

A FUNCTIONAL OUTCOME OF TIBIAL  
FRACTURES TREATED WITH INTRA  
MEDULLARY INTERLOCKING NAIL BY  
SUPATELLAR APPROACH WITH SEMI  
EXTENDED KNEE POSITION, A PROSPECTIVE

By

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In

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Under the guidance of

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**KARNATAKA**

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“A FUNCTIONAL OUTCOME OF TIBIAL FRACTURES TREATED WITH  
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A PROSPECTIVE STUDY.”

MASTER OF SURGERY IN  
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## INTRODUCTION

Tibia fractures are one of the most common fractures of long bones constituting about 2% of adult population. <sup>[1, 2]</sup> Tibial shaft fractures occur with an incidence of 16.9/100,000/year.<sup>[3]</sup> The incidence of tibial fracture has a bimodal peak at age 20 and 50 .<sup>[4]</sup>

Adult both bone leg fractures are most common in young males between the ages of 19 and 39 .The incidence of non-union and malunion in tibial fractures is relatively high when compared to fractures in other parts of the body. The most frequent location for long bone fractures is the tibia, and about 80% of these injuries involve fibular fractures<sup>(1)</sup>.

They usually result from high-energy injuries and are frequently associated with severe soft tissue damage and complex comminution of bone. Tibia being a subcutaneous bone, there is higher chances of compound injuries.

Tibia fractures are more common in younger age group and as a result of higher energy trauma.

The treatment of tibial fracture has seen development for casting and functional bracing to intramedullary nailing and plating ,as developed by Kuntscher in 1940's .<sup>[5,17]</sup>Intramedullary interlocking nails are now the gold standard modality of treatment in closed tibia fractures. With varied fracture patterns based on its anatomical location or varied complications possible ,newer advancements have been made in the concept of tibia nailing .

Traditional method of infrapatellar nailing by splitting patellar tendon needs flexion or hyperflexion of knee. Most common issue faced in proximal tibia fracture by is anterior pull of proximal fragment by quadriceps on knee flexion.

Procurvatum deformity of proximal tibia is a commonly encountered complication.<sup>[7]</sup> With wide metaphysis of tibia, it is difficult to control the varus or valgus mal reduction of distal tibial fracture by infrapatellar approach. This also necessitates need of additional procedure of Poller screw technique. <sup>[8,9,10]</sup>

Intramedullary interlocking nail fixation with semi extended position of knee have been used for proximal and distal 1/3<sup>rd</sup> tibia shaft fractures, as described by Tornetta et al.<sup>[6,11]</sup> This technique involved subluxation of patella laterally following a medial parapatellar arthrotomy.

A modification of the semi extended knee technique for nailing was done by suprapatellar approach by Dr Dean Cole.<sup>[12]</sup> The main concern with this technique is the risk of injury to the patellofemoral articulation, which could cause patellofemoral arthritis and anterior knee discomfort following intramedullary nail fixation.<sup>[13]</sup> However, several studies found no appreciable differences between the Suprapatellar and Infrapatellar approaches in terms of pain, knee range of motion, or knee functional score.<sup>[14,15,16]</sup>

Suprapatellar tibia nailing in semi-extended knee position has been gaining popularity in the concepts of intramedullary nailing. With the semi extended position of nailing of tibia facilitated easy manipulation and reduction. This technique allows easier use of fluoroscopy intraoperatively, shorter fluoroscopy exposure time.<sup>[18,19,20]</sup> Entry of nail by suprapatellar approach creates a parallel plane of entry in line with sagittal axis of tibia, facilitating

ease of reduction and nail entry. This technique has lower potential for post-operative malalignment in proximal and distal tibia fracture. [21,22,23]

## AIM AND OBJECTIVES

‘The aim is to study the clinical ,radiological and functional outcome and complication of proximal and distal 1/3<sup>rd</sup> tibia shaft fractures treated with intramedullary interlocking nail by suprapatellar approach in semi extended position of knee in Department of Orthopaedics at’ -

SHRI B M PATIL MEDICAL COLLEGE AND RESEARCH CENTRE,  
BLDE University, Vijayapura.

## REVIEW OF LITERATURE

In 2021 Dr Anvesh et al. conducted a study on 20 patients of which 4 were closed and 16 were open tibia fractures treated with suprapatellar approach of tibia nailing .Patients were assessed based on Lower Extremity Functional Score of which 70% of patients had excellent results ,20% patients had good results , 5% had fair results ,5% had poor results<sup>(50)</sup> .

In 2021 Andreas Fontalis , et al conducted a study on 148 patients ,on a comparison between suprapatellar and infrapatellar nailing was done .73.2% of people were treated by infrapatellar approach and 66.3% were treated by suprapatellar approach .A lower incidence of anterior knee pain was noticed in suprapatellar group ,though there was no significant difference<sup>(43)</sup> .

In 2020 Dr Mahesh Suresh Kulkarni et al. conducted a study on 43 patients with proximal third tibia fracture treated with a tibial intramedullary interlocking nail by suprapatellar approach. Results showed no incidence of knee pain , four patients had mal union, eight delayed unions, one non-union.



In 2019 Dr R W Mac Donald, et al. conducted a study on 53 patients.

Results showed a mean MODIFIED LYSHOLM knee score of 93%, good alignment after one year of radiographic evaluation<sup>(44)</sup>.

In 2016 Beigang Fu et al. studied 23 patients' with tibial fractures treated with suprapatellar approach and locked META intramedullary nailing fixation. The extension of the knee during the procedure was the suprapatellar approach's greatest benefit, and it was extremely helpful in the treatment of complicated metaphyseal and diaphyseal tibial fractures. With the exception of one case of proximal tibial fractures with a 5 degree angulation, all 13 with tibial metaphysis fractures, four cases of tibial multisegmented fractures, and two cases of ipsilateral femoral fractures experienced satisfactory reduction and good recovery outcomes<sup>(45)</sup>.

In 2016 ,Daniel S Chan ,et al. conducted a study over 41 patients of which 25 patients came for routine follow up for 12 months , of which 14 were treated by infrapatellar approach and 11 were treated with suprapatellar approach .Of the 11 six patients treated by suprapatellar approach had chondromalacia changes at the end of 1 year with no significant patellofemoral pain. The mean LYSHOLM SCORE were 86 and 98 respectively<sup>(46)</sup> .

In 2016 Qi Sun, et al. conducted a study done on 138 patients with tibia fracture treated with suprapatellar and infrapatellar tibia approach .Patients were reviewed post operatively upto 24 months and assessed based on lysholm knee score ,VAS score and range of motion .Suprapatellar group showed better and lower pain score on VAS ,higher scores with good functional outcome based on Lysholm knee score ,significantly lower fluoroscopy time<sup>(47)</sup> .

In 2015 Dr Daniel Chan et al. conducted a study over 23 patients with suprapatellar nailing for tibial fractures. Results showed the mean LYSHOLM score of 96, with decreased post-op pain, improved knee ROM.

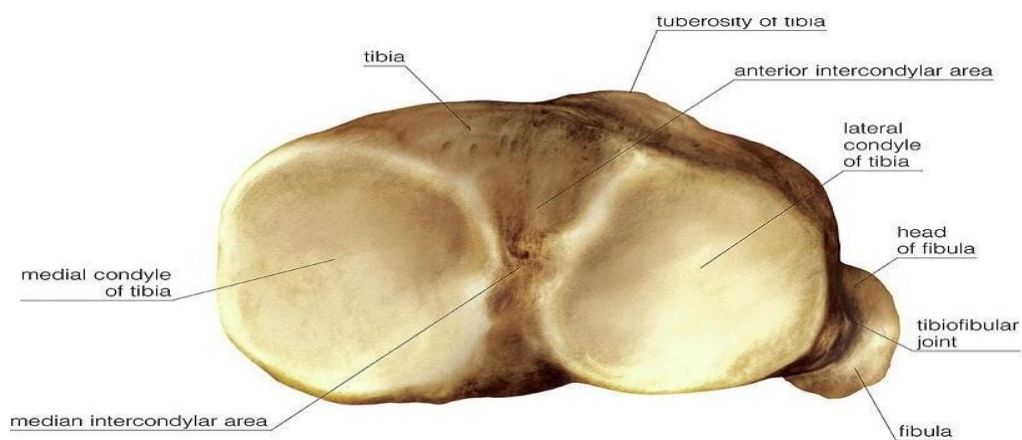
In 2015 Boris A. Zelle, et al. 015 Advances in intramedullary nailing have been studied .Suprapatellar nailing of tibial shaft fractures in semi-extended position to facilitate achieving and maintaining fracture reduction, particularly in proximal 3rd tibia fractures, reduce incidence of postoperative anterior knee pain. With intramedullary nail fixation of tibial shaft fractures, satisfactory outcomes and reproducible results obtained with union rate above 90%<sup>(48)</sup> .

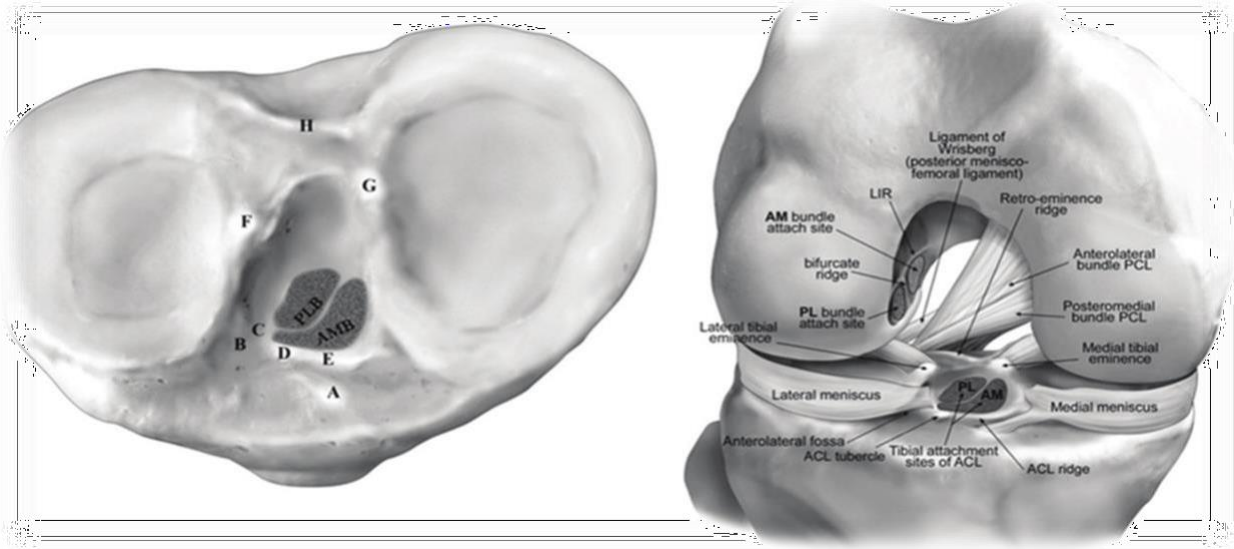
In 2014 Dr Roy Sanders, et al. conducted a study on 36 patients with tibia nail by suprapatellar approach. Results showed all but two fractures healed with 94.6% healing rate, one radiographic malunion observed and LYSHOLM KNEE score of 82.14<sup>(49)</sup>.

## ANATOMY

### OSTEOLOGY

The tibia is a long tubular bone having a triangular cross section. The proximal metaphyseal region is larger than the lower end of tibia . Lower end of the bone has a significant downward protrusion of the medial malleolus on its medial side .Tibia has a sharp anterior border . The intercondylar region divides the upper part of medial and lateral condyles. Another protrusion known as the tibial tuberosity distinguishes the anterior side of the upper end of the tibia. The medial and lateral condyles have concave articular surface that contributes in the formation of the joint.





