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A study of functional outcome of femoral diaphyseal fractures by closed reduction and internal fixation using intramedullary interlocking nail in adults

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Abstract
Introduction
Femur is considered to be the strongest, largest and heaviest tubular bone comprising the skeletal system. Femur is responsible to bear the load in the lower extremity region. Femoral shaft fractures are one of the most commonly encountered injuries in an orthopaedic setup and are responsible for a huge burden of morbidity and mortality in patients. The severity of injury depends on the level of impact causing the injury which eventually is dependent on the age of patients.
Aims and objectives of the study
1. To evaluate the result of intramedullary interlocking nailing in the treatment of fractures of the shaft of femur
2. To study the complications of locked intramedullary nailing of femoral shaft fractures
3. Early mobilization to prevent fracture disease and enhance fracture healing
Results
The present study was planned to study surgical management of fracture shaft of femur with intramedullary interlock nail. For this purpose, a total of 20 patients falling in sampling frame were enrolled in the study. Table 1 shows the age distribution of cases enrolled in the study:
Discussion
Management of diaphyseal femur fractures has seen a fundamental shift from non-surgical to surgical management and within surgical management from external to internal fixation using intramedullary nailing, plates and screws. Today, intramedullary nailing has become a standard for management of diaphyseal femur fractures and has been reported to be useful for all the age groups and in unilateral as well as bilateral fractures.
Conclusion
The surgical management of fracture diaphysis of femur has taken a march ahead with the advent of interlocking nail, which has widened the range of indications for medullary osteosynthesis. The transverse interlocking bolts control the length, rotational alignment of the limbs.

Keywords: femoral diaphyseal fractures, internal fixation, intramedullary interlocking nail

Introduction
Femur is considered to be the strongest, largest and heaviest tubular bone comprising the skeletal system [1]. Femur is responsible to bear the load in the lower extremity region. Femoral shaft fractures are one of the most commonly encountered injuries in an orthopaedic setup and are responsible for a huge burden of morbidity and mortality in patients [2]. The severity of injury depends on the level of impact causing the injury which eventually is dependent on the age of patients. It has been seen that low-energy injuries occur mostly in children and elderly whereas high-energy injuries are more common in the younger population [3]. In case of a high-energy injury, such as road traffic-related injury, it is often accompanied with multiple injuries which might result in unexpected complications and is responsible for long hospital stays and multiple complications [4].
Several factors play a role in shaping the treatment plan for the patient, including age and weight of the patient, fracture pattern, cause of injury, associated injuries and surgeon preference. Economic concerns, the family's ability to care for a patient in a spica cast or

external fixator and the advantages and disadvantages of any operative procedure also are important factors [5].

While dealing with the patients with fracture femur, the challenge before the orthopaedic surgeon is not only offering a quick resumption to routine but also to offer a functionally uncompromised restoration that allows all the physical activities suitable to that age.

The history of femoral fracture management goes way back before the turn of the century. Most of the treatments involved splinting or encasing the thigh with a variety of materials like fibrous plants, wax and gum. The art and science of fracture management has tremendously advanced over the years. From the use of external splints in the Hippocratic age, to the recent sophisticated instrumentation, treatment of fracture has made an impact in the surgical field.

Depending on age, type of fracture and functional needs - variable treatment approaches have been suggested. For the rare, minimally displaced fracture, early spica casting usually produces satisfactory results, although cast wedging or a cast change may be necessary to avoid excessive shortening and angulation. In children with unstable, comminuted fractures, traction may be necessary prior to cast application. Although traction and casting is still a very acceptable and successful method of managing femur fractures in young school-age children, the cost and the social problems related to school-age children in casts have resulted in a strong trend toward fracture fixation. Spica cast management is generally not used for children with multiple trauma, head injury, vascular compromise, floating knee injuries, significant skin problems, or multiple fractures. According to Flynn and Skaggs [6], in preschool children spica cast is the preferred mode of treatment. However, flexible intramedullary nails are the predominant treatment for femur fractures in 5- to 11-year olds, although submuscular plating and external fixation have their place, especially in length-unstable fractures, or in those difficult to manage fractures in the proximal and distal third of the femoral shaft. In children aged more than 11 years too, flexible intramedullary nailing has shown satisfactory to excellent results. Flexible intramedullary nailing has also shown promising results in elderly and adults [7].

