 340 mm nails. (42% of patients). Females required lesser sizes compared to males.

Table 12: Secondary Procedure

Secondary procedure	No of patients	Percentage
Dynamisation	3	12.5%
Fibulectomy	0	0%

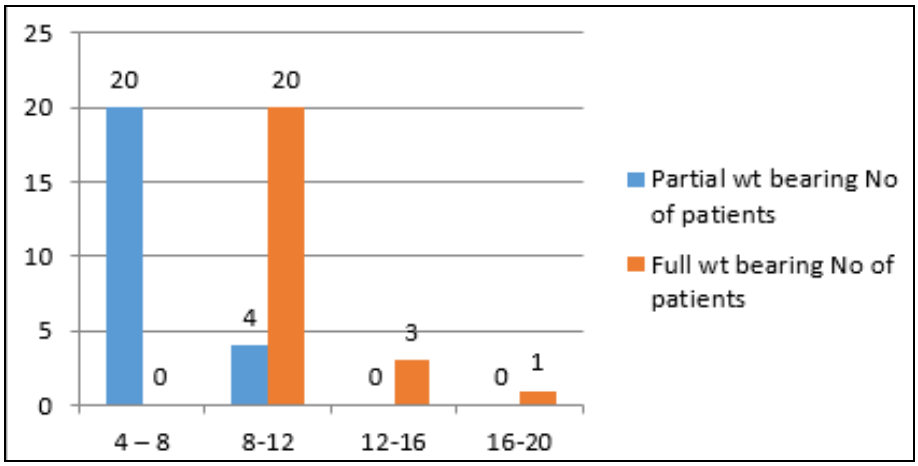


Graph 12: Secondary Procedure

In my study, 12.5% of the patients required secondary procedures for fracture healing. In this study 3 patients (12.5%) required dynamization.

Table 13: Weight bearing

Weeks	Partial WT bearing No of patients	Full wt. bearing No of patients
4-8	20	0
8-12	4	20
12-16	0	3
16-20	0	1

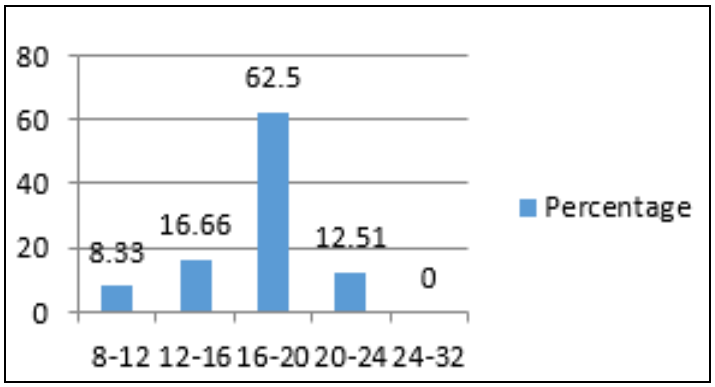


Graph 13: Weight Bearing

In my study, partial weight-bearing were started at 4-8 weeks in 20 patients (83%), and 8-12 weeks in 4 patients (17%). Full weight-bearing were started at 8-12 weeks in 20 patients (83%), 12-16 weeks in 3 patients (12.5%) and 16-20 weeks in 1 patient (4.16%). In 3 patients in my study, dynamization were done at 8 - 12 weeks, and they were mobilized with full weight-bearing.