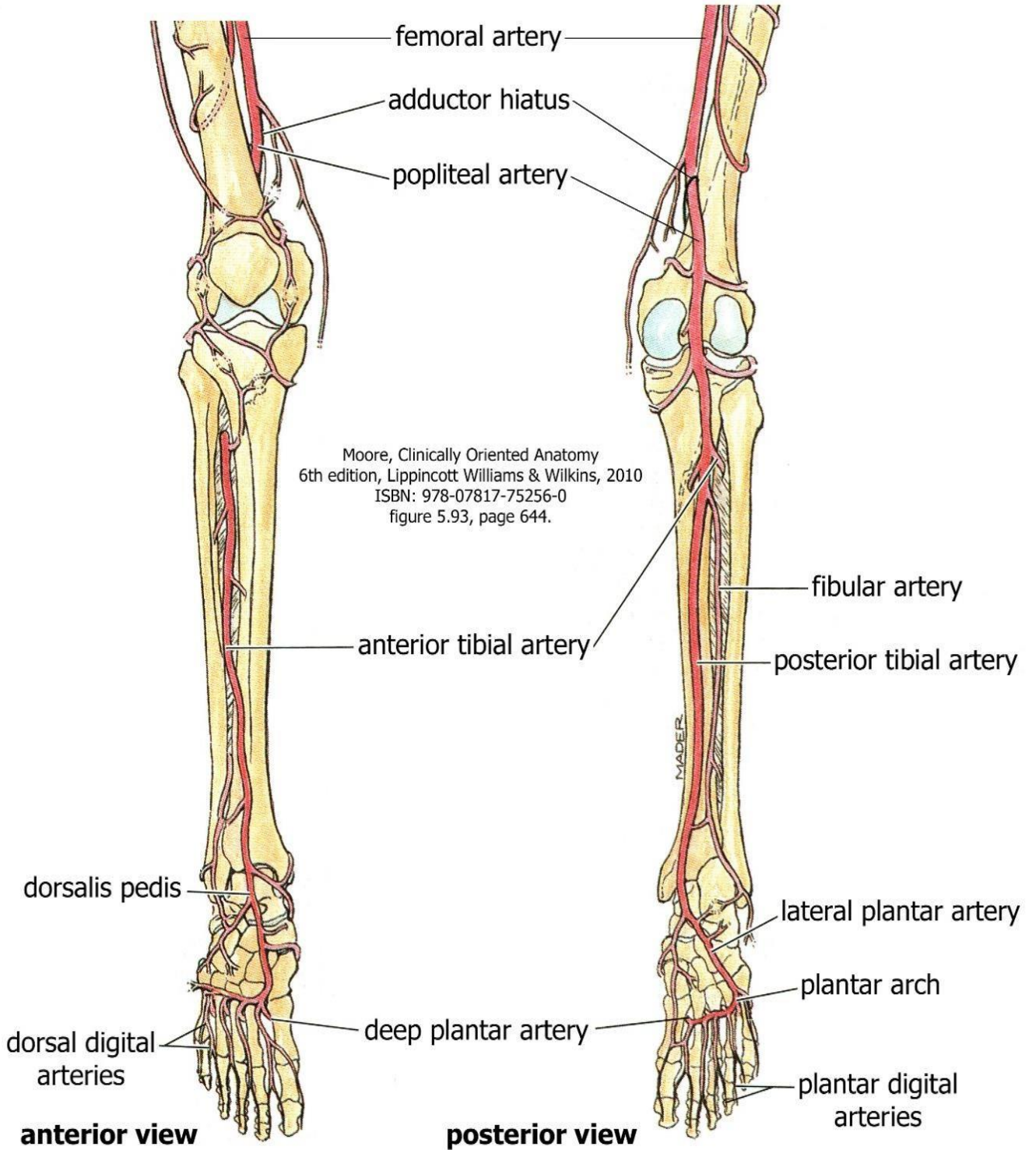
The medial articular surface is oval and wider than the lateral articular surface, which is rounded. An intercondylar area separates articular and non articular surfaces. Proximal intra articular aspect of tibia has a medial and lateral tibial eminence with clinical significance providing attachment to stabilising ligaments of knee.

On proximal aspect of tibia, the medial and lateral condyle merge anteriorly to form a rough triangular surface called tibial tuberosity. Tibial tuberosity provides attachment to patellar ligament, facilitating knee extension. The anterolateral surface of tibia has a bony landmark called Gerdy's tubercle which provides attachment for iliotibial band. In the lateral groove behind the lateral tibial ridge forms the proximal tibia fibular joint which provides articulation for tibia plateau and head of fibula.

## VASCULARITY

Major blood supply of tibia is through nutrient artery arising from the posterior tibial artery .This is the largest nutrient artery in the body .Just distal to the origin of soleus muscle ,the nutrient artery enters the posterolateral cortex .In the medullary canal it gives of 3 ascending and one descending branch .Theses further give rise to endosteal blood supply which anastomose with periosteal vessels of the anterior tibial artery .Endosteal blood supply is the major supply for distal 1/3<sup>rd</sup> of tibia .

The anterior tibial artery courses through a hiatus in the intraosseous membrane which makes it vulnerable to injury .Both periosteal and endosteal blood supply is important in tibia vascularity .The peroneal artery gives of communicating branch of dorsalis pedis artery .The distal 1/3<sup>rd</sup> is supplied by endosteal and periosteal blood supply with increased risk of non union in fracture fixation which emphasize on preserving periosteal blood supply .

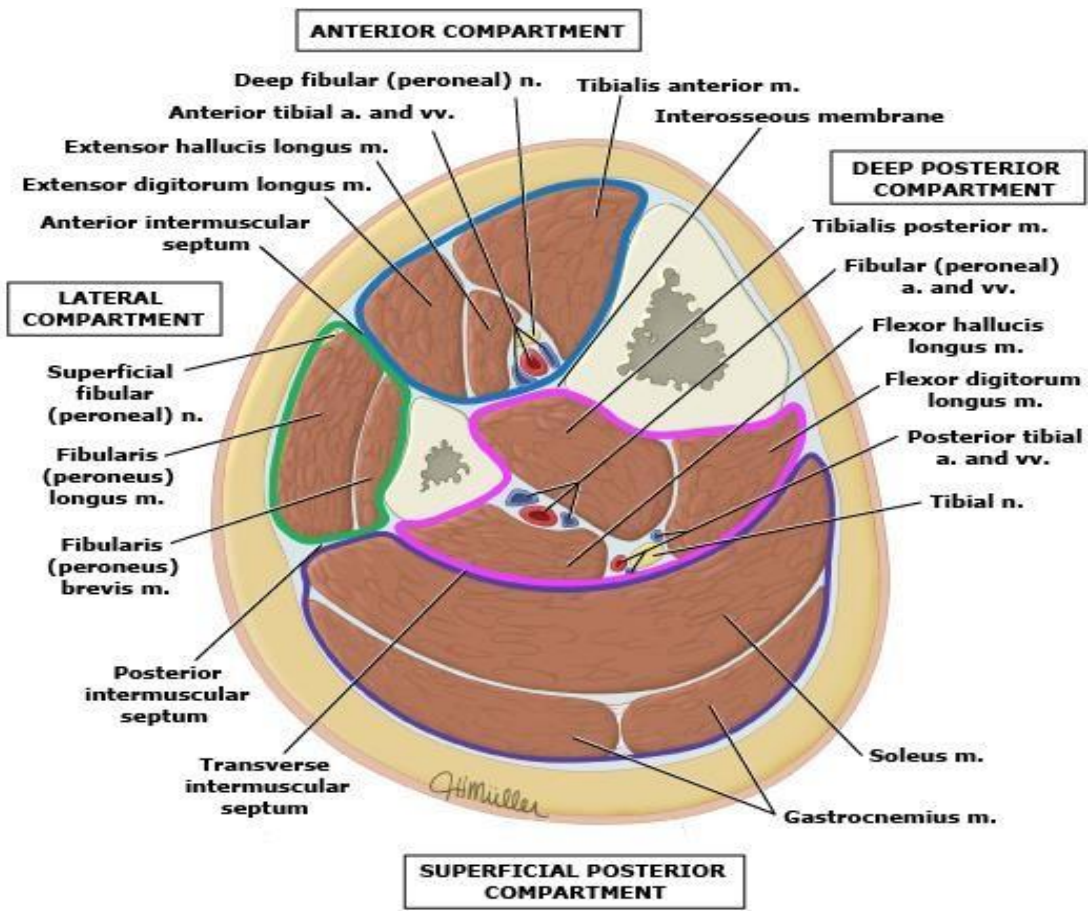


## LEG COMPARTMENTS AND MUSCULATURES

Following are the 4 compartments of leg .

COMPARTMENT	MUSCLES	NERVES
ANTERIOR	Tibialis Anterior Extensor Hallucis Longus Extensor Digitorum Longus Peroneus Tertius	Deep Peroneal Nerve
LATERAL	Peroneus Longus Peroneus Brevis	Superficial Peroneal Nerve
POSTERIOR - SUPERFICIAL	Gastrocnemius Soleus Plantaris	Tibial Nerve
POSTERIOR – DEEP	Tibialis Posterior Flexor Hallucis Longus Flexor Digitorum Longus Popliteus	Tibial Nerve







## TSCHERNE CLASSIFICATION OF CLOSED FRACTURES

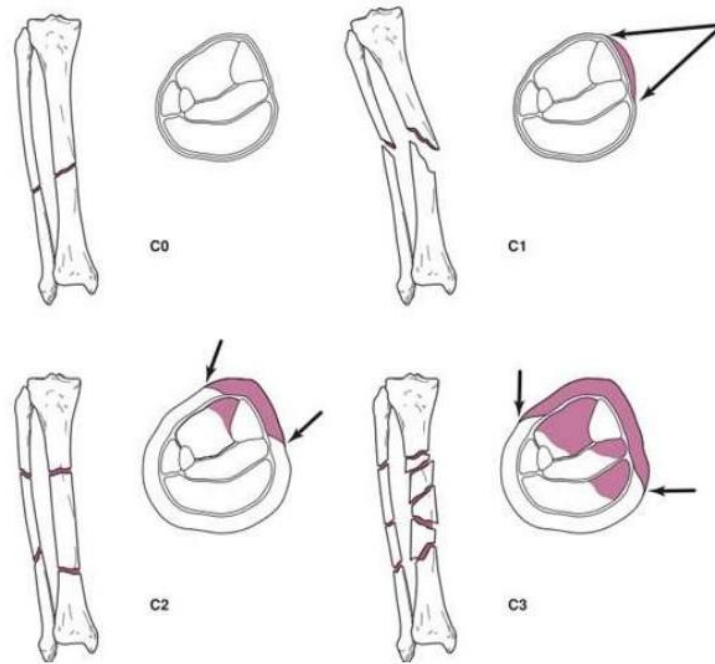
This classifies soft tissue injury in closed fractures and takes into account indirect vs direct injury mechanism

**GRADE 0:** Injury from indirect forces with negligible soft tissue damage

**GRADE 1:** Closed fracture caused by low to moderate energy mechanisms with superficial abrasions or contusions of soft tissues overlying the fracture .

**GRADE 2:** Closed fracture with significant muscle contusion with possible deep contaminated skin abrasion associated with moderate to severe energy mechanism ,high risk for compartment syndrome .

**GRADE 3:** Extensive crushing of soft tissue with subcutaneous degloving or avulsion ,and arterial disruption or established compartment syndrome



### MECHANISM OF INJURY

Tibia fractures have two peaks of age distribution in terms of its incidence with younger population under 30 years more commonly associated with transverse both bone ,comminuted fracture patterns and the elderly population above 50 years with more commonly low energy trauma with spiral orientation .

High energy trauma associated tibial fractures amidst the younger population has a mole preponderance over females ,as a result of more mobile life and with road traffic accidents being the most common primary cause of injury.

Mode of injury varied from Road traffic accidents to contact sports ,self-fall in elderly group and direct trauma .High energy trauma with Road traffic accident being the most common cause and distal 1/3<sup>rd</sup> of tibia being the most common anatomical site of fracture .<sup>[24]</sup>

## GUSTILLO ANDERSON CLASSIFICATION

TYPE	SIZE	CONTAMINATION	SOFT TISSUE INJURY	BONY INJURY
I	<1 CM	CLEAN	MINIMAL , PUNCTURE WOUND	SIMPLE TRANSVERSE/ SHORT OBLIQUE
II	1 – 10 CM	MODERATE	MODERATE	SIMPLE TRANVERSE/OBLIQUE / MINIMAL COMMUNUTED FRACTURE
III A	> 10 CM	HIGH	EXTENSIVE	ADEQUATE BONE COVERAGE
B	> 10 CM	HIGH	EXTENSIVE	PERIOSTEAL STRIPPING AND BONE EXPOSURE
C	> 10 CM	HIGH	EXTENSIVE	VASCULAR INJURY

## AO CLASSIFICATION OF TIBIAL DIAPHYSEAL FRACTURE

### Type A : Unifocal fracture

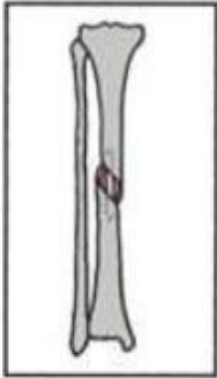
<b>GROUP A1</b>	<b>SPIRAL FRACTURES</b>
Subgroups    A1.1	Intact fibula
A1.2	Tibia and fibula fractures at different level
A1.3	Tibia and fibula fractures at same level
<b>GROUP A2</b>	<b>OBLIQUE FRACTURES (Fracture line &gt;30 degree)</b>
Subgroups    A2.1	Intact fibula
A2.2	Tibia and fibula fractures at different level
A2.3	Tibia and fibula fractures at same level
<b>GROUP A3</b>	<b>TRANSVERSE FRACTURES (Fracture line &lt;30 degree)</b>
Subgroups    A3.1	Intact fibula
A3.2	Tibia and fibula fractures at different level
A3.3	Tibia and fibula fractures at same level

**Subgroups and qualifications:**

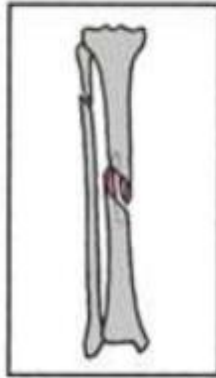
**Tibia/fibula, diaphyseal, simple, spiral (42-A1)**

- (1) proximal zone
- (2) middle zone
- (3) distal zone

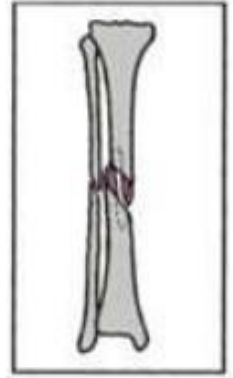
1. Fibula intact (42-A1.1)