Klemm and Schelmann, Grosse and Kempt and Russel Taylor for the first time developed and described proximal and distal fixation called intramedullary interlocking nail [8].

The pioneering work on intramedullary nailing by Gerhard Kuntscher in Germany has revolutionized the management of femoral shaft fractures

Intramedullary nailing of femur fractures provides a stable fixation construct along the line of axial forces that can be applied using indirect reduction techniques. This method yields high union rates and low complication rates [9] like rotational stability, no damage to extra periosteal soft tissues, minimal potential for contamination. Reaming of femoral canal allows insertion of larger nails which gives mechanical purchase, provides stability and also enhances fracture healing due to deposition of marrow elements at fracture site [10].

Aims and objectives of the study

1. To evaluate the result of intramedullary interlocking nailing in the treatment of fractures of the shaft of femur
2. To study the complications of locked intramedullary nailing of femoral shaft fractures
3. Early mobilization to prevent fracture disease and enhance fracture healing
4. To prevent rotational deformity

Material and Method

Study Area: Department of Orthopaedics, Adichunchanagiri Hospital & Research Centre (AH & RC), Mandya. AH & RC is a hospital catering to a diverse demography of patients in and around Mandya and Hassan, having state of the art-infrastructure and multi-speciality facilities.

Study Population: Patients of fracture femur shaft presenting to Department of Orthopaedics of our facility.

Duration of Study: September 2015-September 2017.

Sampling Frame: The sampling frame was bound by the following inclusion and exclusion criteria:

Inclusion criteria

- The patients with injuries associated with fracture of femur
- All patients between age 20yrs to 70yrs
- Segmental fracture
- Grade I Gustillo Andersoncompoundfracture
- Comminuted fracture (Winquist Hansen classification)
- Both males and females.

Exclusion Criteria

- Type II, Type III compound or open fracture.
- Patients unfit for surgery.
- Pre-existing deformity of femur.
- Age group <20yrs.
- Associated fracture neck of femur.
- Pathological fracture.

Sample size: 20

Results

The present study was planned to study surgical management of fracture shaft of femur with intramedullary interlock nail. For this purpose, a total of 20 patients falling in sampling frame were enrolled in the study. Table 1 shows the age distribution of cases enrolled in the study:

Table 1: Distribution of cases according to age

Sl. No	Age Group	No of Cases	Percentage
1	20-29	9	45
2	30-39	5	25
3	40-49	3	15
4	50-59	1	5
5	60-69	2	10

Mean Age+ SD (Range) in years 33.95+13.65 (20-63 Years)

Table 2: Gender Profile of patients enrolled in the study

SN	Gender	No. of cases	Percentage
1.	Male	16	80.0
2.	Female	4	20.0

Table 3: Mode of Injury

SN	Mode of Injury	No. of cases	Percentage
1.	Road traffic accident	18	90
2.	Fall	2	10

Table 4: Fracture type

Fracture Type	No of Cases	Percentage
Comminuted	11	55
Transverse	4	20
Oblique	3	15
Spiral	2	10

Table 5: Grade of Fracture

Grade	No of Cases	Percentage
I	14	70.0
II	2	10.0
III	4	20.0

Table 6: Site of Fracture

Site of Fracture	No of Cases	Percentage
Proximal third	1	5
Middle third	16	80
Distal third	3	15

Table 7: Side of Fracture

Side of Fracture	No of Patients	Percentage
Right	11	55
Left	9	45

Table 8: Nature of Fracture

Nature of Fracture	No of Cases	Percentage
Open	1	5
Closed	19	95

Table 9: Associated injuries

Associated Injuries	No of Cases
Patella	1
Ipsilateral tibia	2
Head injury	2
Total	5

Table 10: Distribution of cases according to frequency and nature of intraoperative complications

SN	Variable	No. of cases	Percentage
1.	No complication	19	95
2.	Intraoperative fracture	1	5

Table 11: Distribution of cases according to Postoperative complications

SN	Postoperative complications	No. of cases	Percentage
1.	No complication	16	80
2.	Superficial infection	2	10
3.	Shortening	2	10

Table 12: Distribution of cases according to Duration of hospital stay

SN	Duration of Hospital Stay	No. of cases	Percentage
1.	≤14 days	10	50
2.	15-28 days	9	45
3.	>28 days	1	5
Mean duration +SD (Range) in days		19.25+7.15 (12-35)	

