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Evaluation of Functional Outcome in Adults with Fracture Shaft of Femur Treated by Close Intramedullary Interlocking Nail

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Abstract: ***Introduction: To study functional outcome in adults with fracture shaft of femur Treated by close Intramedullary Interlocking Nail – Intramuscularly 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 complications rates like rotational stability, no damage to extra periosteal soft tissues, minimal potential for contamination. Methodology: Study Centre: Ravindra Nath Tagore Medical College & Maharana Bhupal Government Hospital, Udaipur in Department of Orthopaedics & Traumatology. Study Type - Prospective, Inclusion Criteria: All patients between age 20yrs to 60yrs. Type I, II, III Winquest Hansen classification. Grade I Gustillo Anderson compound fracture. Patients willing to give consent and willing for follow - up. Exclusion Criteria: Type IV Winquest Hansen classification, Age Group <20yrs. Pre - existung deformity of femur. Pregnant women. Patients unfit for surgery. Sample Size - 50, Results: 50 cases were operated and followed up. Excellent outcome was observed among 36 (72%) cases, Good outcome aming 10 (20%) cases, 2 (4%) cases show fair outcome followed by poor outcome among 2 (4%) cases. All the patients at the end of 9 months were comfortable to do their day to day activities without any pain. No case required routine implant removal. Conclusion: We conclude that Most of the cases of femoral shaft fracture treated with close Intramuscularly Interlocking Nail technique is treatment of choice. This method yields high union rates, and had load sharing property, Rotational stability, Torsional Rigidity Early Mobilization and shortened Hospital stay.***

Keywords: Femur Fractures, Winquest Hansen, Union Rate, IMIL Nail.

1. Introduction

In recent era due to increase in the availability of the high speed vehicle and increased number of the high energy road traffic accident has led to increase in number of the complex fracture of the femur bone. Femoral shaft fractures are usually the result of high energy trauma such as road traffic accidents. The annual incidence of fracture shaft femur is approximately 10 per 100, 000 people.

Femoral shaft fractures comprise 5 - 6% of all long bone fractures in adult.4 As fracture shaft of the femur is a high - velocity injury, it is often associated with other systemic injuries or multiple fractures. The incidence of fracture shaft of femur ranges from 9.9 to 12 per 1, 00, 000 per year[5, 6] most of which occurs in male. A bimodal age of presentation is seen in cases of fracture shaft of the femur. It is more commonly seen in 15 to 24 years of individuals associated mostly with road traffic accidents and also in around 75 years of elderly populations associated with trivial injuries like fall from standing height.

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 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.

Aim and Objectives

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) To study effectiveness of intramedullary interlocking nail fixation.

Classification

WINQUIST AND HANSEN CLASSIFICATION

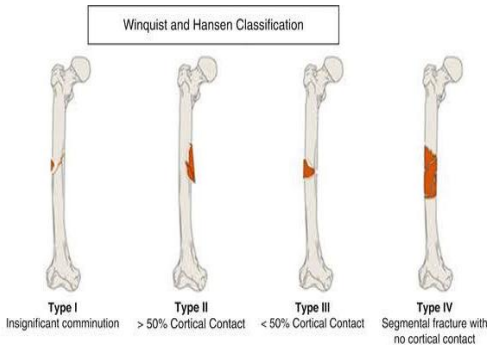
Winquist's classification reflects the observation that the degrees of soft tissue damage and fracture instability increases with increasing grades of communition.

TYPE - 1: There is only a tiny cortical fragment.

TYPE - 2: The "butterfly fragment" is larger but there is still atleast 50% cortical contact between main fragments.

TYPE - 3: The "butterfly fragment" involves more than 50% of bone width.

TYPE - 4: It is essentially a segmental fracture.



2. Material and Methods

Study Area

This was a prospective type study, conducted at RNT Medical College & Hospital, Udaipur in Department of Orthopaedics & Traumatology on those who were admitted with isolated closed disphyseal femur fracture in the ipsilateral lower limb. A prospective case series study of adult cases of closed and Gustilo Anderson type I open diaphyseal fractures of femur were treated by closed intramedullary interlocking femur nail was done during the period December 2021 to November 2022.

- **Study Population**: Patients with fracture femur shaft attending our Department of Orthopaedics.
- **Duration of Study**: December 2021 to November 2022.
- **Sampling Frame:** The sampling frame was bound by the following inclusion and exclusion criteria:

Inclusion criteria

1) The patients with injuries associated with fracture of shaft femur.
2) All patients between age 20 yrs to 60 yrs.
3) Grade I Gustillo Anderson compound fracture
4) Type I, II, III (Winquest Hansen classification)
5) Both males and females.
6) Patients willing to give consent.