2. Fibula fracture at different level (42-A1.2)



3. Fibula fracture at same level (42-A1.3)

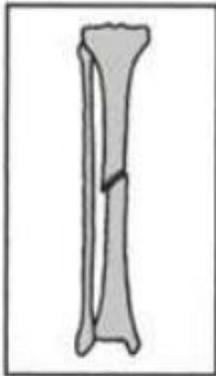


**A1**

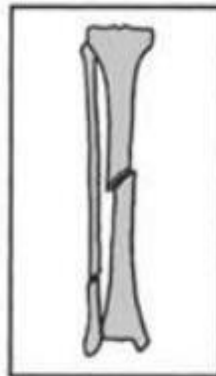
**Tibia/fibula, diaphyseal, simple, oblique (>30 degrees) (42-A2)**

- (1) proximal zone
- (2) middle zone
- (3) distal zone

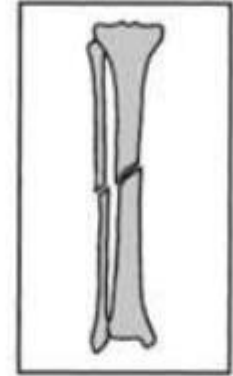
1. Fibula intact (42-A2.1)



2. Fibula fracture at different level (42-A2.2)



3. Fibula fracture at same level (42-A2.3)

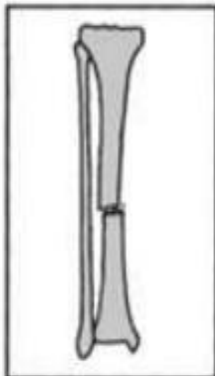


**A2**

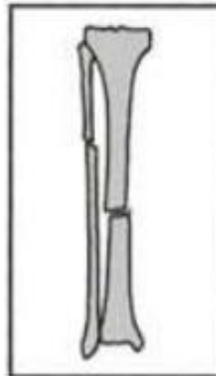
**Tibia/fibula, diaphyseal, simple, transverse (<30 degrees) (42-A3)**

- (1) proximal zone
- (2) middle zone
- (3) distal zone

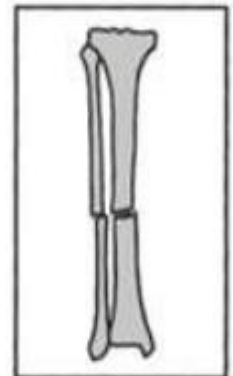
1. Fibula intact (42-A3.1)



2. Fibula fracture at different level (42-A3.2)



3. Fibula fracture at same level (42-A3.3)



**A3**

## TYPE B: Wedge Fracture

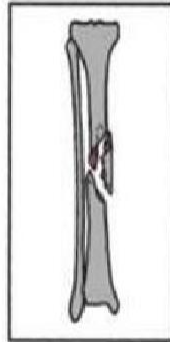
<b>GROUP B1</b>	<b>INTACT SPIRAL WEDGE FRACTURE</b>
Subgroups B1.1	Intact fibula
B1.2	Tibia and fibula fractures at different level
B1.3	Tibia and fibula fractures at same level
<b>GROUP B2</b>	<b>INTACT BENDING WEDGE FRACTURE</b>
Subgroups B2.1	Intact fibula
B2.2	Tibia and fibula fractures at different level
B2.3	Tibia and fibula fractures at same level
<b>GROUP B3</b>	<b>COMMINUTED WEDGE FRACTURE</b>
Subgroups B3.1	Intact fibula
B3.2	Tibia and fibula fractures at different level
B3.3	Tibia and fibula fractures at same level



**Tibia/fibula, diaphyseal, wedge, spiral (42-B1)**

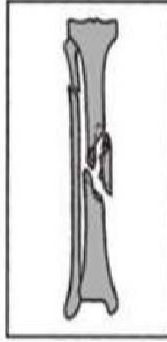
- (1) proximal zone
- (2) middle zone
- (3) distal zone

1. Fibula intact (42-B1.1)

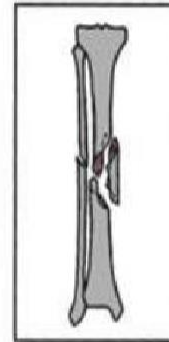


**B1**

2. Fibula fracture at different level (42-B1.2)



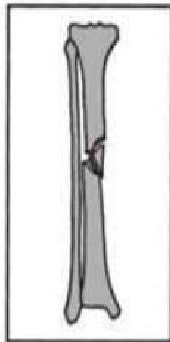
3. Fibula fracture at same level (42-B1.3)



**Tibia/fibula, diaphyseal, wedge, bending (42-B2)**

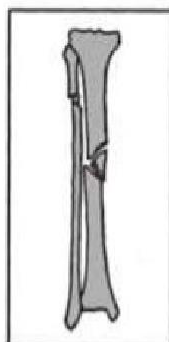
- (1) proximal zone
- (2) middle zone
- (3) distal zone

1. Fibula intact (42-B2.1)

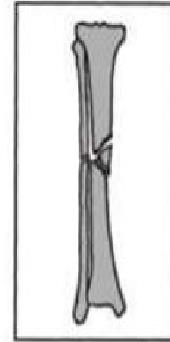


**B2**

2. Fibula fracture at different level (42-B2.2)



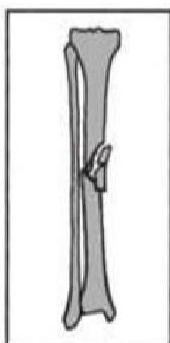
3. Fibula fracture at same level (42-B2.3)



**Tibia/fibula, diaphyseal, wedge fragmented (42-B3)**

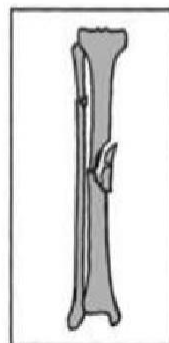
- (1) proximal zone
- (2) middle zone
- (3) distal zone

1. Fibula intact (42-B3.1)

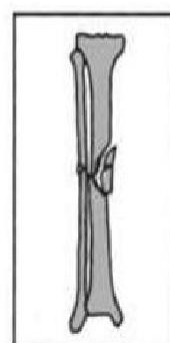


**B3**

2. Fibula fracture at different level (42-B3.2)



3. Fibula fracture at same level (42-B3.3)



**TYPE C: Complex Fracture (Multisegmentary, Segmental or Comminuted Fracture)**

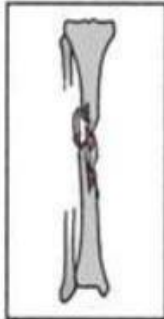
<b>Group C1</b>	<b>SPIRAL WEDGE FRACTRE</b>	
<b>Subgroups</b>	<b>C1.1</b>	Two intermediate fragments
	<b>C1.2</b>	Three intermediate fragments
	<b>C1.3</b>	More than three intermediate fragments
<b>Group C2</b>	<b>SEGMENTAL FRACTURE</b>	
<b>Subgroups</b>	<b>C2.1</b>	One segmental fragment
	<b>C2.2</b>	Segmental fragment and additional wedge fragment
	<b>C2.3</b>	Two segmental fragments
<b>Group C3</b>	<b>COMMINUTED FRACTURE</b>	
<b>Subgroups</b>	<b>C3.1</b>	Two or three intermediate fragments
	<b>C3.2</b>	Limited <u>comminution</u> (< 4cm)
	<b>C3.3</b>	Extensive comminution (> 4 cm)

**Tibia/fibula, diaphyseal, complex, spiral (42-C1)**

- (1) pure diaphyseal
- (2) proximal diaphysis-metaphysis
- (3) distal diaphysis-metaphysis

1. With two intermediate fragments (42-C1.1)

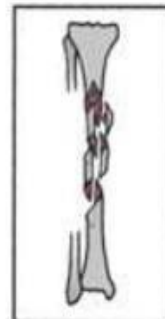
C1



2. With three intermediate fragments (42-C1.2)



3. With more than three intermediate fragments (42-C1.3)



**Tibia/fibula, diaphyseal, complex segmental (42-C2)**

1. With an intermediate segmental fragment (42-C2.1)

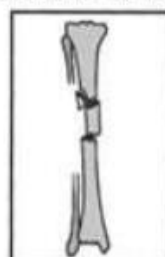
- (1) pure diaphyseal
- (2) proximal diaphysis-metaphyseal
- (3) distal diaphysis-metaphyseal
- (4) oblique lines
- (5) transverse and oblique lines

C2



2. With an intermediate segmental and additional wedge fragment(s) (42-C2.2)

- (1) pure diaphyseal
- (2) proximal diaphysis-metaphyseal
- (3) distal diaphysis-metaphyseal
- (4) distal wedge
- (5) Three wedges, proximal and distal



3. With 2 intermediate segmental fragments (42-C2.3)

- (1) pure diaphyseal
- (2) proximal diaphysis-metaphyseal
- (3) distal diaphysis-metaphyseal



**Tibia/fibula, diaphyseal, complex, irregular (42-C3)**

1. With two or three intermediate fragments (42-C3.1)

- (1) Two intermediate fragments
- (2) Three intermediate fragments

C3

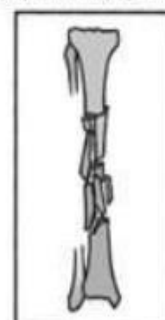


2. Limited shattering (> 4 cm) (42-C3.2)



3. Extensive shattering (> 4 cm) (42-C3.3)

- (1) pure diaphyseal
- (2) proximal diaphysis-metaphyseal
- (3) distal diaphysis-metaphyseal



## **MATERIALS AND METHODS**

### **1. SOURCE OF DATA:**

The material for the present study was obtained from the patients admitted in B.L.D.E.A.S' Shri B.M.Patil Medical college hospital and research centre, Department of Orthopaedics with diagnosis of TIBIA SHAFT fracture between January 2021 – May 2022 .

A Total of 32 cases were taken and prior information was given to the patients about the study conducted and informed consents were taken .

### **METHOD OF COLLECTION OF DATA**

- By interview
- By clinical examination
- By analysing case papers
- By follow up at intervals of 6wks, 3months, and 6months ,1 year .

### **INCLUSION CRITERIA**

1. Patient of age 18 years and above.
2. Proximal 1/3<sup>rd</sup> and Distal 1/3<sup>rd</sup> Tibial shaft fracture.
3. Open fractures with Gustillo Anderson type I.

### **EXCLUSION CRITERIA**

1. Open fractures Gustillo Anderson type II and III.
2. Tibia fractures with Intra-articular extensions.
3. Patients medically unfit for surgery.
4. Immunocompromised status.
5. Non-union or mal-union cases.

## **DIAGNOSIS**

### **CLINICAL DIAGNOSIS**

- Pain ,aggravated on moving being the most common presenting symptom
- Inability to bear weight
- Swelling
- Bony tenderness
- Abnormal mobility
- Crepitus
- Shortening
- Restricted range of motion of a joint

### **RADIOLOGICAL DIAGNOSIS**

- Antero-posterior view of the limb
- Lateral view

- CT scan to define comminution and asses intra articular involvement

## **TREATMENT**

### CONSERVATIVE MANAGEMENT

It is considered in low energy ,undisplaced or minimally displaced ,minimally comminuted ,extra articular fractures with no significant soft tissue damage .

Patient is initially managed by an above knee splint for a period of 1 week until swelling subsides .

It is then converted to long leg cast above knee stabilizing one joint above and one joint below in 5-10 degrees of knee flexion with weight bearing as tolerated from 2<sup>nd</sup> - 4<sup>th</sup> week based on fracture orientation .It can later be converted to

Patellar Tendon Bearing cast to initiate early mobilization as early by 3<sup>rd</sup> to 6<sup>th</sup> week .

### OPERATIVE

#### Indications

- Loss of reduction on conservative management
- Compound fracture
- Comminuted fracture
- Intra-articular extension

- Segmental fracture
- Compartment syndrome
- Ipsilateral femur fracture

Trafton's acceptable criteria of reduction<sup>[25,26,27]</sup>

- < 5 degrees of varus / valgus
- < 10 degrees of anterior or posterior angulation
- < 10 degrees of rotation
- < 15mm of shortening
- > 50% of cortical contact

#### PREOPERATIVE MEASURE

- Planning of right modality of treatment and if nailing is ideal for that particular fracture .
- Knee examination for stiffness
- Preoperative Tibial length determination<sup>[28]</sup>
- Radiological measurement of isthmus
- Rule out pre-existing knee stiffness
- Stable Cardiopulmonary status

#### SURGICAL APPROACHES

- Medial - parapatellar approach
- Lateral - parapatellar approach



- Infrapatellar - approach
- Suprapatellar - approach

## **MEDIAL PARAPATELLAR APPROACH**

Incision taken over knee from midpoint of patella and 1cm medial to it and extended distally along the patella .Soft tissue dissected along the medial aspect of patella in line with skin incision .

The approach should be limited to fat pad not into the joint .



It is difficult to maintain the entry point due to deforming forces of patella and patella tendon to push the guide wire medially .

### **LATERAL PARAPATELLAR APPROACH**

Incision taken over knee from midpoint of patella and 1cm lateral to it and extended distally along the patella .Soft tissue dissected along the medial aspect of patella in line with skin incision .

The approach should be limited to fat pad not into the joint .



## **INFRAPATELLAR APPROACH**

It is the most commonly used approach for tibia nailing .Skin incision taken from tibial tuberosity to 3 cm proximally . Soft tissue dissection done .Patella tendon incised longitudinally in line with skin incision .Care is taken to protect patellar tendon .



The problem occurs in proximal tibia fracture with guide wire directed posteriorly with this approach .

## **SUPRAPATELLAR APPROACH**

### **PATIENT POSITION**

Patient positioned supine on a radiolucent table .Lower limb Torniquet applied .