Table 13: Factors affecting duration of hospital stay

SN	Factor	Hospital stay ≤14 days		Hospital stay >14 days		Statistical significance	
		No.	%	No.	%	'χ²'	'p'
1.	Mean age±SD (Years)	29.00±10.33		38.90±15.25		't'=1.699; p=0.532	
2.	Gender						
	Male	8	80.0	8	80.0	0	1
	Female	2	20.0	2	20.0		
3.	Mode of injury						
	Road traffic accident	9	90.0	9	90.0	0	1
	Fall	1	10.0	1	10.0		
4.	Type of fracture						
	Comminuted	3	30.0	8	80.0	5.05	0.02
	Others	7	70.0	2	20.0		
5.	Grade						
	I	8	80.0	6	60.0	0.95	0.32
	II/III	2	20.0	4	40.0		
6.	Site						
	Middle third	9	90.0	7	70.0	1.25	0.26
	Lower/Upper third	1	10.0	3	30.0		
7.	Side						
	Left	4	40.0	5	50.0	0.20	0.65
	Right	6	60.0	5	50.0		
8.	Associated injury	1	10.0	4	40.0	2.40	0.12

On evaluating the role of different factors in determining the duration of hospital stay, although mean age of patients requiring longer stay (>14 days) was higher as compared to that of patients who required shorter stay (≤14 days), however, this difference was not significant statistically (p=0.532).

Among those having longer duration of hospital stay (>14 days), proportion of males, road traffic accident victims, those having comminuted fractures, having Grade I fracture, middle third involvement, and presence of associated injuries was higher as compared to that among those having hospital stay ≤14 days. However, except for type of fracture, for none of the other variables, the difference was significant statistically (p>0.05). The proportion of those with hospital stay >14 days had significantly higher proportion of cases with comminuted fracture (80%) as compared to those having hospital stay ≤14 days (30%) (p=0.02).

Follow Up Assessment

(a) At 6 weeks

Table 14: Findings of follow up assessment at 6 weeks

SN	Finding	No. of cases	Percentage
1.	Complications		
	No complication	13	65.0
	Restricted ROM	5	25.0
	Superficial infection	2	10.0
2.	Radiological assessment		
	Bulging Callus	18	90.0
	No bulging callus	2	10.0

At 6 weeks, complications were seen in 7 (35%) patients – there were 5 (25%) patients who complained of restricted ROM whereas 2 (10%) patients had superficial infections.

Radiological assessment at 6 weeks showed bulging callus formation in all except 2 (10%) cases.

(b) At 12 weeks

Table 15: Findings of follow up assessment at 12 weeks

SN	Finding	No. of cases	Percentage
1.	Knee flexion		
	Upto 90°	3	15.0
	90-120°	8	40.0
	>120°	9	45.0
2.	Extended flexion		
	≤5°	11	55.0
	5-10°	8	40.0
	10-15°	1	5.0
	>15°	0	-
3.	Lower limb discrepancy		
	No discrepancy	12	60.0
	< 1 cm	6	30.0
	1 cm	2	10.0
4.	Rotational malalignment		
	Nil	16	80.0
	5°	2	10.0
	10°	2	10.0
5.	Complications	2	10

At 12 weeks, 9 patients had achieved knee flexion >120º (45%). There were 8 (40%) patients who achieved knee flexion in 90-120º range but 3 (15%) could achieve knee flexion upto 90º only.

Range of extended flexion was ≤5º in 11 (55%) patients and 5-10º in 8 (40%) patients. There was 1 (5%) patients with extended flexion in 10-15º range while none had extended flexion of >15º at this interval.

No limb discrepancy was seen in 12 (60%) patients. It was < 1 cm in 6 (30%) patients. There were 2 (10%) patients with limb discrepancy of 1 cm.

No rotational malalignment was seen in 16 (80%) patients. There were 2 (10%) patients each with rotational malalignment of 5º and 10^0 respectively.

At 12 weeks, 2 cases had complication – first having delayed union and second having a deep infection. Delayed union was due to raised sugars with added infection which was eventually brought under control and union achieved by 26th week.