Table 14: Radiological fracture union

Fracture union	Number of patients	Percentage
8-12	2	8.33
12-16	4	16.66
16-20	15	62.5
20-24	3	12.51
24-32	*0*	0
Total	24	100.00

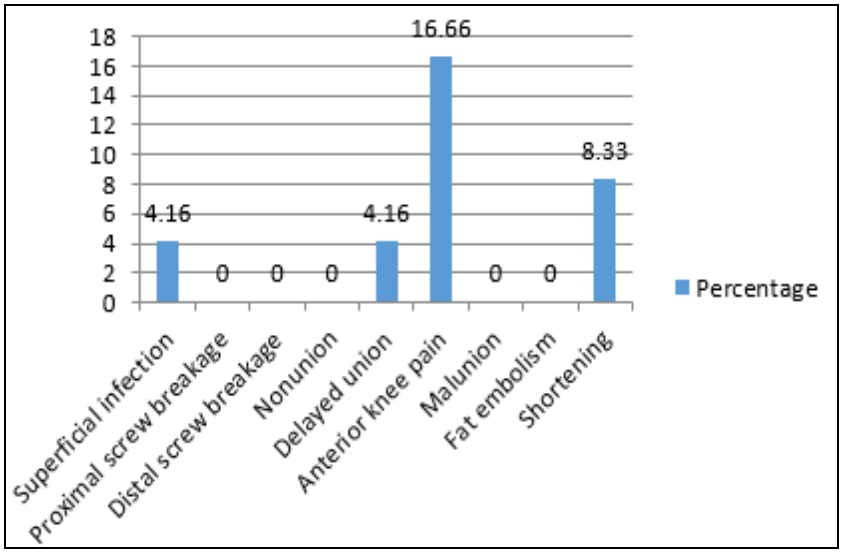


Graph 14: Radiological fracture union

In my study, the majority of fractures united within 20 weeks. The average healing time was 18.6 weeks.

Table 15: Complications

Complications	Number of patients	Percentage
Superficial infection	1	4.16
Proximal screw breakage	0	0
Distal screw breakage	0	0
Nonunion	0	0
Delayed union	1	4.16
Anterior knee pain	4	16.66
Malunion	0	0
Fat embolism	0	0
Shortening	2	8.33



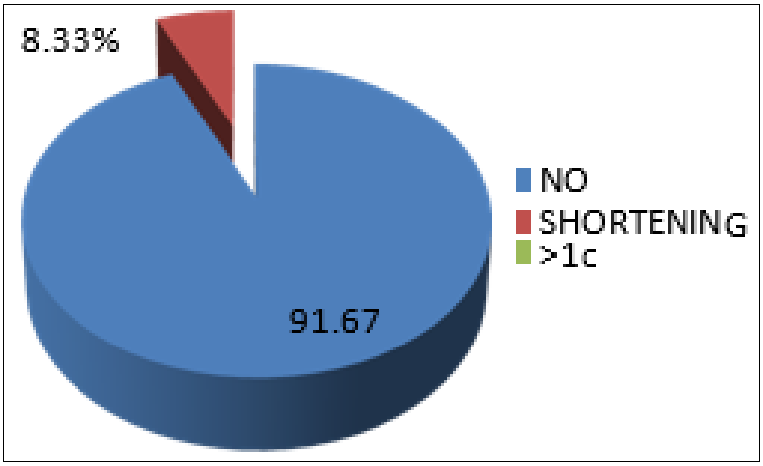
Graph 15: Complications

The infection rate were around 4% in my study, which included 1 superficial infection. Superficial infections healed by debridement, dressing, and antibiotics.

Anterior knee pain were seen in 4(16.66%) patients and 1(4.16%) patient had delayed union, shortening were seen in 2 (8.33%) patients.

Table 16: Shortening

Shortening (in cm)	Number of patients	Percentage
No Shortening	22	91.67%
0-1	2	8.33%
>1	0	0