A bolster placed under ipsilateral knee joint or leg to maintain knee flexion of 20 degrees

Image intensifier placed on contralateral side of injured limb .



## INCISION

Skin incision started 2 cm above proximal pole of patella ,extended 5cm proximally .Soft tissue dissected and quadriceps tendon visualized .A full thickness longitudinal incision made over substance of tendon in line with skin incision .Finger dissection done to access patellofemoral joint .If patella femoral



recess deemed tight a medial or lateral retinaculum release can be performed

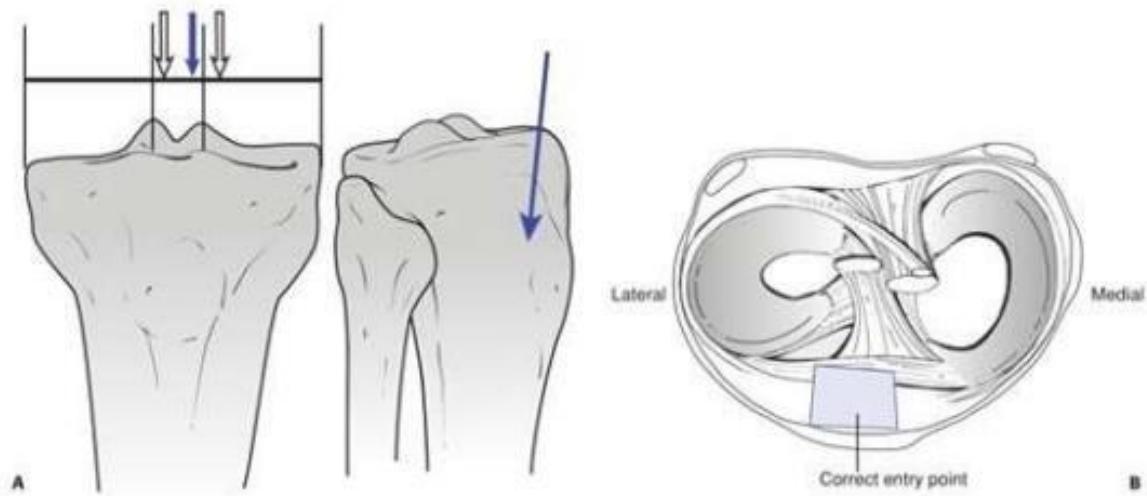
[29,30]





## ENTRY POINT

Entry point confirmed in both Anteroposterior and Lateral view under image intensifier .Ideal entry point is medial to the lateral tibial spine ,9mm lateral to centre of tibial plateau on an anteroposterior view .On lateral view ideal entry is anterior to articular surface .<sup>[29]</sup>



***Images shows ideal entry point in AP and Lateral View and Superior View***





## INSERTION OF GUIDE WIRE

Following blunt dissection of patellofemoral space done to access proximal tibial plateau .A protection sleeve followed by a trocar inserted with minimal manipulation sliding in the trochlear groove until it reaches junction of anterior aspect of proximal tibial articular surface and anterior cortex .

Blunt trocar is exchanged with guide wire sleeve .A 3.2 mm guide pin inserted in the sleeve into tibia until minimal purchase is achieved .Position of guide wire confirmed in both anteroposterior and lateral view .<sup>[30]</sup>It should not be drilled more than 3-5 cm .Entry widened using proximal reamer .Fracture reduced and confirmed under image intensifier in both Anteroposterior and lateral views and guide wire passed until 0.5 – 1mm from ankle joint .

## REAMING

Reaming has been practiced commonly in the field of long bone nailing .Reaming has its own advantage of promoting early healing by increased growth factors at fracture site . Reaming also helps in using larger diameter which in turn provides higher axial and rotational stability .

Serial reaming of medullary canal is done in increments of 0.5cm to a diameter of 1.5mm more than the diameter of desired nail .Reaming should not be done more than 2mm once cortical contact or clutter of reamer is heard .Reaming has

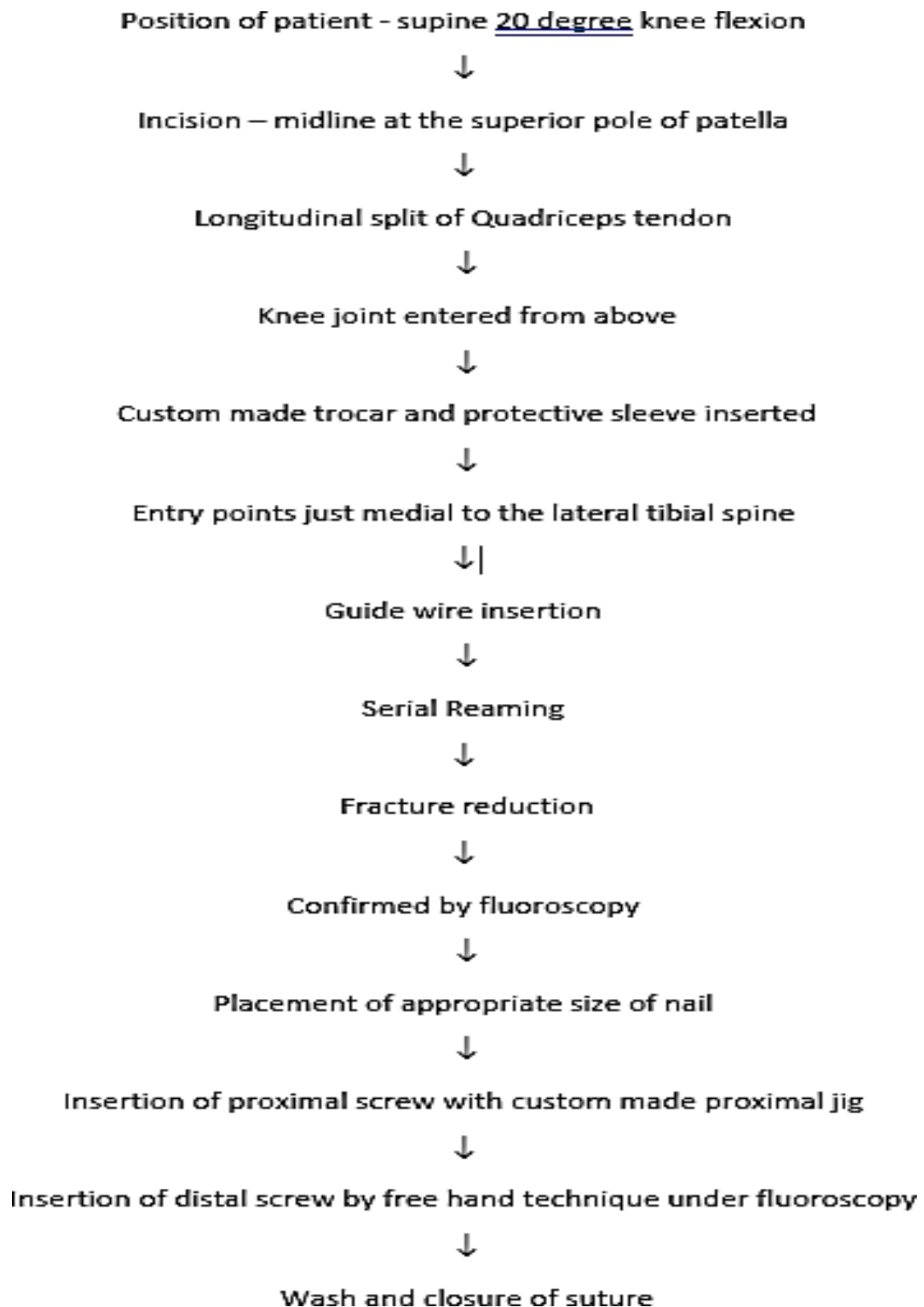
its disadvantages in terms of disruption of endosteal vessels ,increased chances of fat embolism ,but still practiced commonly as the benefits out weighs the incidence of complications .

## PLACEMENT OF NAIL

Nails available of size 230mm ,280mm ,300mm ,320mm ,340mm ,360mm ,380mm and of diameter 8 ,9 ,10 ,11mm .Nail used in our study is GPS nail (Gadegone Pandya Shivashankar) .Following reduction ,nail of size 1.5mm less than the last reaming done is used for fixation of tibia shaft fracture .Fracture reduction ,position of proximal and distal tip of nail visualized under image intensifier . Insertion of Proximal interlocking screws are followed by Distal interlocking screws .Proximal locking bolts of size 4.9mm inserted with the use of zig and distal locking done by free hand with the aid of image intensifier .

Final fluoroscopic views taken ,zig is detached .Thorough saline wash of knee joint given .Full range of motion of knee to be ascertained to assess patellar tracking .Quadriceps tendon sutured .Soft tissue closure done in layers .

## **SUPRAPATELLAR TIBIA NAILING**











## COMPLICATIONS

### IMMEDIATE

- Infection
- Haemarthrosis
- Anterior knee pain
- Iatrogenic fracture
- Patella and Trochlea cartilage injury
- Lateral meniscus injury
- Tendoachilles tendinitis

### LATE

- Knee stiffness
- Mal union
- Non union
- Patello - femoral arthritis
- Implant failure



## POST OPERATIVE PROTOCOL AND FOLLOW UP

- Intravenous antibiotics for 5 days post operatively .
- Static quadriceps and Ankle-Foot exercise on day 1.
- Early knee range of motion
- Regular sterile dressings on the second ,fifth and eighth post operative day .
- Check radiograph on 2<sup>nd</sup> post operative day .
- Suture removal done on twelve day postoperatively .
- Early weight bearing as tolerated in simple transverse diaphyseal fracture if axial stability is good .
- Non weight bearing for 6 weeks in comminuted fracture .
- Partial bearing of weight thereafter until radiological union
- Patients were regularly followed up on intervals at 6 weeks ,3 months ,6months ,1 year ,assessed both clinically and radiologically and functional status assessed by Modified Lysholm Score .

**LYSHOLM KNEE SCORING SCALE\***

**I. LIMP:**

- I have no limp when I walk. (5)
- I have a slight or periodical limp when I walk. (3)
- I have a severe and constant limp when I walk. (0)

**II. USING CANE OR CRUTCHES**

- I do not use a cane or crutches. (5)
- I use a cane or crutches with some weight-bearing. (2)
- Putting weight on my hurt leg is impossible. (0)

**III. LOCKING SENSATION IN THE KNEE**

- I have no locking and no catching sensations in my knee. (15)
- I have catching sensation but no locking sensation in my knee. (10)
- My knee locks occasionally. (6)
- My knee locks frequently. (2)
- My knee feels locked at this moment. (0)

**IV. GIVING WAY SENSATION FROM THE KNEE**

- My knee never gives way. (25)
- My knee rarely gives way, only during athletics or other vigorous activities. (20)
- My knee frequently gives way during athletics or other vigorous activities, in turn I am unable to participate in these activities. (15)
- My knee occasionally gives way during daily activities. (10)
- My knee often gives way during daily activities. (5)
- My knee gives way every step I take. (0)

**V. PAIN:**

- I have no pain in my knee. (25)
- I have intermittent or slight pain in my knee during vigorous activities. (20)
- I have marked pain in my knee during vigorous activities. (15)
- I have marked pain in my knee during or after walking more than 1 mile. (10)
- I have marked pain in my knee during or after walking less than 1 mile. (5)
- I have constant pain in my knee. (0)

**VI. SWELLING**

- I have no swelling in my knee. (10)
- I have swelling in my knee only after vigorous activities. (6)
- I have swelling in my knee after ordinary activities. (2)
- I have swelling constantly in my knee. (0)

**VII. CLIMBING STAIRS:**

- I have no problems climbing stairs. (10)
- I have slight problems climbing stairs. (6)

- \_\_\_ I can climb stairs only one at a time. (2)
- \_\_\_ Climbing stairs is impossible for me. (0)

### **VIII. SQUATTING**

- \_\_\_ I have no problems squatting. (5)
- \_\_\_ I have slight problems squatting. (4)
- \_\_\_ I can not squat beyond a 90 degree bend in my knee. (2)
- \_\_\_ Squatting is impossible because of my knee. (0)

**TOTAL** \_\_\_/100

A score of 100 means no symptoms or disability.

Scores are categorized

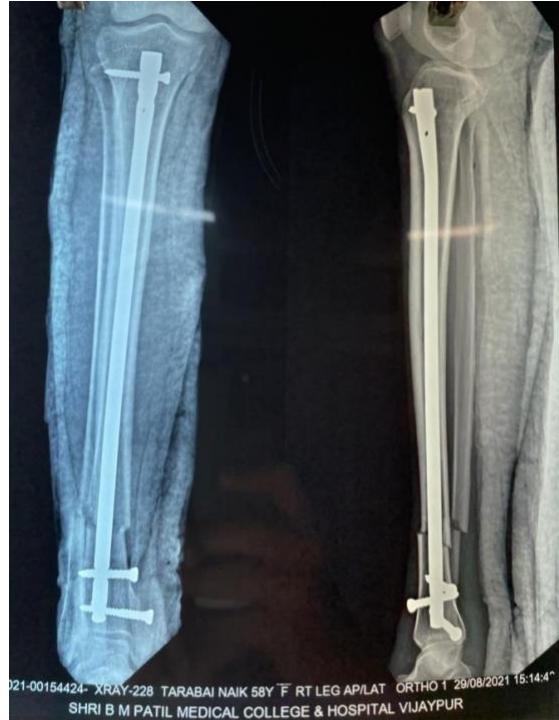
- Excellent (95–100)
- Good (84–94)
- Fair (65–83)
- Poor (64)

## CASE ILLUSTRATIONS

### Case No.1



**Pre op X ray**



**Immediate post op xray**



**1 year 3 months post op Xray**



Case No.2



**Pre op Xray**



**Immediate Post op Xray**



**6 Weeks Post op Xray**



**1 year 2month post op Xray**







Case No.3



**Pre op Xray**



**Immediate post op Xray**



**1 year post op Xray**



## Sample size calculation

### Sample size

With anticipated Proportion of healing rate of Tibial fracture treated with Tibial intramedullary interlocking nail

with Suprapatellar approach 94.6% (ref) and an incidence of 10.3 per 10000 annually at 1% incidence,<sup>5</sup> the study would require a sample size of **32 patients** with a 98% level of confidence and 10% absolute precision.