(c) At 18 weeks

Table 16: Findings of follow up assessment at 18 weeks

SN	Finding	No. of cases	Percentage
1.	Knee flexion		
	Upto 90°	2	10.0
	90-120°	7	35.0
	>120°	11	55.0
2.	Extended flexion		
	≤5°	10	50.0
	5-10°	6	30.0
	10-15°	2	10.0
	>15°	2	10.0
3.	Lower limb discrepancy		
	No discrepancy	13	65.0
	< 1 cm	6	30.0
	1 cm	1	5.0
4.	Rotational malalignment		
	Nil	16	80.0

	5°	2	10.0
	10°	2	10.0
5.	Complications	0	0

At 18 weeks, majority of patients had achieved knee flexion >120º (55%). There were 7 (35%) patients who achieved knee flexion in 90-120º range but 2 (10%) could achieve knee flexion upto 90º only.

Range of extended flexion was ≤5º in 10 (50%) patients and 5-10º in 6 (30%) patients. There were 2 (10%) patients each with extended flexion in 10-15º and >15º range at this interval.

No limb discrepancy was seen in 13 (65%) patients. It was < 1 cm in 6 (30%) patients. There were 1 (5%) patients with limb discrepancy of 1 cm.

No rotational malalignment was seen in 16 (80%) patients. There were 2 (10%) patients each with rotational malalignment of 5º and rotational malalignment of 10º.

At 18-weeks no new complication was recorded

Discussion

Management of diaphyseal femur fractures has seen a fundamental shift from non-surgical to surgical management and within surgical management from external to internal fixation using intramedullary nailing, plates and screws. Today, intramedullary nailing has become a standard for management of diaphyseal femur fractures and has been reported to be useful for all the age groups and in unilateral as well as bilateral fractures [11]. There have been rapid advancements in intramedullary nails with evolution of different variants such as those with and without reaming, dynamic as well as locked nails, antegrade or retrograde, and so on. Each one of these has been shown to provide good clinical outcome. However, there are limited studies on use of intramedullary reamed nails in Indian environment. The present study was an attempt to study surgical management of fracture shaft of femur with Intramedullary interlocking nail at a tertiary care centre in India basically catering to patients of lower and middle socioeconomic strata.

For this purpose a total of 20 patients falling in sampling frame were enrolled in the study. Age of patients enrolled in the study ranged from 20 to 70 years. Mean age of patients was 33.95±13.65 years. Although femur fractures are common in all age groups yet the age profile was dependent on the inclusion criteria which ruled out inclusion of patients below 20 years of age. These fractures are generally afflicted due to high-energy impacts and most commonly affect the patients in active age groups. The age profile of patients in present study is similar to that reported in epidemiological study. In a population based epidemiological study, Enninghorst *et al* [12] reported the mean age of patients with diaphyseal femur fractures as 38 years. In another study, Hollis *et al.* reported the mean age of patients as 39.2 years. In some Indian studies among adults, mean age of patients has been reported to vary from 27.4 years to 49.8 years. Among different Indian studies, the age profile of present study is close to that reported by Arun Kumar *et al.* who reported the mean age of their patients as 31 years. Gavaskar and Kumar [39] also reported the mean age of their patients as 36 years. The findings in different studies thus suggest that slight variability in age profile of the patients might be dependent on the demography, age expectancy and other regional reasons, despite these differences, most of the studies report early adulthood (20-40 years) as the most affected age group.

The present study predominantly had male patients with male to female ratio of 4. A male predominance has also been reported in different previous studies too. Botchu *et al.*[13] in their study reported a gender ratio of 6.69. In another study Helmy *et al.* reported this ratio as 2. In the study of Enninghorst *et al*, this ratio was 1.63 and Hollis *et al.* found it to be 1.91. In different Indian studies too, a male predominance has been reported. Mukherjee in their study had this ratio at 19; Gavaskar and Kumar in their study also had gender ratio of 7.33 which is higher than ours. However, Arun Kumar *et al.* reported this ratio as 2.33 and Maruthi and Shivanna[14] reported this ratio as 1.72 which is lesser than that in present study. Among Indian studies, the gender ratio close to ours was shown by Shah and Patel who reported this ratio as 3.2 while Deepak *et al.* reported exactly same gender ratio *i.e.* 4 in their study as reported in present study. Thus irrespective of the environment, all the studies show a skewed gender ratio with more affected males as compared to females. The reason for predominance of males as compared to females could be the fact that these fractures are often afflicted by high impact injuries which is congruent to the traditional gender-related differences in activity profile.