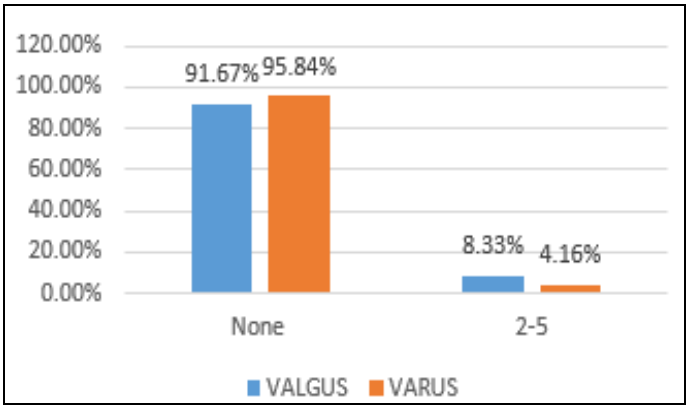


Graph 16: Shortening

Shortening were seen in 2 patients (8.33%). one patient had a comminuted fracture, and one patient with comminuted fracture was delayed union. These were managed by heel raise of the foot wear.

Table 17A: Deformity Assessment

Deformity	In degrees	Number of patients	Percentage
Valgus	None	22	91.67%
	2-5 °	2	8.33%
Varus	None	23	95.84%
	2-5 °	1	4.16%

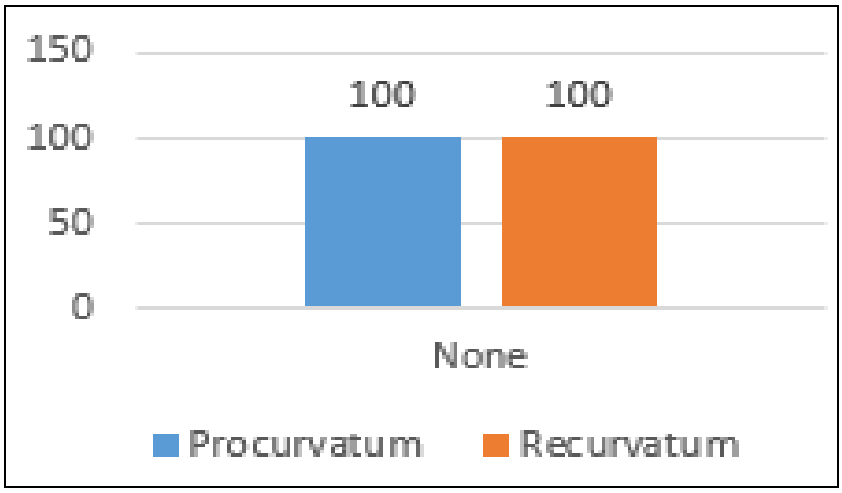


Graph 17: Deformity Assessment

Valgus deformity of <5 degrees were seen in 2 patients. Varus deformity was seen in 1 patient of 3 degrees, and no patients had valgus and varus deformities >5degrees.

Table 17B: Deformity Assessment

Deformity in degrees		Number of patients	Percentage
Procurvatum	None	24	100%
Recurvatum	None	24	100%