Formula used

$$n = \frac{z^2 p * q}{d^2}$$

Where Z= Z statistic at  $\alpha$  level of significance

d = Absolute error

P= Proportion rate

q= 100-p

### Statistical Analysis

The data obtained will be entered in a Microsoft Excel sheet, and statistical analysis will be

performed using a statistical package for the social sciences (Verson 20).

Results will be presented as Mean (Median)  $\pm$ SD, counts and percentages and diagrams.

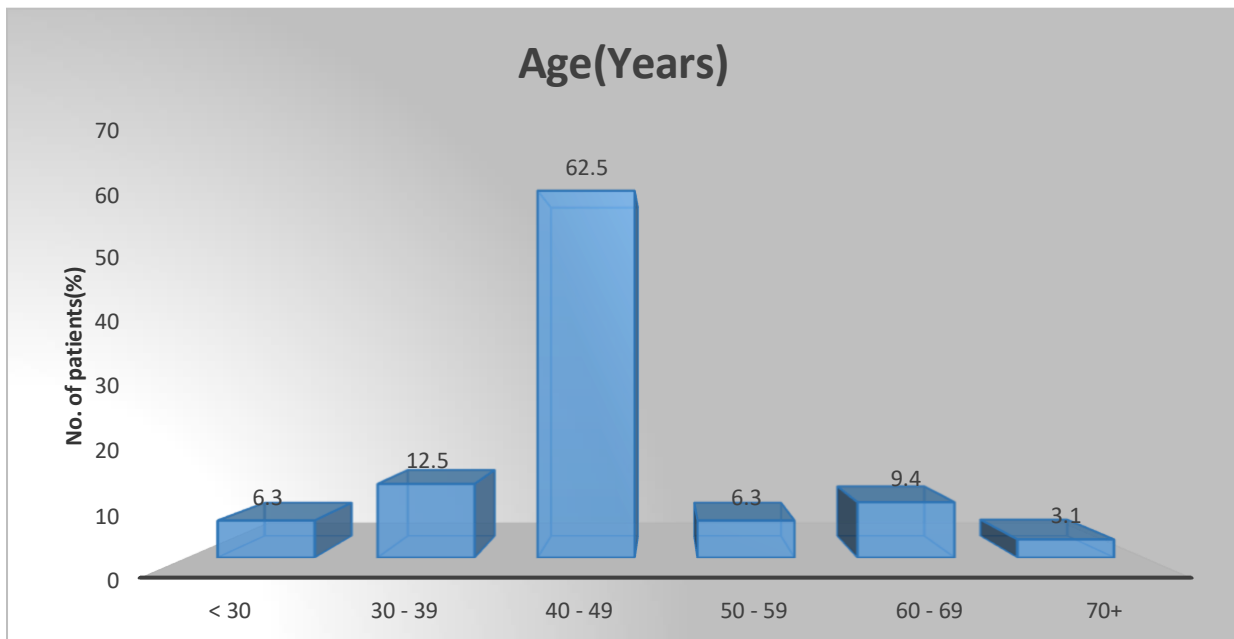
## RESULTS

### AGE DISTRIBUTION AMONG THE STUDY POPULATION

**TABLE NO 1**

Age(Years)	No. of patients	Percentage
< 30	2	6.3
30 - 39	4	12.5
40 - 49	20	62.5
50 - 59	2	6.3
60 - 69	3	9.4
70+	1	3.1
Total	32	100.0

In the study population, 62.5% were aged between 40-49years, 12.5% between 30 to 39 years, 9.4% between 60-69 years, 6.3% below 30 years, 6.3% between 50 to 59 years and 3.1% were aged above 70 years.

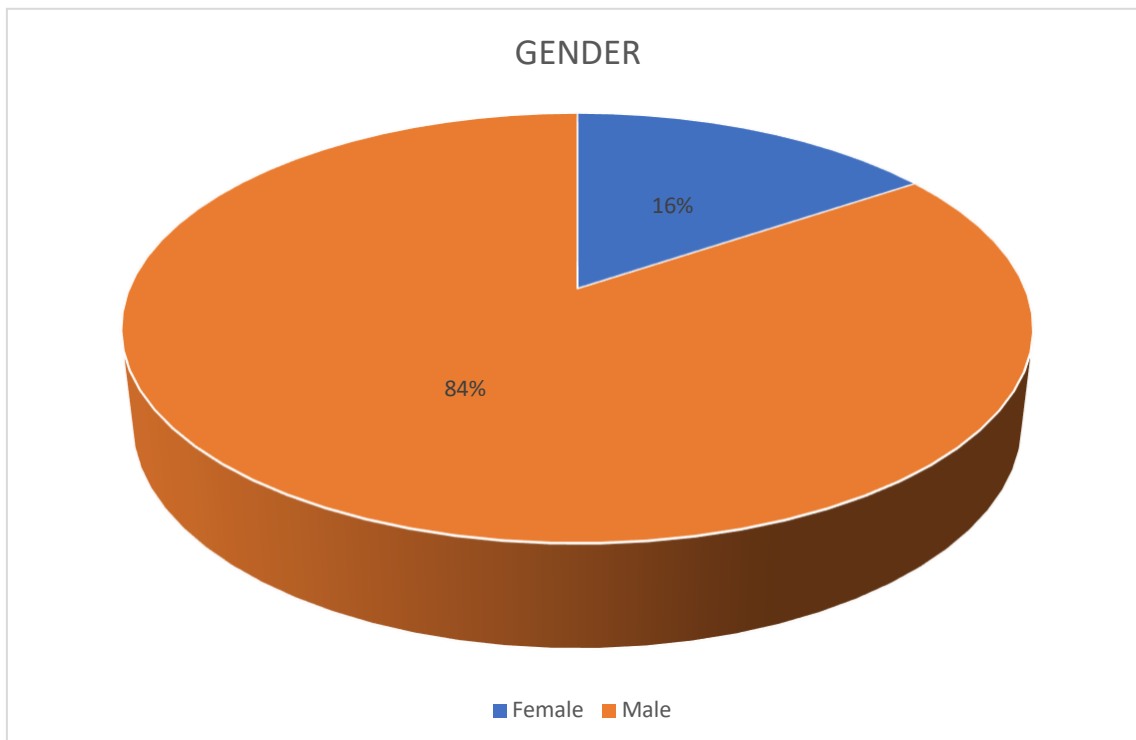


## GENDER DISTRIBUTION AMONG THE STUDY GROUP

**TABLE NO 2**

Gender	No. of patients	Percentage
Female	5	15.6
Male	27	84.4
Total	32	100.0

In the present study population, 84.4% were females and 15.6% were males.



## INCIDENCE OF LEFT AND RIGHT TIBIA FRACTURE IN THE STUDY GROUP

**TABLE NO 3**

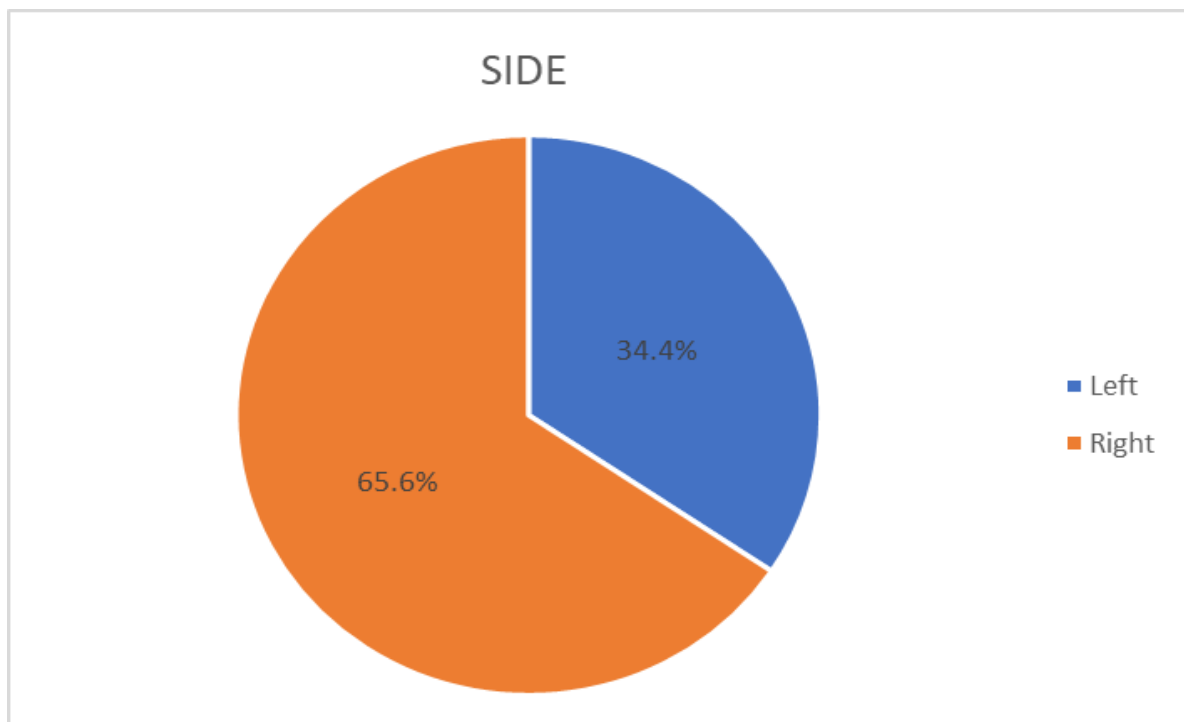
	Frequency	Percentage
Left	11	34.4
Right	21	65.6
Total	32	100.0

In the

total 32 people with tibial fracture, 11 had left tibia and 21 had right tibia fracture .

34.4% of people had left tibia fracture

65.5% of people had right tibia fracture



## INCIDENCE OF TIBIA FRACTURE - BASED ON SITE OF FRACTURES

**TABLE NO 4**

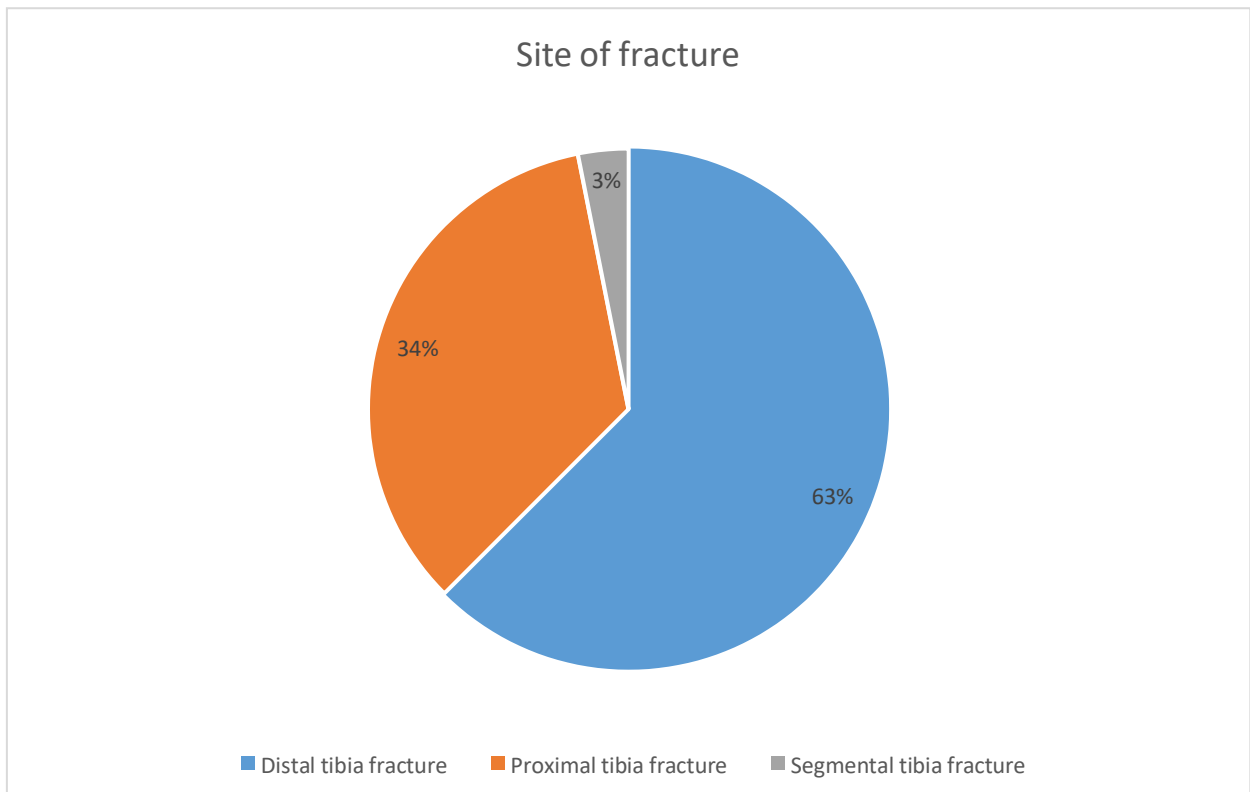
	Frequency	Percentage
Distal tibia fracture	20	62.5
Proximal tibia fracture	11	34.4
Segmental tibia fracture	1	3.1
Total	32	100.0