The present study identified road traffic accidents (90%) as the major cause of injury. This finding is in agreement with the epidemiological data that also supports that diaphyseal femur fractures are caused as a result of high-energy trauma and road traffic accidents are the most common reason for this trauma. Similar to present study, Botchu *et al.* also found road traffic injuries as the major reason. However, Hollis *et al.* stratified the causes of injury in different age groups. In their study, they found that age group 21-30 years had 71% of fractures afflicted by road-traffic accidents. They also found road traffic accidents to be dominant cause of injury among males whereas fall was the major etiology among females. The high proportion of road traffic accidents as the etiology in present study could be owing to a high dominance of males (80%). Among different Indian studies, Deepak *et al.* have also reported a high proportion of road traffic accident (83.34%) patients in their series. Among other Indian studies too nearly two-third to three-fourth of patients of diaphyseal fracture has road traffic accident as the reason for injury. The findings in present study are similar to those reported by Mukherjee who reported 86.7% of their patients to be victims of road traffic accidents.

As far as fracture type was concerned, the present study had communited or transverse types as the dominant types comprising 75% of total sample. Intramedullary nail fixations are quite useful for management of comminuted fractures as it helps to stop the bone fragments from escaping to the medulla. The high prevalence of comminuted fractures in present study could be attributed to the high impact injuries afflicted during the road traffic accident. Contrary to findings of present study, Botchu *et al.* in their study had none of the comminuted fractures and had 83% transverse and 17% oblique/comminuted cases while Haonga *et al.* in their series had all the cases of comminuted fracture only. The reason for difference between two studies could be difference in etiology as stated above. In present study 90% of patients had road traffic injury as the inflicting reason whereas Botchu *et al.* reported other reasons as the inflicting injuries in their study. Among Indian studies, similar to present study, Deepak *et al.* comminuted and transverse types to comprise 63.3% of their

patients. Arun Kumar *et al.* [16] in their study reported transverse type as the most common type (60%).

Maximum fractures were grade I (70%) fractures and involved middle third (80%s). The present study only undertook unilateral cases of closed fracture type with slightly higher involvement of right (55%) as compared to left side. The unilateral selection and exclusion of open types was done in order to rule out any confounding effect. In present study there were 5 (25%) cases with associated injuries. Although, keeping in view the fact that high impact road traffic injuries were the major cause of fracture, the proportion of patients with associated injuries could have been higher, however, fortunately this did not happen. Although, presence of associated injuries can be a confounding factor, however, it is difficult to rule out all the cases as high-impact injuries are often accompanied with associated/multiple injuries.

In present study, none of the cases required traction. Although, intramedullary nail fixation technique does not require a traction [17]. However, one must understand that the patients were high impact road traffic accident victims and as such sometimes traction is considered to be useful to stabilize the bone. In one such study, Shah and Patel [49] reported traction or external fixation need in 47.6% of their cases dominated by patients having high energy trauma as the major etiology. Mukherjee [47] also reported a high incidence of traction need (93.3%). Some workers opine that preoperative skeletal traction can improve soft-tissue contractures and facilitate open reduction. However, it also increases hospital stay considerably, though this can be avoided [39]. In present study too, we completely tried to avoid it.

In present study, no intraoperative complication was noted except in one case where intraoperative fracture took place. The fact that the patients were suffering from high-impact injury and occurred in a case in whom traction was done. Intraoperative fractures are generally rare while using intramedullary nails, however, in cases where traction is being done, the incidence of intraoperative fracture increases. Similar to present study, Wilde *et al* reported incidence of intraoperative fractures in 1.2% of cases in whom traction was done. Moreover high-energy injury, such as road traffic-related injury might sometimes result in unexpected complications. In another study Tornetta and Tiburzi observed that complications while managing femoral shaft fractures through intramedullary nail fixation could be reduced by use of reaming. In present study reaming was performed as part of standard procedure and that is why the intraoperative complications were well under control. On evaluating the contemporary Indian literature, we could not find any study reporting any intraoperative complication, particularly, intraoperative fractures and hence this finding can be set aside as an incidental finding that cannot be generalized.

