A COMPARATIVE STUDY OF MIDDLE ONE THIRD OF FEMUR SHAFT FRACTURES MANAGED WITH INTERLOCKING NAILS AND KUNTSCHER INTRAMEDULLARY NAILS AT LEVEL 2 AND LEVEL 3 REFERRAL HOSPITALS IN TERMS OF HEALING TIME, FULL WEIGHT BEARING AND POST OPERATIVE COMPLICATIONS

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ABSTRACT

BACKGROUND

The aim of the study was to compare the outcome of middle one third of femur shaft fractures managed with Kuntscher intramedullary nails and interlock intramedullary nails at level 2 and level 3 referral hospital in terms of healing time, full weight bearing and post-operative complications.

MATERIALS AND METHODS

In our quasi experimental study, 100 cases of middle one third femur shaft fractures (Winquist Type I and Type II) were included. Fifty patients were treated with Kuntscher intramedullary nails (Group 1) and rest fifty patient treated with intramedullary Interlocking Nails (Group 2). The detailed data of the patients was recorded, computed and analysed using chi-square test/ Fisher's exact test was plotted using Kaplan Meier performed to compare the study variables between control and study groups. p-value less than ($P<0.05$) was taken as statistically significant. The main parameter compared included fracture healing time, full weight bearing time and post-operative complications.

RESULTS

There was no significant difference between the two groups in terms of demographic data, fracture type and associated co-morbidities. The average operating time was 60 + 10 minutes for the Kuntscher nail and 110 + 10 minutes for interlock nails. Out of 100 fractures 95 (95%) healed within six months while 5 (5%) did not. The latter included 1 (1%) case of delayed union and 3 (3%) non-union cases with Kuntscher nail and 1(1%) in case of interlocking nail.

CONCLUSION

We therefore conclude that unlocked Kuntscher nailing is still useful for the management of middle one third fracture shaft femur (Winquist type 1 and 2).

KEY WORDS

Middle One Third Fracture Shaft Femur, Intramedullary Interlock Nail, Kuntscher Nail

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BACKGROUND

Gerhard Kuntscher first introduced unlocked intramedullary nailing for femoral fractures in the 1940's.[1,2] The inherent rotational instability of unlocked intramedullary nailing was solved with introduction of the locked intramedullary nail in the 1970's. Winquist RA et al 1989 in their study of a series of intramedullary nailing of femoral fractures concluded that unlocked intramedullary nailing should only be used for the middle one third femoral shaft fractures with Winquist type I or II.

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The goal of treatment is restoration of normal anatomy, rigid and stable fixation and early mobilization of hip & knee joint.[3]

Interlocking Nails are said to control shortening, angulation and rotation, provide early weight bearing but they are expensive and require special instrument and image intensifier. The Kuntscher nails on the other hand are comparatively very cheap, easy to introduce and does not need any special instruments[3]. This study was carried out to compare the intramedullary nailing in our setup.

The aim of the present study is to compare the outcome of middle one third femur shaft fracture managed by Kuntscher intramedullary nail and interlock intramedullary nail at level 2 and level 3 referral hospitals.

MATERIALS AND METHODS

Design

Quasi experimental study.

Study Period
One and half year, from Jan. 2017 – June 2018.

Sample Size
The sample size of 100 Patients was taken for convenience.

Sampling
The patients were selected that came to the emergency Department, in the department of orthopaedics, District Hospital, Bahraich.

Study Population
For the purpose of study, 100 patients aged between 20-50 years, that are both male and female were selected, which that came to the emergency department of the department of Orthopaedics in the district hospital of Bahraich.