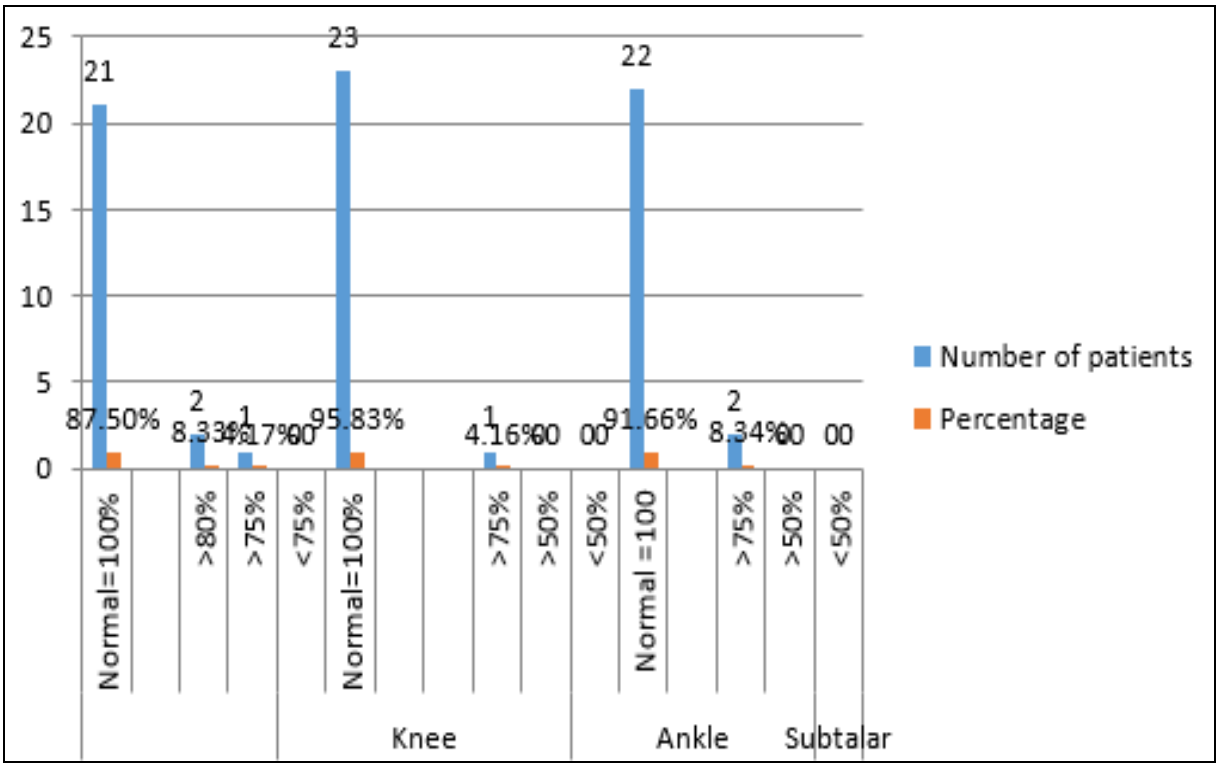


Graph 17: Deformity Assessment

None of the patients had recurvatum deformities and procurvatum deformities.

Table 18: Movements

Movements		Number of patients	Percentage
Knee	Normal=100%	21	87.50%
	>80%	2	8.33%
	>75%	1	4.17%
	C75%	0	0
Ankle	Normal=100%	23	95.83%
	>75%	I	4.16%
	>50%	0	0
	<50%	0	0
Subtalar	Normal =100	22	91.66%
	>75%	2	8.34%
	>50%	0	0
	<50%	0	0

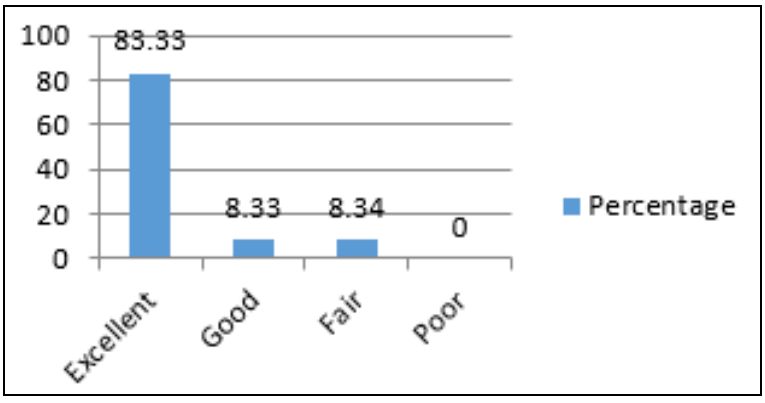


Graph 18: Movements

Knee movements were reduced in 2 patients (8.33%) to >80% and 1 patient (4.17%) to >75%, probably due to the proximal end of the nail was abutting the tendon and anterior knee.
Ankle movements was reduced in 1(4.16%) patient, and sub-talar movements were reduced in 2 (8.34%) patients. each probably due to angulation in the fracture site, altered alignment, and due to prolonged non-weight bearing.

