

# INTELOCKING VERSUS KUNTSCHER NAILS IN THE MANAGEMENT OF FEMORAL SHAFT FRACTURES

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## ABSTRACT

**Objective:** To compare the outcome of Femoral shaft fractures managed with Interlocking and Kuntscher intramedullary nails, in terms of healing time, full weight bearing and post-operative complications.

**Design & Duration:** Prospective, quasi-experimental study from March 1999 to May 2002.

**Setting:** Orthopaedics Unit I, Civil Hospital, Karachi.

**Patients:** A total of 200 cases of Femoral shaft fractures.

**Methodology:** Half (100) the cases of Femoral shaft fractures were treated with Kuntscher intramedullary nails and the other half (100) with Interlocking nails, the cases being assigned randomly. The detailed data of the patients was recorded, computed and analyzed using Chi-square test and Students t-test. The main parameters 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  $110 \pm 25$  minutes for the Interlocking nail and  $80 \pm 15.8$  mins for the K-nail. All patients of K-nail group needed blood transfusion, while only 17 patients of interlocking group needed blood transfusion. The full weight bearing time was significantly shorter ( $p < 0.005$ ) in cases of Interlocking nail. Out of 200 fractures 182 (91%) healed with in six months while 18 (9%) did not. The latter included 6 (3%) cases treated with Interlocking nails and 12 (6%) with Kuntscher nails,  $p < 0.005$ .

**Conclusion:** Interlocking intramedullary nailing is better than Kuntscher nailing in every respect.

**KEY WORDS:** Fracture Shaft Femur, Intramedullary Nail, Interlocking Nail, Kuntscher Nail

## INTRODUCTION

Femoral shaft fractures are usually the result of severe, high-energy forces. The goal of treatment is restoration of normal anatomy, rigid and stable fixation, and early mobilization of the hip and knee joints<sup>1,2</sup>.

In children, the treatment of femoral shaft fractures is conservative, but in adults, the treatment is almost always open reduction and internal fixation<sup>3</sup>. For fixation various implants like intramedullary nails, plates, external fixators, etc. can be used. However, intramedullary

nails are the preferred choice of implant. Amongst them Kuntscher nail (K-nail) was in common use until recently, but with the advent of Interlocking nail (IL-nail) it is less preferred<sup>4</sup>.

In cases of K-nail the fracture site is opened while in cases of Interlocking nail the fracture site is not opened, the nail being stabilized by means of proximal and distal screws<sup>5,6</sup>. Interlocking nails are said to control shortening, angulation and rotation, provide early weight bearing, causes minimal blood loss during surgery<sup>7</sup>, but they are expensive. The K-nails on the other hand are comparatively very cheap, easy to introduce and does not need any special instruments or image intensifier. This study was carried out to compare the results of the two type of intramedullary nailing in our set-up.

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## PATIENTS & METHODS

This quasi-experimental study was carried out in the Dept. of Orthopaedics (Unit-I), Dow University of

Health Sciences and Civil Hospital, Karachi from March 1999 to March 2002. In this comparative study 200 patients of femoral shaft fractures were managed by intramedullary nailing, half (100) with Kuntscher nail and half (100) with Interlocking nail.

Amongst the 200 patients included in the study there were 142 (71%) males and 58 (29%) females. The age of the patients ranged from 18-50 years, mean age being 33.64 years. One hundred and twenty (60%) femoral shaft fractures were caused by road traffic accidents, 44 (22%) by gun-shot injuries and 34 (17%) by falls, while 2 (1%) were the result of blunt trauma due to assault (Table I).

Right femoral shaft was fractured in 141 (70.5%) patients and left in 59 (29.5%) patients. Sixty four (32%) fractures were transverse, 42 (21%) oblique, 12 (6%) spiral and 82 (41%) comminuted in nature. Thirty fractures (15%) were located in the upper third of femoral shaft, 108 (54%) in the middle third and 62 (31%) in the lower third as shown in Table II. Seventy (35%) patients had open fractures, whereas in 130 (65%) cases the fracture was closed.

After basic data collection and appropriate investigations all the patients underwent surgery; those >30 years were operated under spinal while those <30 years under general anesthesia. The cases were randomly assigned for K-nailing or IL-nailing, the former being done in the lateral position and the latter in the standard position under C-arm fluoroscopy. In all cases of interlocking nails proximal screws were used, while the distal screws

were used only in 86 cases. Suction drains were removed after 48 hours and the patients were encouraged to have early mobilization in bed.

After discharge all the patients were followed-up regularly in the Out-Patient Dept. and notice made of any complications, weight bearing time and healing. Bony union was determined by clinical and radiological examinations. The results were analyzed using the Chi-square and Students t-tests, on the basis whether the fracture was stable or unstable.

## RESULTS

There was no significant difference between the two groups in terms of demographic data (age, sex), fracture type, hospital stay, metabolic diseases and associated co-morbidity. The average time for the procedure in interlocking nail was  $110 \pm 25$  minutes (85-135 min), while in K-nail group it was only  $80 \pm 15.8$  mins. (60-95 mins.). All patients of K-nail group needed blood transfusion, while only 17 patients of interlocking group needed blood transfusion. The post-operative hospital stay was on an average six days.