After all the patients were subjected to detailed history, clinical examination, necessary radiological and pathological investigations which are recorded in registers, the patients underwent surgery. All cases were operated in the standard position and procedure of antegrade nailing through pyriformis fossa was followed after adequate reaming of the femoral canal under C-arm fluoroscopy and some cases without fluoroscopy including one pregnant women. The pregnant female was operated in lateral decubitus position on a standard operation table. Fracture fragments were exposed and cleaned with minimum periosteal stripping through lateral approach. The canal was reamed, the nail length was measured with help of reamer passed through canal of both fragments and an appropriately sized Kuntscher nail was inserted retrograde through proximal fragment. The fracture was anatomically reduced under direct vision and nail inserted into the distal fragment by punching. Rotation was corrected using the linea aspera as a marker. The nail was left protruding 2 cm proximal to the greater trochanter to facilitate its removal.[1,2] The wound was closed over a suction drain and was removed after 48 hrs. After discharge all the patients were followed up regularly in the outpatient department monthly for 6 months than thrice another 6 months and notice made of any complications, weight bearing time and healing. Bony union was determined by clinical and radiological examinations as the radiological examinations were repeated post operatively and at the end of 6 weeks, 12 weeks and 6 months interval.

Sampling Procedure
For this study, patients were selected that came with the history of middle one third femur shaft fracture, either from fall, road traffic accident, or assault. These patients were managed alternatively by 2 techniques i.e. Kuntscher nail and Interlocking nail alternatively. So, for intramedullary nailing, 50 cases were operated with Kuntscher nails (Group 1) and 50 cases were managed by interlock intramedullary Nails (Group 2).

Inclusion Criteria
Patient aged between 20 to 50 years who gave consent to be the part of study.

Statistical Analysis
Statistical Methods: SPSS version 20 was used for statistical analysis. All study variables were represented using frequency and percentage. Chi-square test / Fisher's exact test was plotted using Kaplan Meier performed to compare the study variables between control and study groups. The p-value less than ($P<0.05$) will be taken as statistically significant.

RESULTS
In my study, the age (Mean) of the patients was 35 years (20-50 years) with 82 (82%) males and 18 (18%) females. Majority of patients (88%) sustained fractures following high energy trauma (Road traffic accident), with fall from height (9%) and assault making up the rest (3%).

Majority of fractures were on right side ipsilateral 74 (74%) and left side ipsilateral in 26 (26%) patients (Table 1). The average operating time was 60 + 10 minutes for Kuntscher nail and 110 +10 minutes for interlocking intramedullary nail.[4]

All wounds healed with-in 12 days and fractures healed in 16 to 28 weeks for all cases.

Figure 1. Post-Operative X-Ray with Kuntscher Nail

Figure 2. 12 Weeks Follow Up X-Ray with Kuntscher Nail

Figure 3. Post-Operative X-Ray with Interlocking Nail

Figure 4. 12 Weeks Follow Up X-Ray with Interlocking Nail

It took 16-24 weeks for fracture healing in case of interlock nail and 16-28 weeks for Kuntscher nails. There were no cases of persistent deep infections. Other main complications were non-union in 4 cases (4%) and 1 (1%) delayed union with Kuntscher nail.

Full weight bearing was commenced on the average of 12 to 22 weeks for all fractures, which was 8-16 weeks and 12-32 weeks in interlocking nail and Kuntscher nail respectively. The mean average weak of full weight bearing 17 weeks for all cases. The mean average week of full weight bearing was 10 weeks for interlock intramedullary nails and mean average was 14 weeks for Kuntscher nail (Table II).

In our study no patient had a significant limb length discrepancy.

Sl. No.	Variables	Kuntscher Nail (Group 1)	Interlock Nail (Group 2)	p-Value
1.	**Sample Size**	**50**	**50**	
2.	**Age (Years)**			0.5912
	20-30	13	10	
	30-40	28	33	
	40-50	9	7	
3.	**Sex**			0.6027
	Male	40	42	
	Female	10	8	
4.	**Mode of Injury**			0.1927
	Fall	7	2	
	RTA	42	46	
	Blunt Trauma	1	2	
5.	**Side Affected**			0.6484
	Right	38	36	
	Left	12	14	

Table I. Demographic Features

*Results are not significant at 5% level of significance (P<0.05).