Table 19: Functional outcome (lower extremity functional scale)

Functional outcome	Number of patients	Percentage
Excellent	20	83.33
Good	2	8.33
Fair	2	8.34
Poor	0	0
Total	24	100.00

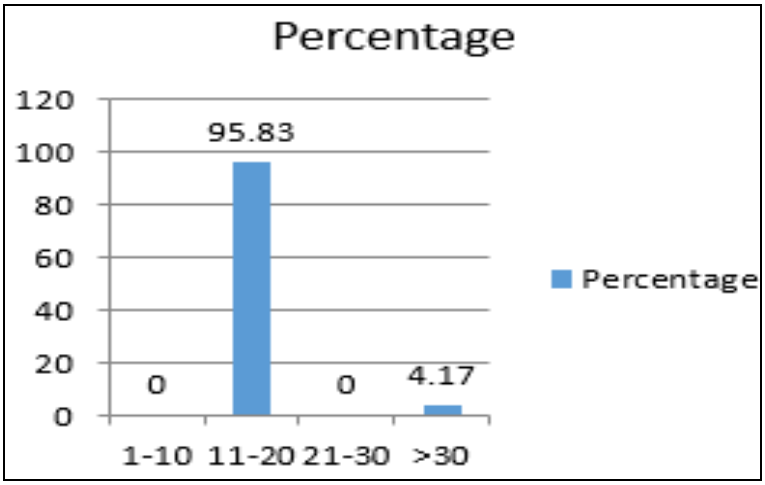


Graph 19: Functional outcome (lower extremity functional scale)

In my study, 83.33% of patients had excellent functional results, and 8.33% had good functional outcomes, while 8.34% had a fair functional outcome. There was no case found poor outcome.

Table 20: Duration of hospital stay

Duration of hospital admission	No. of patients	Percentage
1-10	0	0
11-20	23	95.83
21-30	0	0
>30	1	4.1 7
Total	21	100.00

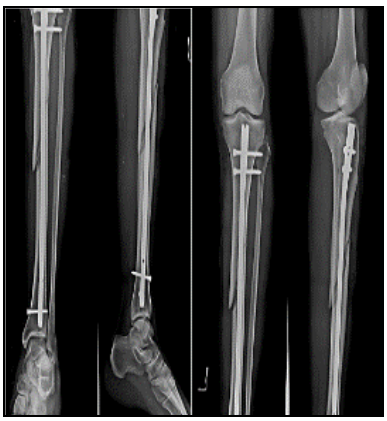


Graph 20: Duration of hospital stay

In this study duration of hospital stay were 11-20 days and average of 16.20 days.

Case 1

Pre-operative X-rays



Immediate post-operative X-ray

Twelve months follow up X-rays

Functional outcome

FLEXION OF KNEE AND SQUATTING

SITTING CROSS LEG

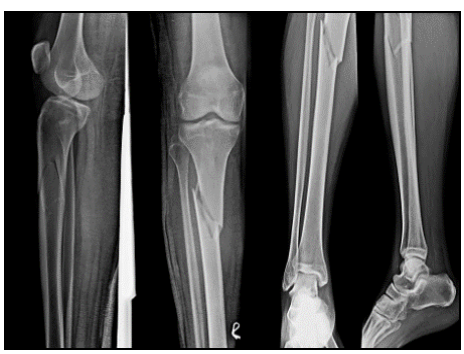
STANDING KNEE EXTENSION

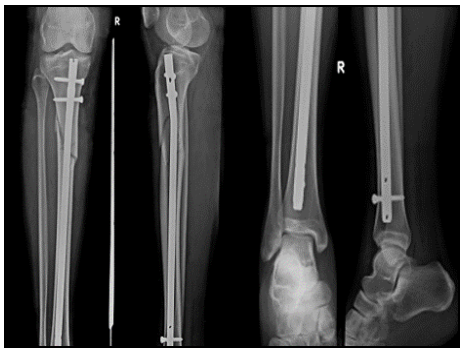
STANDING KNEE FLEXION


Inversion


Eversion

Case 2


Preoperative X-ray


Immediate post-operative X-rays


Five months follow up X-ray

Functional outcome


Flexion of knee and squatting


Standing knee flexion


Standing knee flexion


Planter Flexion


Dorsi Flexion


Sitting cross leg

Discussion

This study includes 24 patients who were admitted in the Orthopedics Wards in "District government hospital, Eluru, Andhra Pradesh".