Exclusion Criteria

1) Winquest Hansen type IV.
2) Patients unfit for surgery.
3) Pre - existing deformity of femur.
4) Age group < 20yrs.
5) Associated fracture neck of femur.
6) Pathological fracture.
7) Pregnant women

Results of the treatment were evaluated using modified Klaus and Klemm criteria.3[5]

Excellent:

- Normal radiographic alignment
- Full hip and knee motion
- No muscle atrophy

Good:

- Angular deformity <5°
- Slight loss of hip and knee motion
- Muscle atrophy <2 cm
- Shortening <2 cm

Fair:

- Angular deformity 5° - 10°
- Moderate (25%) loss of hip and knee motion
- Muscle atrophy >2 cm
- Shortening >2 cm

Poor:

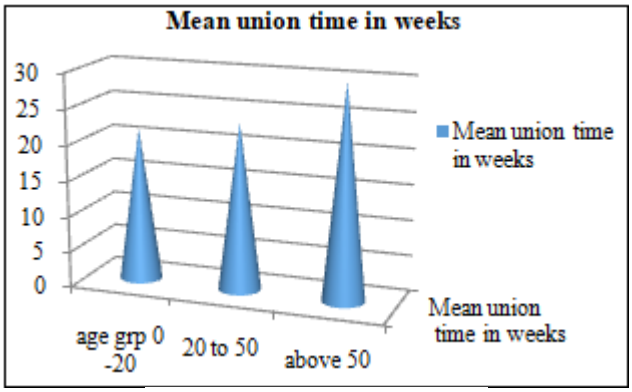
- Angular deformity >10°
- Marked loss of hip and knee motion
- Marked muscle atrophy
- Marked shortening.

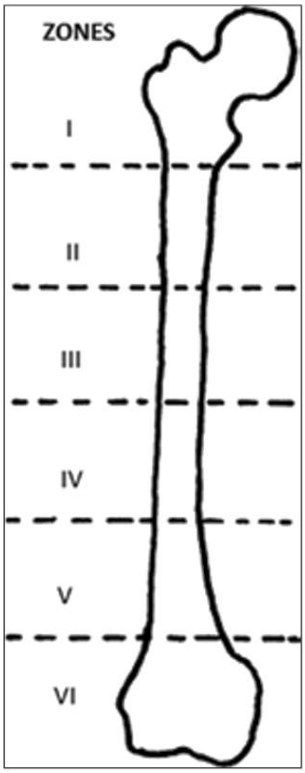
Technique

Pre - operative management: Patient with fracture shaft of femur may be in hypovolemic shock requiring blood transfusion and fluid replacement. Since associated injuries are known to occur, involvements of other specialities may be required. After the patient has been stabilized, in skeletal traction in the form of upper tibial pin traction on a Bohler – Braun splint with a weight of 10% of patient body weight is added. **Implant Selection:** In our study we have used conventional interlocking nail. The proper length of the nail used was determined by measuring on the normal side from the tip of the greater trochanter to superior pole of the patella. **Anaesthesia:** Epidural or spinal anaesthesia. **Position:** Patient is positioned laterally on a ordinary table with suitable sand bags and pillows. In Fracture table with patient in supine position with traction of involved limbs and abduction of normal limb to allow navigation of image intensifier. **Entry point:** By 5cms gluteal incisions starting from top of the greater trochanter, gluteal medius split in the middle and pyriform fossa exposed. Using awl medullary canal is opened and circular hole is made. **Reaming and Fracture Reduction:** Serial reaming done with rigid reamer or flexible reamers upto desired size of the nail and it should cross the isthumus. **Nail insertion:** Nail is inserted in ante - grade manner over the guide wire by gentle taping. **Distal locking:** With the help of distal targeting device, distal locking is done. If distal targeting device is not available, the locking done by free hand technique using image intensifier. The fracture gap is impacted by gentle reverse hammering.