Among 32 people with tibia fracture:

20 had distal tibia fracture

11 had proximal tibia fracture

1 had segmental tibia fracture



## INCIDENCE OF TIBIA FRACTURE – BASED ON OPEN OR CLOSED FRACTURE

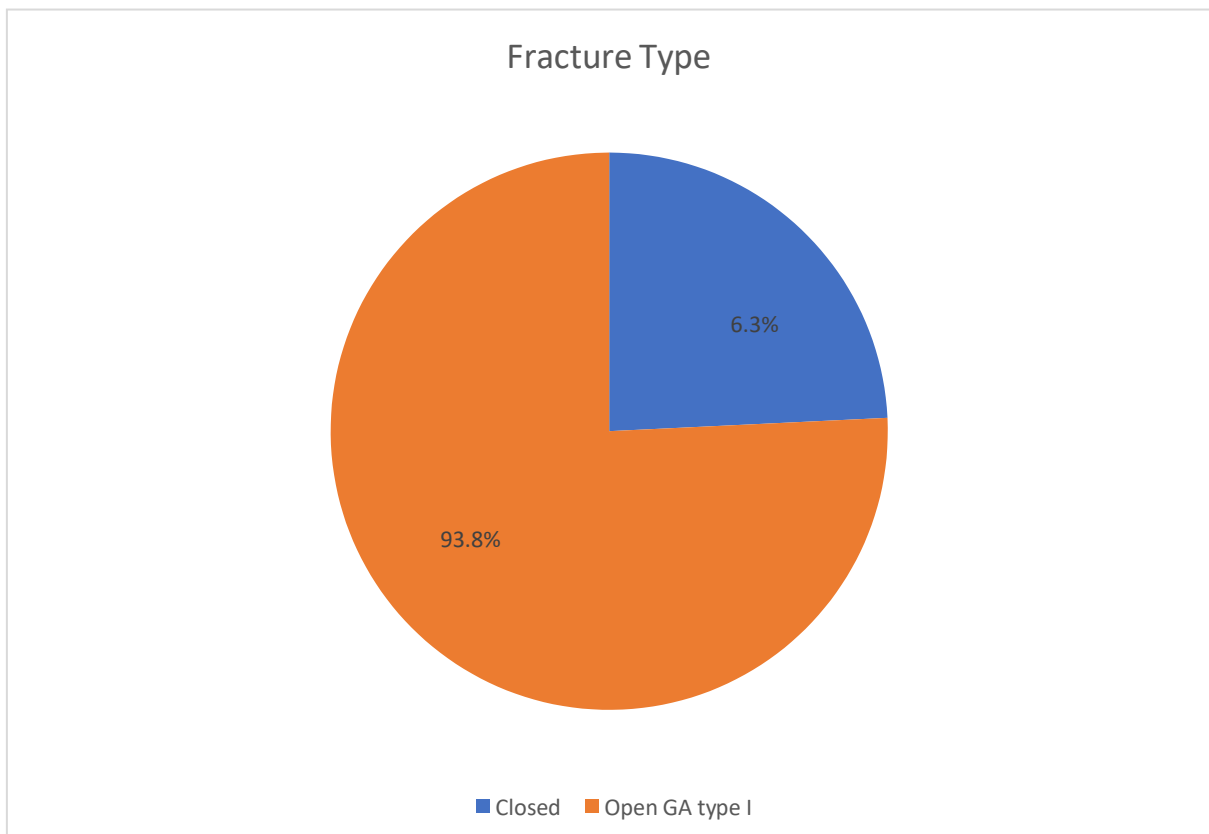
**TABLE NO 5**

	Frequency	Percentage
Closed	30	93.8
Open GA type 1	2	6.3
Total	32	100.0

Among 32 people with tibia fracture:

30 had closed type of tibia fracture

2 had open GA type 1 tibia fracture

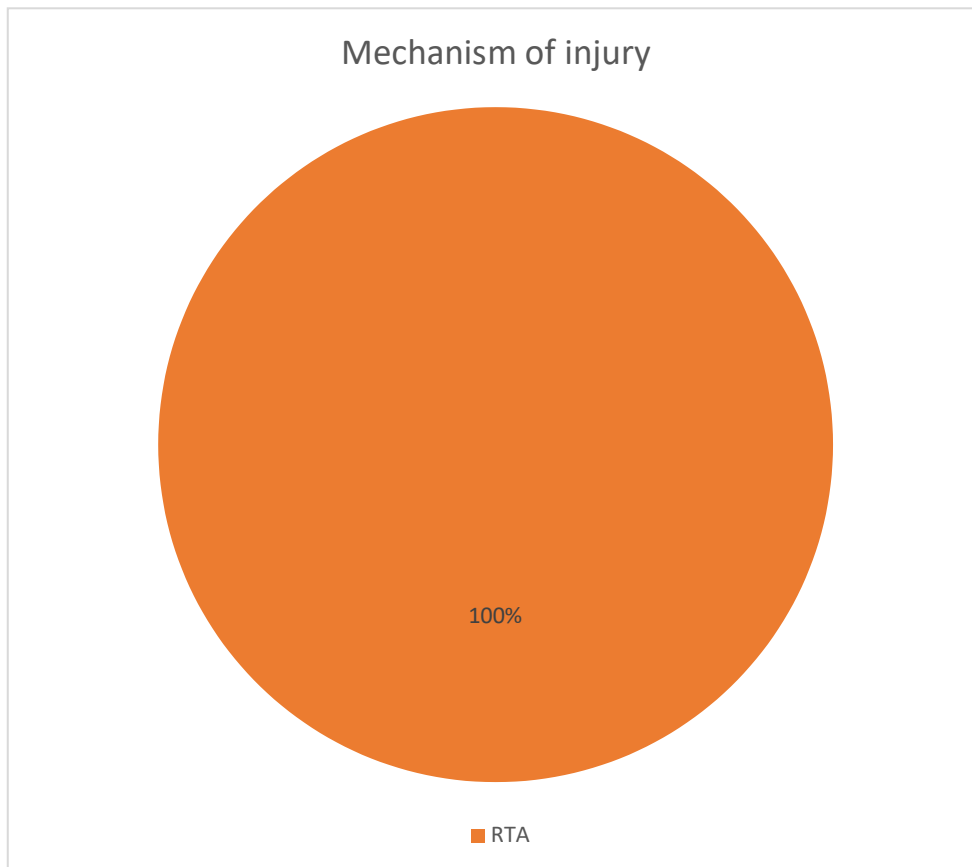


## INCIDENCE OF TIBIA FRACTURE – BASED ON MECHANISM OF INJURY

TABLE NO 6

	Frequency	Percentage
RTA	32	100

Among 32 patients all tibia fracture occurred as a result of road traffic accident





## FRACTURES ASSOCIATED WITH TIBIA FRACTURE

**TABLE NO 7**

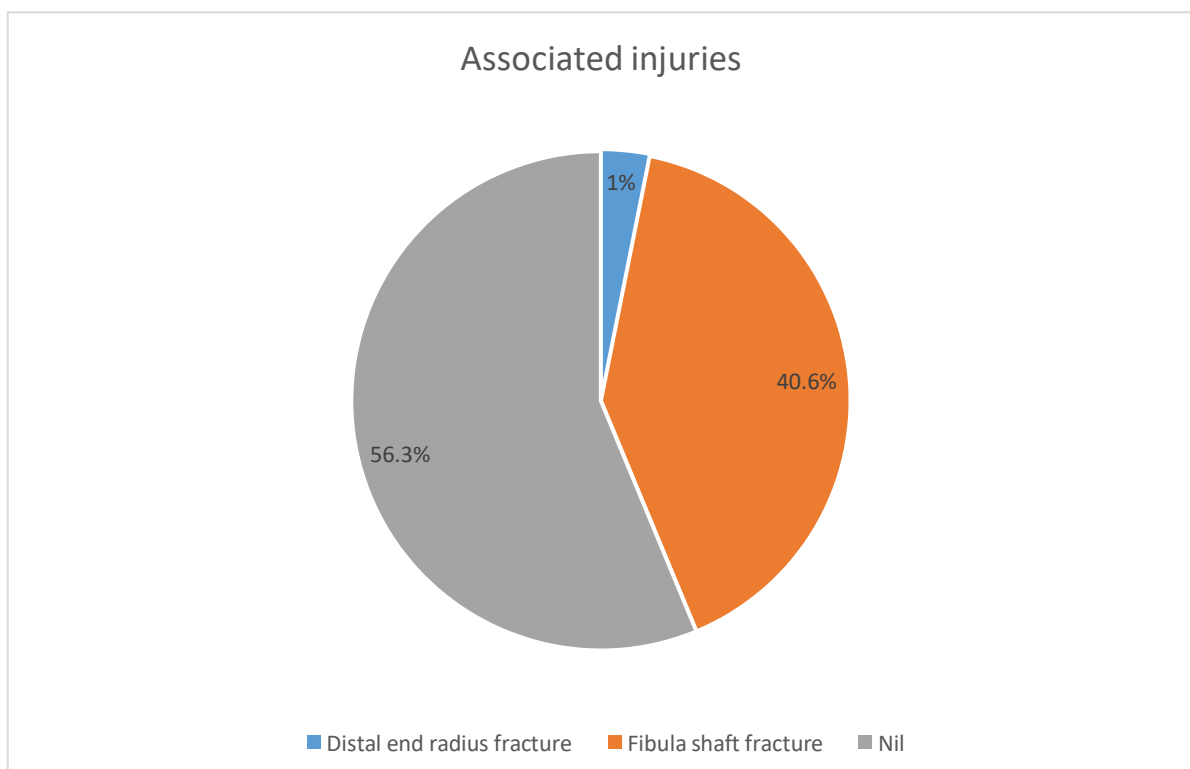
	Frequency	Percentage
Distal end radius fracture	1	3.1
Fibula shaft fracture	13	40.6
Nil	18	56.3
Total	32	100.0

Among 32 people with tibia fracture:

18 had no other associated injury

13 had fibula shaft fracture

1 had distal end radius fracture.



## TIME OF UNION

**TABLE NO 8**

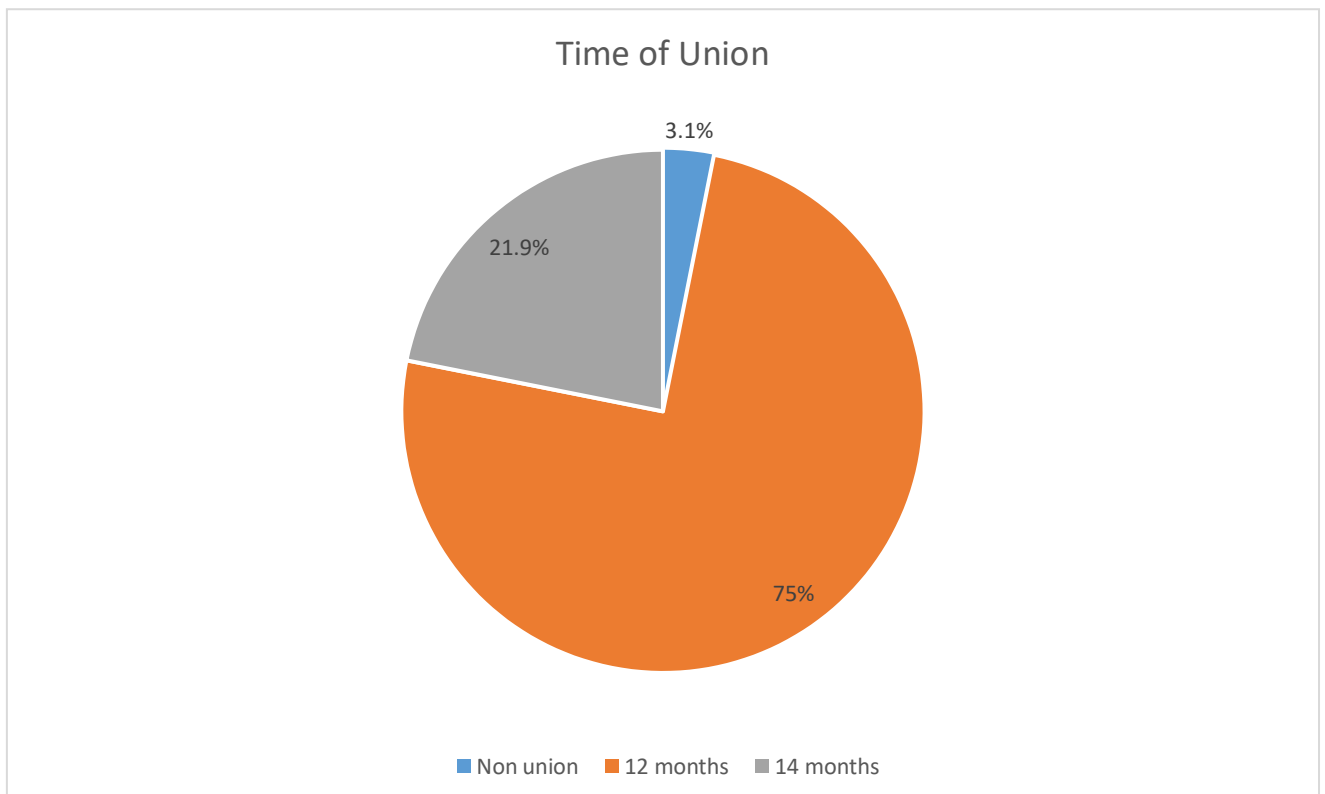
	Frequency	Percentage
12 months	24	75.0
14 months	7	21.9
Non Union	1	3.1
Total	32	100.0