Weeks	Kuntscher Nail (Group 1) Sample 50	Interlock Nail (Group 2) Sample 50
12	--	
14	--	
16	18	23
18	--	16
20	12	
22	09	5
24	--	5
26	--	
28	08	
Total		
Mean Average Duration	20.21 ± 4.26	18.08 ± 2.71

Table II. Fracture Healing Time Duration

Weeks	Kuntscher Nail (Group 1)	Interlocking Nail (Group 2)
	Sample =50	**Sample =50**
4 Weeks	---	---
8 Weeks	---	14
12 Weeks	27	28
16 Weeks	16	7
20 Weeks	3	---
24 Weeks	---	---
28 Weeks	---	---
32 Weeks	1	---
Total	47	49
Mean Average Duration	14.30 weeks ± 3.61	10.14 weeks ± 2.19
Mean Average Duration for All Cases	12.18 weeks ± 3.62	

Table III. Full Weight Bearing Time Duration

The Kuntscher nail group 1 and interlock nail group 2 did not differ significantly in their speed of radiological bony union (p-0.7015) or full weight bearing (p-0.4112). Although, the fractures fixed with interlock nail united somewhat earlier as compared to those treated with Kuntscher nail. The difference was not statistically significant. There was no significant difference in post-operative fracture alignment between the two groups.

	Kuntscher Nail (Group 1) Sample of 50	Interlocking Nail (Group 2) Sample of 50	p- Value
Bone Healing Time	20.21 Weeks ± 4.26	18.10 Weeks ± 2.71	0.7015
Full Weight Bearing	14.30 Weeks ± 3.61	10.14 Weeks ± 2.19	0.4112
Post-Operative Complications	4	1	0.1903
Overall Outcome			0.4996

Table IV. Showing Overall Outcome of The Study in Both The Groups

*Results are not significant at 5% level of significance.

DISCUSSION

In the current study, we found that the conventional unlocked intramedullary nail (Kuntscher Nail) is still reliable alternative for Winquist type I and type II fractures of femur, in that there was a rate of 95% of satisfactory fracture union with an average of 20 weeks. Other studies have shown 12, 16 and 24 weeks in their series.[5,6,4]

This result is comparable to the standard interlock intramedullary nail. Stability of the fixation is not a major concern because the medullary canal is hand reamed to the exact size of the implant diameter and hammered into tight fit canal and convents the compression force into hook stress help to limit rotation instability. Therefore, post-operative rehabilitation is similar to interlock nails. Hence it results in excellent fracture healing early mobility.

The few complications were 5 cases out of which, 4 cases (4%) went into non-union and 1 case (1%) went into delayed union in case of Kuntscher nail, while only one case of delayed union was seen in case of interlock nail. The p value was found to be 0.1903.

Biomechanical studies shows that dynamic implants have more weight bearing capacity than static implants. Furthermore, partial weight bearing creates a micromovements in the dynamic system which increases union rate[7]. The mean average week of full weight bearing is 10 weeks for interlock intramedullary nails and mean average 14 weeks for Kuntscher nail. Other studies report a period of 11 weeks and 14.5 weeks.[8] The p value was calculated to be 0.4112.

The fracture healing time in case of Kuntscher Nail was 20 weeks, whereas in case of interlocking intramedullary nail was found to be 18 weeks. The p value was calculated to be 0.7015. Other studies have shown p value 0.3282.[4]

CONCLUSION

Femoral nailing has advanced continuously over the past decade. The introduction and increased popularity of interlocking nails allowed for improved rotational control, better maintenance of femoral length, early weight bearing, but even in today's world there exists a large chunk of population who cannot avail of these methods. In a developing country like India, the availability of such techniques and facilities is largely limited to certain centres only.

Many factors are responsible for this scenario like lack of facilities (equipment and trained manpower) & economic constrains. In such a scenario, close Kuntscher nail is a good option for the treatment of Winquist type I & type II middle one third femoral fracture, with special indications like pregnant female, in whom exposure of foetus to radiation can be avoided. It provide good union rate and low risk of complications. It is a time saving alternative and results are comparable to closed interlocking intramedullary nailing for this group of fractures.[9]

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