3. Results

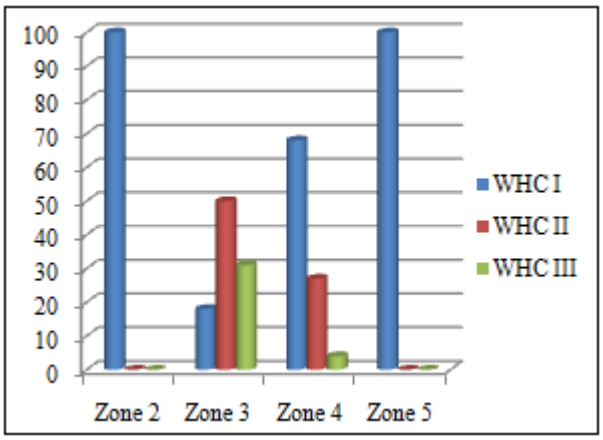
Age groups [years]	Mean [SD] fracture union time in Weeks	P value
0 - 20	21.5 [4.6]	0.009
Above 20	23.5 [6.2]	
Above 50	30 [3.5]	
total	24.2 [6.1]	





Showing 6 zones of femur

			WHC Type			Total
			I	II	III	
Zone	2.0	Count	7	0	0	7
		% within zone	100.0%	0.0%	0.0%	100.0%
	3.0	Count	3	8	5	16
		% within zone	18.8%	50.0%	31.3%	100.0%
	4.0	Count	15	6	1	22
		% within zone	68.2%	27.3%	4.5%	100.0%
	5.0	Count	5	0	0	5
		% within zone	100.0%	0.0%	0.0%	100.0%
Total		Count	30	14	6	50
		% within zone	60.0%	28.0%	12.0%	100.0%
P value					0.001	



Zones involved and fracture union time in weeks: maximum union time was observed in Zone 5 followed by zone 3, zone zone 2 ans zone 4.

Hip flexion

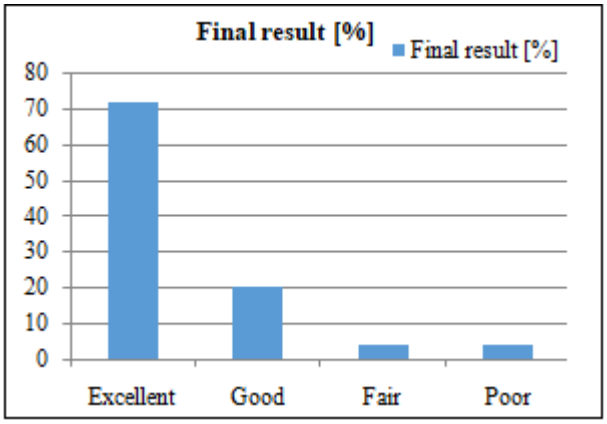
Average Hip flexion observed was 120 degree [SD 4.03]. Hip flexion of 120 degree was observed among 42% patients.

Hip flexion	Frequency	Percentage
0 - 110°	1	2.0
0 - 115°	12	24.0
0 - 120°	21	42.0
0 - 125°	16	32.0
Total	50	100.0

Final result

Excellent outcome was observed among 72% patients, followed by Good outcome among 20%.

Final result	Frequency	Percentage
Excellent	36	72
Good	10	20
Fair	2	4
Poor	2	4
Total	50	100



4. Discussion

This was a prospective type study, conducted at RNT Medical College & Hospital, Udaipur in Department of

Orthopaedics & Traumatology on those who were admitted with isolated closed disphyseal femur fracture in the ipsilateral lower limb.

The index study included 40% participants in the age group 30 to 45 years of age. Maximum patients [82%] in the study were males. In study by Patel S D[36] et al patients were of younger age group, 36 (46.15%) patients between 20 - 30yrs, average age being 33.7 years, which correlate the fact that younger population is at increased risk of femoral fractures. Compared to the other studies in past our mean age group involved is slightly higher. Radiological union in weeks was 24.2 Weeks [SD 6.1 weeks]. Mean fracture union time was maximum in type III fracture, followed by type 1 and type 2. The average time of radiological union was 18 weeks in the study by Patel S D et al, whereas in Gross Kempf et al. (1985) and in Thoresen et al. (1985) series it was 18 weeks and 16 weeks respectively. With WISS[38] et al. (1986) it is 26 weeks. Union time was 39.4 weeks in a series of Claworthy et al. [14], who had used AO undreamed nail, compared to our study of reamed intramedullary nail.

5. Conclusion

We conclude that assessment of functional outcomes by modified klaus and klemn criteria. In Adults with fracture shaft femur treated by Intramedullary interlocking Femur Nail give and Excellent outcome was observed among 36 (72%) patients, Good outcome among 10 (20%) patients, fair out among 2 (4%) followed by poor outcome among 2 (4%) patients. With Our Study We Conclude that Closed Intramedullary Interlocking Nailing is the Current Treatment Choice for closed Diaphyseal Fractures of Femur in Adults.

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