In the present study group:

75% had union of the fracture after 12 months

21.9% had union of the fracture after 14 months

3.1% had non union



## FOLLOW UP DETAILS OF PATIENTS

**TABLE NO 9**

	Frequency	Percentage
8 months	1	3.1
9 months	1	3.1
10 months	5	15.6
11 months	2	6.3
12 months	23	65.7
14 months	2	6.2
Total	32	100.0

3.1% of patients came for follow up after 8 months

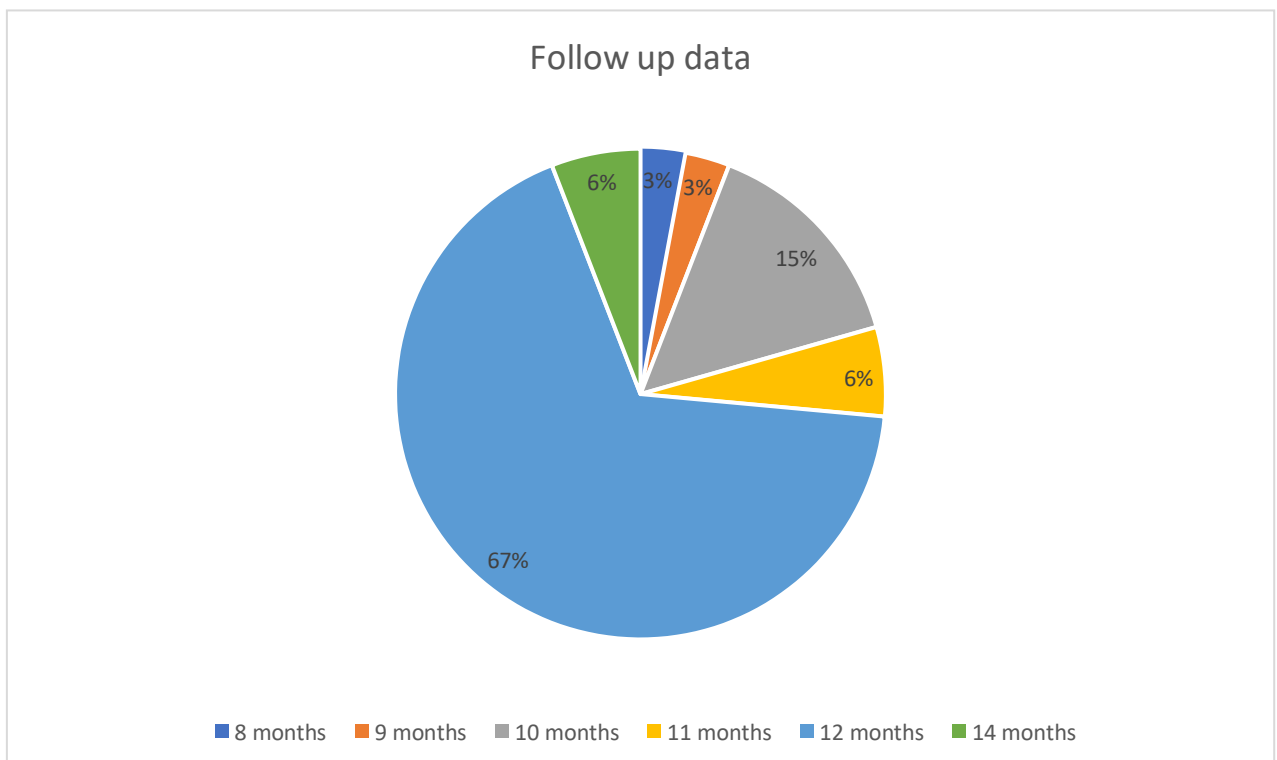
3.1% of patients came for follow up after 9 months

15.6% of patients came for follow up after 10 months

6.3% of patients came for follow up after 11 months

65.7% of patients came for follow up after 12 months

6.2% of patients came for follow up after 14 months

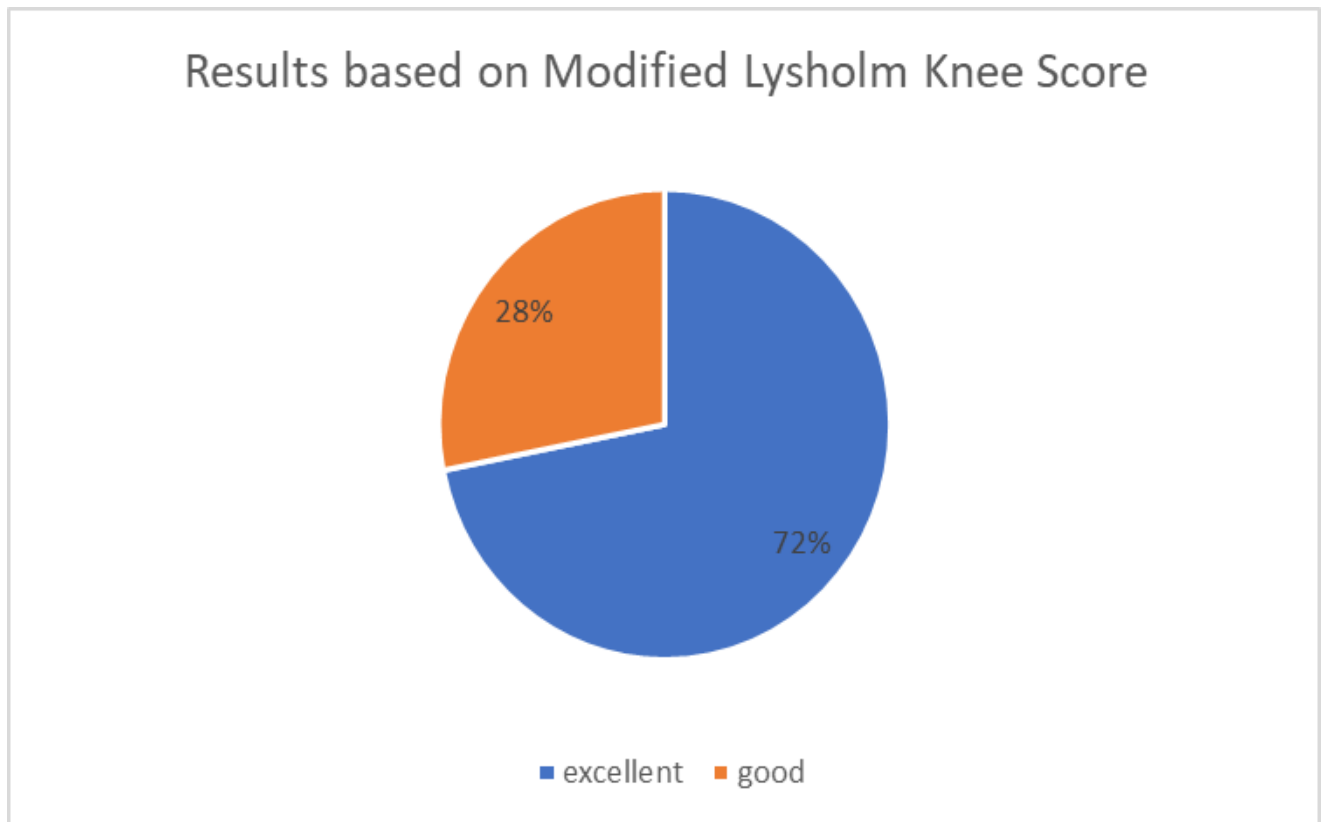


**FUNCTIONAL OUTCOME BASED ON MODIFIED LYSHOLM SCORE****TABLE NO 10**

	Frequency	Percentage
excellent	23	71.9
good	9	28.1
Total	32	100.0

71.9% of patients had excellent result

28.1% of patients had good result



## INCIDENCE OF POST OPERATIVE COMPLICATION

**TABLE 12**

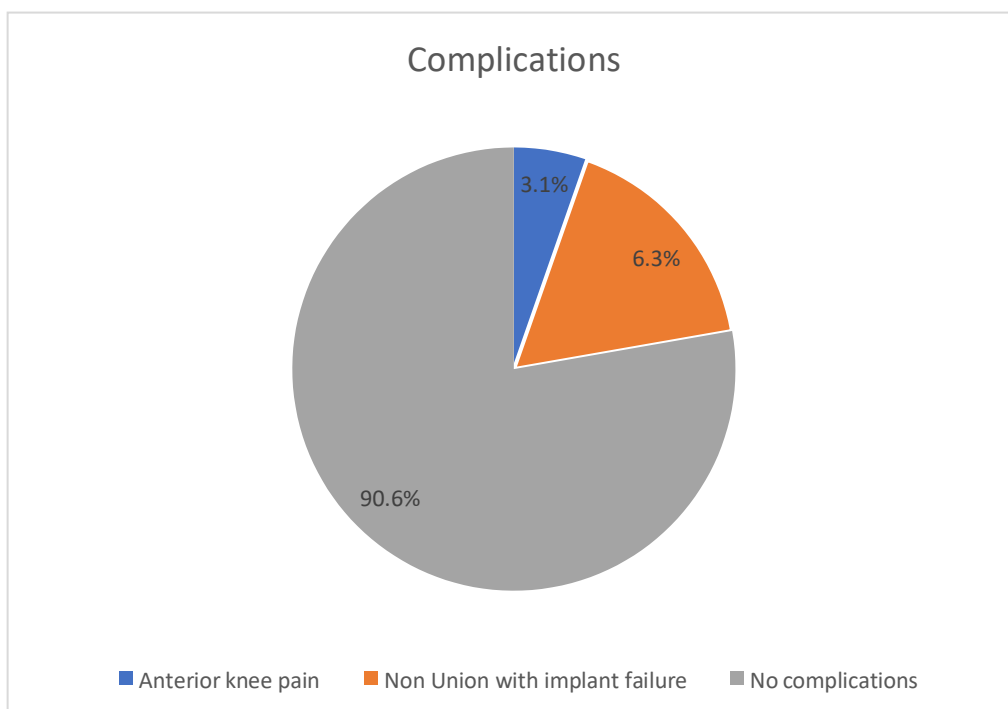
	Frequency	Percentage
Anterior knee pain	2	6.3
Non union and implant failure	1	3.1
No Complications	29	90.6
Total	32	100.0

6.3% of patients had fracture site pain

3.1% of patients had delayed union

3.1% of patients had delayed union and implant failure

87.5% of patients had no complications.



**FREQUENCIES**

	AGE	TIME OF UNION	FOLLOW UP
Mean	43.53	12.45	11.5
Median	40.00	12.00	12.00
Std. Deviation	10.761	.850	1.073
Percentiles	25	40.00	11.00
	50	40.00	12.00
	75	47.25	12.00

## FUNCTIONAL OUTCOME

Based on our inclusion criteria 32 patients were selected for suprapatellar approach of intramedullary interlocking nail for tibia fracture with semi extended position of knee .Good functional outcome seen following tibia shaft fracture fixation by this technique .

32 patients came for a mean follow up of 11.5 months .Patients were reviewed on clinical and radiological outcome .Signs of callus seen in radiographs at 6-8 weeks .Mean time of union was at 12.5 months .

1 patient showed non union changes with implant failure with breakage of distal locking bolt .Patient failed to review on regular follow up and started early full weight bearing at 6 weeks . 2 patients had complain of knee pain with no restriction of daily activity .No evidence of surgical site infection .

Functional outcomes were calculated using modified lysholm score .A mean value of 95 was found with excellent results of functional outcome .

MEAN	SUPRAPATELLAR TIBIA NAILING
TIME OF UNION	12.5 MONTHS
FOLLOW UP	11.5 MONTHS
MODIFIED LYSHOLM SCORE	95 = EXCELENT



## DISCUSSION

In our study we selected ,32 patients of proximal and distal tibia extra articular fracture ,from Shri B M patil medical college hospital and research centre .All patients were operated for tibia fracture with suprapatellar tibia nailing with knee in semiextended position .32 patients were treated with suprapatellar approach ,achieved good range of movements with excellent results of functional outcome on modified lysholm knee score .

Suprapatellar approach has its main advantage in proximal and distal 1/3<sup>rd</sup> tibia fracture .Orientation of medullary canal is in line with the entry portal of suprapatellar approach .It reduces the risk of malunion of proximal and distal tibia fractures .The semi extended knee position makes it easier to reduce the fracture and maintain reduction .Suprapatellar approach of tibia nailing also reduces the exposure to fluoroscopy .

The dilemma to use this approach of tibia nailing lies in its risk in damaging the chondral surface of patella ,knee or anterior horn of meniscus . The use of protection sleeve can reduce the risk of these complications .Only 2 of our operated patients experienced anterior knee pain .