Patients who underwent K-nail fixation had more early complications than those having interlocking nail, though the difference was not significant; late complications were similar in both the groups. There were six cases of infection out of 70 open femoral shaft fractures. The overall period for early and late weight bearing was significantly shorter in the interlocking group than the

**Table I. Demographic Features**

Feature	K-Nail	IL-nail
<b>Sex</b>		
Male	68	74
Female	32	26
<b>Age</b>		
Range in years	18-45	21-50
Mean in years	31.5	35.5
<b>Cause</b>		
Road Traffic Accident	54	66
Gun Shot Injury	19	25
Fall	19	15
Blunt Trauma	01	01

**Table II. Details of Femoral Shaft Fractures**

Feature	K-Nail	IL-nail
<b>Side</b>		
Right	66	75
Left	34	25
<b>Site</b>		
Upper 1/3rd	13	17
Middle 1/3rd	53	55
Lower 1/3rd	29	33
<b>Type</b>		
Transverse	36	28
Oblique	22	20
Spiral	07	05
Comminuted	45	37

Weeks	Stable Fractures		Unstable Fractures	
	IL Nail	K-Nail	IL-Nail	K-Nail
4	14	--	--	--
6	18	--	--	--
8	08	22	--	--
10	06	18	6	--
12	--	14	14	--
14	--	04	18	02
16	--	10	06	04
18	--	--	04	04
20	--	--	06	06
22	--	--	--	10
24	--	18	--	06
Total pts.	46	68	54	32
Average	6.26 wks	10.88 wks	14.22 wks	19.87 wks

**Table III. Weight Bearing Time in Femoral Shaft Fractures treated with Intramedullary Nails**

K-nail group (Table III). Out of 200 fractures 182 healed within six months (mean 16.25 weeks), while 18 fractures, six with interlocking nail and 12 with Kuntscher nail, showed delayed healing (Table IV).

## DISCUSSION

Satisfactory outcome is common in patients with fractures of femoral shaft. Presence of associated co-morbidities, osteoporosis and fracture instability are adverse

factors for healing. Early mobilization may decrease the risk of mortality and morbidity, as most of the cases are capable of partial weight bearing in the early post-operative period, especially in the interlocking group. In patients with osteoporotic fractures, maintenance of reduction can be a major problem during the healing period. To reduce the healing time, dynamic devices are replaced with the static ones. Bio-mechanical studies show that dynamic implants have more weight bearing capacity than static implants. Furthermore, partial weight

**Table IV. Fracture Healing Time in Femoral Shaft Fractures treated with Intramedullary Nails**

Weeks	Stable Fractures		Unstable Fractures	
	IL Nail	K-Nail	IL-Nail	K-Nail
12	20	9	--	--
14	10	17	6	--
16	4	16	24	2
18	4	11	6	10
20	4	5	10	8
22	4	4	2	4
24	--	2	--	--
> 24	--	4	6	8
Total	46	68	54	32

bearing creates a micro-movement in the dynamic systems which increases the union rate<sup>8,9</sup>. In comminuted fractures, full weight bearing is not permitted until the radiograph shows callus formation.

The average full weight bearing time in this study was 12.16 weeks for all fractures, which was 6.26 and 10.88 weeks in Interlocking and Kuntscher nail respectively amongst stable fractures. In unstable fractures, it was 14.22 and 19.87 weeks respectively. Other studies report a period of 11 weeks and 14.5 weeks<sup>10,11</sup>.

In our series, no patient had a significant limb length discrepancy. Noumi et al<sup>12</sup> reported two cases of shortening due to dynamic locking, while Jaarsma et al<sup>13</sup> described a shortening of 2 cms in two of their cases due to early dynamization of comminuted fractures. Mahaisavariya et al<sup>14</sup> had a 21% incidence of limb length discrepancy among 52 femoral shaft fractures while Wu et al<sup>15</sup> concludes that limb shortening is the most common complication following comminuted fractures. Aiho et al<sup>16</sup> in their series of 123 femoral shaft fractures reported a shortening rate of 7.3%, and recommends performing static locked intramedullary nailing in every case.

In this study six cases (8.57%) developed infection out of 70 open femoral shaft fractures. Lhowe<sup>17</sup> has reported an infection rate of 5% and Brumback et al<sup>11</sup> 8% in their series of open femoral fractures. Baixauli et al<sup>10</sup> had no infection rate in their cases.

Out of 200 fractures in the present study, 182 healed within six months. In 18 cases, six of Interlocking nail and 12 of Kuntscher nail, there was delayed healing. In unstable fractures dealt with by Interlocking nail, 48 out of 54 cases healed within six months with an average of  $17.2 \pm 3.68$  weeks (12-24 weeks); while in Kuntscher nailing, 24 out of 32 healed within 6 months with an average of  $19.7 \pm 3.89$  weeks.

Amongst stable fractures, all (46) fractures treated with Interlocking nail healed with an average of  $13.5 \pm 10$  weeks; while in Kuntscher nailing out of 68 fractures 64 healed with an average of  $14 \pm 1.63$  weeks. Other authors have shown 12 weeks, 18 weeks and 16.3 weeks in their series<sup>8,18,19</sup>.

## CONCLUSION

Fractures of femoral shaft, especially upper and lower 1/3, should be managed with Interlocking intramedullary nail because it causes:

- i) Excellent fracture healing.
- ii) Early mobility.

- iii) Prevention of rotation and angulation of bone.
- iv) Prevention of upward or downward migration of the implant.

However K-nail is a good form of treatment, where facilities of Interlocking nail are not available.

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