This study includes various patterns of fractures, closed as well as open injuries treated by a closed method.

Age distribution

In my study, the majority of the patients were in the age group of 18-29 years. There were 10 patients who belonged to this age group in my study. The average age of the patient in my study was 41.6 years (Range from 18 years to 71 years). Diaphyseal fractures of the tibia were seen in the younger age group as they are the persons who were physically active, engaged in increased various outdoor activities, and as a result most of the fractures sustained were due to high-velocity

injuries.

Sex distribution

In my study, males predominated the females. There were 22 male patients (92%) and 2 female patients (8%). The incidence of males were higher because of their more outdoor activities, while women confined themselves to domestic activities.

Mode of injury

In my study it was found that the majority of the tibial diaphyseal fractures occurred due to road traffic accidents (20 patients). In majority of the cases, were motorists.

In my study the incidence of fracture of the proximal shaft of the tibia due to road traffic accidents were 83.34%, assault were 8.33% and self-fall were 8.33%.

Anatomical location of the fracture

In my study, the anatomical location of the fracture were in the proximal third of the shaft of tibia in 23(95.83%) patients, followed by the middle third in 1(4.17%) of the case.

Type of fracture

In my study, percentage of comminuted fractures were 50% of the cases. Transverse fractures were 17% of the cases, oblique fractures were 12.5% of the patients, butterfly fracture were 16.3% and spiral fracture 4.2%.

Preoperative, operative, and nailing procedure

In my study, I used intramedullary nails ranging from 8 to 11 mm in diameter and from 300 to 360 mm in length.

Reamed closed intramedullary nailing were done in all the cases in my study. Static locking were done in all the cases.

No other complications like compartment syndrome, neurological or vascular injury were seen.

Superficial infections occurred in one patient at the site of the surgical incision over the knee and it was healed by dressings and antibiotics.

In the majority of my patients, active hip, knee, ankle movements, and quadriceps exercises were started on the first postoperative day in all 24 patients. The majority of the patients were mobilized with the walker from the third post-operative day without bearing weight on the operated leg. Suture removal were done in all patients between 10^{th} to 14^{th} day post-operative. Complete relief of pain were seen in a majority of patients in two weeks. Follow-ups were done on the $6^{th,}$ $10^{th,}$ $12^{th,}$ $16^{th,}$ 20^{th} week, and 6^{th} month. At follow-ups, the clinical and radiological assessments were done regularly with useful follow-up advices.

Depending upon the type of fracture and stability of fixation, partial weight-bearing were started between 4-8 weeks when there were evidences of early callus. In my study partial weight-bearing were started in the majority of the patients by 4- 8 weeks. Weight-bearing were encouraged and increased depending on the progression of healing as evidenced by tolerance, clinical and radiological assessments.

Full weight bearing

Full weight-bearing were started at 8-12 weeks in 20 patients (83.33%), 12-16^{th} week in 3 patients (12.5%) and 16-20 week in 1 patient (4.16%).

The appearance of bridging callus were used to assess and allow the patient for full weight-bearing. The average time of full weight-bearing was 13 weeks.

Full weight-bearing were delayed in few patients with comminuted fractures.

Fracture union

Fracture union were considered when the patient was full weight-bearing without pain, fracture site was not tender on palpation, and the radiograph showed osseous union.

In my study, majority of fractures were united within 20 weeks in 21(87.5%) patients and 20-24 weeks in 3 (12.5%) patients. The average time of union were 18.6 weeks.