According to Gaines et al. in his study described lower chances of damage to articular structures on suprapatellar nailing<sup>(31)</sup>. Availability of multiple locking options for proximal metaphyses and lesser Herzogs bend compared to earlier nails has provided better stability in terms of design of implants used in suprapatellar nailing. Older nails with acute Herzogs bend and lesser locking options contributed to implant related failures.<sup>(32,33,34,35)</sup> No evidence of anterior knee pain seen according to a study by Serbast et al<sup>(36)</sup>. Good functional outcome were found on similar studies based on suprapatellar nailing of tibia<sup>(38,39,40,41)</sup>.

Our study was a single centred ,treated by standard protocol by trained surgeons with a patient followed up on regular basis both clinically and radiologically .

Following variables were assessed in our study :

AGE : Our patients ranged from 20-60 years age ,with a mean age of 43.5 years.

SEX : Our study had 84% males and 16% females .This shows predominantly male population owing to their active and mobile state of life .

INJURY PATTERN : In our study all cases suffered from road traffic

accidents . Road traffic accidents were the root cause of 87.3% of open fractures in the Thakur and Patankar series<sup>(42)</sup> .

**FRACTURE SITE :** Our study has 62.5% of patients with distal tibia 1/3<sup>rd</sup> shaft fractures and 34.3% of proximal tibia fractures and 3.1% of segmental fracture .

**COMPLICATIONS :** Our study had 1 patient with non union with implant breakage ,2 patients had anterior knee pain .

**RESULTS :** Our study had 68.75% of excellent results and 31.25% of patients with good results based on modified lysholm knee score .

## CONCLUSION

The subcutaneous nature of tibia bone owes to its high incidence of fracture amongst long bones .With the growing population and traffic congestion higher incidence of high energy trauma have been the cause of most fractures .

Ideal mode of treatment for a closed tibia fracture has been reamed interlocking intramedullary nail with various insertional approaches .Our study describes surgical hints in performing a safe and convenient technique for suprapatellar nailing of tibia fracture .This technique has benefits over the conventional infrapatellar methods in terms of semiextended position of knee which indirectly facilitates ease of reduction ,lesser fluoroscopy time ,decreased risk of malunion , with very less complications of anterior knee pain with excellent results of functional outcome based on modified lysholm knee score .Further prolonged follow up study can validate the potential risk of early arthritis .

Our study concludes Suprapatellar nailing of tibia shaft fracture in semi extended knee position has excellent and innovative method of nailing and prompts to furthermore innovations in our field of orthopaedics .

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## **ANNEXURE I**

### **Ethical Committee Certificate**





B.L.D.E. (DEEMED TO BE UNIVERSITY)  
(Declared vide notification No. F.9-37/2007-U.3 (A) Dated. 29-2-2008 of the MHRD, Government of India under Section 3 of the UGC Act, 1956)

IEC/100.09/2021  
Date - 22/01/2021

The Constituent College

SHRI. B. M. PATIL MEDICAL COLLEGE, HOSPITAL AND RESEARCH CENTRE

## INSTITUTIONAL ETHICAL CLEARANCE CERTIFICATE

The Institutional ethical committee of this college met on 11-01-2021 at 11 am to scrutinize the synopsis of Postgraduate students of this college from Ethical Clearance point of view. After scrutiny the following original/corrected and revised version synopsis of the Thesis has been accorded Ethical Clearance

**Title:** A functional out come tibial fractures treated with tibial intra medulary interlocking nail, by suprapatellar approach with semi extended knee position- Aprospective study

**Name of PG student :** Dr Shree Sagar B V, Department of Orthopaedics

**Name of Guide/Co-investigator :** Dr Santosh S Nandi, Professor of Orthopaedics

DR .S.V.PATIL  
CHAIRMAN, IEC

**Institutional Ethical Committee  
B L D E (Deemed to be University)  
Shri B.M. Patil Medical College,  
VIJAYAPUR-586103 (Karnataka)**

**Following documents were placed before Ethical Committee for Scrutinization:**

1. Copy of Synopsis / Research project
2. Copy of informed consent form
3. Any other relevant documents.

## ANNEXURE II

**B.L.D.E. (DEEMED TO BE UNIVERSITY) SHRI B.M.PATIL**  
**MEDICAL COLLEGE HOSPITAL AND RESEARCH CENTER,**  
**VIJAYAPURA -586103**

**INFORMED CONSENT FOR PARTICIPATION IN**  
**DISSERTATION/RESEARCH**

I, the undersigned, \_\_\_\_\_, S/O D/O W/O \_\_\_\_\_, aged \_\_\_\_\_ years, ordinarily resident of \_\_\_\_\_ do hereby state/declare that Dr. Shree Sagar B V of Shri. B. M. Patil Medical College Hospital and Research Centre has examined me thoroughly on \_\_\_\_\_ at \_\_\_\_\_ (place) and it has been explained to me in my own language that I am suffering from \_\_\_\_\_ disease (condition) and this disease/condition mimic following diseases. Further Dr. Shree Sagar B V informed me that he/she is conducting dissertation/research titled "A FUNCTIONAL OUTCOME OF TIBIAL FRACTURES TREATED WITH TIBIAL INTRA MEDULLARY INTERLOCKING NAIL BY SUPRAPATELLAR APPROACH WITH SEMI EXTENDED KNEE POSITION" under the guidance of Dr. Santosh.S. Nandi requesting my participation in the study. Apart from routine treatment procedure, the pre-operative, operative, post-operative and follow-up observations will be utilized for the study as reference data.

The Doctor has also informed me that during the conduct of this procedure, adverse results may be encountered. Most of them are treatable but are not anticipated hence there is chance of aggravation of my condition, and in rare circumstances it may prove fatal in spite of anticipated diagnosis and best treatment made available. Further Doctor has informed me that my participation in this study help in the evaluation of the results of the study which is a useful reference to the treatment of other similar cases in near future, and also I may be benefited in getting relieved of suffering or cure of the disease I am suffering.

The Doctor has also informed me that information given by me, observations made/ photographs/ video graphs taken upon me by the investigator will be kept secret and not assessed by the person other than my legal hirer or me except for academic purposes.

The Doctor did inform me that though my participation is purely voluntary, based on the information given by me, I can ask any clarification during the course of treatment/study related to diagnosis, the procedure of treatment, result of treatment or prognosis. At the same time, I have been informed that I can withdraw from my participation in this study at any time if I want or the investigator can terminate me from the study at any time from the study but not the procedure of treatment and follow-up unless I request to be discharged.

After understanding the nature of dissertation or research, diagnosis made, mode of treatment, I the undersigned Shri/Smt \_\_\_\_\_ under my full conscious state of mind agree to participate in the said research/dissertation.

Signature of the patient:

Signature of Doctor:

Witness: 1.

2.

Date:

Place :

**ANNEXURE – III**

**SHRI B.M. PATIL MEDICAL COLLEGE, HOSPITAL AND  
RESEARCH CENTRE, VIJAYAPURA – 586103**

**PROFORMA**

CASE NO. :

FOLLOWUP NO. :

NAME :

AGE/SEX :

I P NO :

DATE OF ADMISSION :

DATE OF SURGERY :

DATE OF DISCHARGE :

OCCUPATION :

RESIDENCE :

Presenting complaints with duration :

History of presenting complaints :

Family History :

Personal History :

Past History :

### General Physical Examination

Pallor:	present/absent
Icterus:	present/absent
Clubbing:	present/absent
Generalized lymphadenopathy:	present/absent
Built:	poor/moderate/well
Nourishment:	poor/moderate/well

### Vitals

PR:	RR:
BP:	TEMP:

### Systemic Examination:

Respiratory system -  
Cardiovascular system -  
Per abdomen -  
Central nervous system -

### Local examination:

Right/ Left Leg

Gait:

Inspection:

- a) Attitude
- b) Abnormal swelling
  - Site
  - Size
  - Shape
  - Extent
- c) Shortening
- d) Skin condition
- e) Compound injury if any

Palpation:

- a) Swelling
- b) Local tenderness
- c) Bony irregularity
- d) Abnormal movement
- e) Crepitus/ grating of fragments
- f) Absence of transmitted movements
- g) Wound

Movements:

Active

Passive

KNEE :

Flexion

Extension

ANKLE :

Dorsiflexion

## Plantarflexion

## MASTERCHART

NAME	AGE	SEX	PATIENT ID	SIDE	DIAGNOSIS	OPEN/CLOSED	MECHANISM OF INJURY	Associated injuries	TIME OF UNION	FOLLOW UP	MODIFIED LYSHOLM SCORE	RESULT	VAS score	COMPLICATIONS
TARABHAI	58	Female	54424	Right	Distal tibia fracture	Closed	RTA	Fibula shaft fracture	12	12	100	excellent	1	Nil
PRABHU	50	Male	2429	Right	Distal tibia fracture	Closed	RTA	Fibula shaft fracture	-	12	96	excellent	2	Non union with implant failure
RAJMA	28	Female	29084	Left	Segmental tibia fracture	Closed	RTA	Fibula shaft fracture	12	12	91	good	0	Nil
ANIL SANNAD	34	Male	157787	Right	Distal tibia fracture	Closed	RTA	Nil	12	12	100	excellent	0	Nil
SHREEDevi	66	Female	192202	Left	Distal tibia fracture	Closed	RTA	Fibula shaft fracture	12	12	96	excellent	2	Nil
MALLIKARJUN	43	Male	200493	Left	Distal tibia fracture	Open GA type 1	RTA	Fibula shaft fracture	12	12	96	excellent	0	Nil
ARUN	26	Male	200423	Right	Distal tibia fracture	Closed	RTA	Nil	12	12	92	good	0	Anterior knee pain
CHIDANAND	31	Male	210002	Left	Distal tibia fracture	Open GA type 1	RTA	Nil	12	12	94	good	0	Nil
AKSHAY WAAD	30	Male	245799	Left	Distal tibia fracture	Closed	RTA	Fibula shaft fracture	12	10	95	excellent	0	Nil
UMESH	44	Male	251904	Left	Distal tibia fracture	Closed	RTA	Nil	12	10	94	good	1	Anterior knee pain
DAYANAND	41	Male	282608	Right	Distal tibia fracture	Closed	RTA	Nil	12	8	96	excellent	0	Nil

DUNDAPPA	64	Male	212462	Right	Proximal tibia fracture	Closed	RTA	Distal end radius fracture	12	12	98	excellent	1	Nil
SIDDAPPA	74	Male	302886	Right	Distal tibia fracture	Closed	RTA	Fibula shaft fracture	12	11	98	excellent	0	Nil
GANESH	40	Male	311598	Right	Distal tibia fracture	Closed	RTA	Fibula shaft fracture	12	9	96	excellent	2	Nil
BASAPPA	38	Male	257027	Right	Distal tibia fracture	Closed	RTA	Nil	14	12	96	excellent	0	Nil
VEERESH	40	Male	11842	Right	Proximal tibia fracture	Closed	RTA	Nil	12	10	96	excellent	0	Nil
PRATAB	40	Male	20984	Right	Proximal tibia fracture	Closed	RTA	Nil	12	12	94	good	1	Nil
KALPANA	40	Female	20805	Left	Distal tibia fracture	Closed	RTA	Fibula shaft fracture	12	12	92	good	1	Nil
GANESH	40	Male	39743	Right	Proximal tibia fracture	Closed	RTA	Nil	12	12	100	excellent	0	Nil
RAZAK	40	Male	65844	Right	Proximal tibia fracture	Closed	RTA	Nil	12	12	96	excellent	0	Nil
BHARAT	40	Male	65844	Right	Distal tibia fracture	Closed	RTA	Nil	12	12	92	good	0	Nil
KAJU	60	Male	10118	Right	Distal tibia fracture	Closed	RTA	Fibula shaft fracture	12	12	96	excellent	0	Nil
ABDUL	40	Male	91845	Right	Proximal tibia fracture	Closed	RTA	Nil	12	12	98	excellent	0	Nil
SUNIL	40	Male	99094	Left	Proximal tibia fracture	Closed	RTA	Nil	12	12	96	excellent	0	Nil
MAHANTESH	40	Male	6693	Right	Proximal tibia fracture	Closed	RTA	Fibula shaft fracture	12	11	96	excellent	0	Nil
LAXMI	48	Female	160977	Right	Proximal tibia fracture	Closed	RTA	Nil	12	12	94	good	1	Nil



GANAPATHI	40	Male	130269	Right	Distal tibia fracture	Closed	RTA	Fibula shaft fracture	14	14	95	excellent	0	Nil
GURURAJ	40	Male	122746	Right	Proximal tibia fracture	Closed	RTA	Nil	12	10	95	excellent	0	Nil
FAROOK	45	Male	34410	Left	Proximal tibia fracture	Closed	RTA	Nil	12	10	95	excellent	1	Nil
SAHEBGUDA	41	MAL E	188374	Left	Distal tibia fracture	Closed	RTA	Nil	14	14	100	excellent	0	Nil
ANIL	44	MAL E	257199	Right	Distal tibia fracture	Closed	RTA	Fibula shaft fracture	12	12	94	good	1	Nil
NINGAPPA	48	MAL E	257031	Left	Distal tibia fracture	Closed	RTA	Nil	12	12	95	excellent	0	Nil



# 20BMORT009-SREE SAGAR-A FUNCTIONAL OUTCOME OF TIBIAL FRACTURES TREATED WITH INTRA MEDULLARY INTERLOCKING NAIL...

## ORIGINALITY REPORT



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