In present study, postoperative complication was noted in 4 cases, superficial infection in two (10%) cases and shortening in 2 cases (10%). Infection can be a potential post-operative complication in intramedullary nailing procedures; however, this complication can be substantially reduced by taking appropriate preventive measures. The infection rates reported in literature are also relatively lower ranging from 0% to 10% generally. Similar to present study, Boonevialle *et al.* in their study reported infection in only 3/57 (5.3%) of their cases in elderly age group. Ligier and Metaizeau *et al.* in their study reported infection in only 1/123 (0.8%) cases in pediatric age group. However, Becher and Ziran in their study reported deep infections in 2/35 (6%) of their cases. Bagheri *et al.* [44] in their study also reported superficial infection in only 1/50 (2%) of their cases. Among different Indian studies, Deepak *et al.* reported a high post-operative infection rate (16.7%). Mukherjee [47] in his study had superficial infection in 5/60 (8.3%) cases of their series. However, Maruthi and Shivanna [53] reported postoperative infection in only 3% of their patients. Thus, in general, the post-operative infection rate is lower in intramedullary nail fixation technique and findings of present study also substantiated it further.

In present study, 50% of patients spent $\leq$14 days in hospital. The duration of hospital stay ranged from 12 to 35 days with a mean of 19.25$\pm$7.15 days. Compared to this Pendilton *et al.* in their study reported average length of hospital stay as 3.9 days in cases with isolated femoral shaft fractures treated by intramedullary nails. The reason for longer duration of hospital stay in present study could be the fact that majority of patients were road traffic victims and a substantial proportion of them (25%) had associated injuries too. The duration of hospital stay can be variable in different environments and depending on the protocol of intramedullary fixation used. In another study, Sadic *et al.* while using undreamed intramedullary nails reported the average duration of hospital stay as 15.5 days. Alobaidi *et al.* [47] in their study reported mean duration of hospital stay as 13 days for early reamed intramedullary nails and 9 days for late reamed intramedullary nails. In present study we followed an early reaming protocol and had a mean hospital stay of 19.25 days. The reason for slightly longer duration of hospital stay in our study can be attributable not only to associated injuries but also to the fact that the patients had came from far-off places and hospital discharge was done only when they attained mobilization and stability. Among Indian studies, Bhasale and Joshi, on the other hand had reported the average hospital stay as 5-7 days with broad spectrum antibiotics given for 3 days, thus emphasizing the fact that post-operative infection is an issue to be taken care off and prophylaxis or close hospital monitoring is essential. However, Deepak *et al.* in their study similar to our study reported duration of hospital stay to be 11-20 days in 70% of their patients while the upper range of duration of hospital stay in their study was 33 days. Kimmatkar *et al.* [18] too like present study had mean hospital stay of 12.16 (range 5-34 days). Gavaskar and Kumar [19] in their study had reported the mean duration of hospital stay as 21 days, however, such prolonged hospital stay in their study could be attributed to the fact that they included patients with neglected fractures, whereas in present study the case was not so. In fact, duration of hospital stay in most of the Indian studies is longer than that reported in western studies where the infrastructural facilities, personal hygiene, environmental conditions are better than those existing in our environment and hence duration of hospital stay is often reduced [20].

Conclusion

The surgical management of fracture diaphysis of femur has taken a march ahead with the advent of interlocking nail, which has widened the range of indications for medullary osteosynthesis. The transverse interlocking bolts control the length, rotational alignment of the limbs.

- Interlocking nail is effective in controlling rotational and longitudinal forces that act across the fracturesite allowing early weight bearing and early rehabilitation
- Supine position on traction table, with affected limb adducted, provides sufficient access for the entry point. In our series closed reduction on traction table could be achieved without skeletal traction
- Closed nailing is preferred over open nailing, due to its

faster rate of healing.

- Reaming and interlocking expands the scope of nailing, to include all segments of femoral shaft.
- During nail insertion, the reduction should be held properly, to avoid distal cortical break.
- Rotational alignment should be confirmed, before fixing the interlocking bolts to avoid malrotation.
- Restoration of anatomic length alignment of comminuted fractures is possible and it extends the use of intramedullary nail to more proximal and distal fractures.
- Interlocking nail offers the patients the added advantage of early joint mobilization, early muscle rehabilitation shorter hospitalization and most important early return to work and prefracture state as the incidence is more in working age group.
- Interlocking intramedullary nailing is a very effective and successful method of definitive primary treatment, in most types of fractures of the shaft of the femur.

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