Complications

In my study, the superficial infection rate was 4.16%, and it healed with dressings and antibiotics.

Anterior knee pain were seen in 4 patients (16.66%). Due to the nail was abutting the patellar tendon and tibial tuberosity.

In my study, Shortening were seen in 2 patients (8.33%), one patient had a comminuted fracture; another patient had comminuted fracture with delayed union. Shortening was managed by advising heel raise footwear.

Deformity assessment

In my study, valgus deformity of 2–5 degrees were seen in 2 patients, and Varus deformity of 2 -5 degrees was seen in 1 patient.

Functional outcome

The final assessment was done by following objective and subjective symptoms of gait, pain, deformity, range of motion of the knee, ankle, and subtalar joints, shortening, neurovascular disturbances, ability to do strenuous activities, radiological union and presence or absence of non-union. Functional outcome was graded into excellent, good, fair, and poor.

In my study, 83.33% (20 patients) showed excellent result, 8.33% (2 patients) showed good and 8.34% (2 patients) showed fair functional outcome.

Conclusion

In my study, I treated proximal tibial shaft fractures with intramedullary nail through suprapatellar approach with knee in semi-extended position.

In my study, the main principle of nailing through suprapatellar approach with semi-extended knee was to neutralize the deforming force exerted by patellar tendon on the proximal fracture fragment. Thus satisfactory anatomical reductions were achieved intra-operatively.

This study showed excellent results in all of 24 patients in terms of maintenance of limb lengths, alignments and rotations, early weight bearing, early functional recovery and reduced hospital stay. These showed significant psychological impact and improvement in level of confidence of the patients in returning to daily activities.

Thus it can be concluded that intramedullary nailing` through suprapatellar approach can be a treatment of choice in management of proximal tibial shaft fractures by Preventing angular malalignment and procurvatum deformity.

Summary

From JULY 19 to JUNE 2021, 24 patients with fractures of the shaft of the tibia were treated by closed intramedullary interlocking nailing at District government hospital eluru, west Godavari district Andhra Pradesh.

- The average age of the patient in our study was 41.6 years.
- Males predominated the females in the ratio of 11:1.

- The right tibia were affected in 54.16% of the cases and left tibia were affected in 45.84%.
- Road traffic accidents were the main mode of injury in 83.34% of cases, self-fall were 8.33% and assault were 8.33%.
- Closed (simple) fracture were 18 patients (75%) and open (compound) fracture were 6 patients (25%).
- Among open (compound) fractures 4(16.70%) patients were type-1 and 2(8.30%) patients were type-2.
- The majority of fractures were located in the Proximal-third (96%) in 23 patients and the middle third was in 1 patient (4%).
- Comminuted fracture were (50%), transverse fracture were (17%) fractures, Butterfly fractures were 16.3%, spiral fracture were 4.2% and oblique fracture were 12.5%.
- The fibula was fractured in 87.5% of cases.
- The average time duration from injury to surgery was 4.6 days.
- Females required smaller sizes of nails 8mm and 9mm and males required larger size of nails 10mm and 11mm.
- Females required less length nails (less than 340mm), and males required more length nails (more than 340mm).
- Reamed closed intramedullary interlocking nailing was done in all the cases.
- In my study, partial weight-bearing were started at 4-8 weeks in 83.33% and the rest of them (17%) by 8-12 weeks.
- Full weight-bearing were started at an average time of 13 weeks.
- 3 (12.5%) patients required dynamization.
- The average duration of hospital stay was 16.20 days.
- The average healing time was 18.6 weeks.
- In my study, superficial infection were seen in 4.16% of patients and anterior knee pain in 16.66% of patient's. Shortening were seen in 8.33% of patients, and delayed union were seen in 4.16% of the patients.
- In my study, 20 patients (83.33%) had excellent, 3 patients (12.5%) were good, and 1 patient was (4.16%) delayed union with a fair outcome.

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