

Case Report

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Intramedullary Kuntscher Nailing Intensified With Cerclage Wiring to Treat Acute Closed Shaft Fractures of Femur: A Series Cases

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ABSTRACT

Between March 1985 and March 1987, we performed 98 surgeries (96 patients) of Intramedullary Kuntscher Nailings Intensified with Cerclage Wiring (if fractures unstable) to treat the fresh closed Fractures of Shaft Femur. Accessing the fractures by Posterolateral Approach, remove soft tissues, hematoma interposing between fragments, reaming medullary canal, performing good reduction, then stabilizing by an Intramedullary Kuntscher Nail. If the fractures not stable enough, Loops of Wiring were intensified. Postoperatively, walking with crutches, and gradual weight bearing according to the extent of bone healing. Physical Therapy focused on Range of Motion (ROM) of hip, knee and ankle. Loss of follow-up: 20 patients (22 femurs). 76 patients (76 femurs) were followed-up for a mean of 27 months (6 to 108). 61 femurs achieved complete bone healing (evaluated on patients and Xrays) with no incidents. 18 femurs /patients were removed Kuntscher nail after in average 32 months (22- 48). Allowing Full Weight Bearing in average after 50 days if fracture simple, after 70 days if there were additional fractures. All 13 patients who lost ROM of hip or knee more than 20°, sustained associated injuries of pelvis or legs. Reoperation: 5 femurs (5 %) including delayed and nonunion: 2 femurs (2 %), deep infection: 2 femurs (2%). Surgical fixation not stable enough needed one or more interventions: 1 case (1%). One patient remained rotational displacement 10°; 3 others with angulation 3° -6°. Leg shortening in average 2,4cm [1-4] : 6 femurs (patients) in which 2 had shortening more than 2 cm. In Vietnam at that time, for the femoral shaft fractures, Intramedullary Kuntscher Nailing with Cerclage Wiring (if fractures unstable) were resumably an acceptable good treatment.

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Introduction

Fresh closed diaphyseal fractures of femur are very common in Vietnam, essentially by traffic accident. At HoChiMinh City Hospital for Traumatology and Orthopaedics (HTO) in 2 years (from March 1985 to March 1987) there were 98 femoral fractures / 96 patients treated by Open Intramedullary Kuntscher Nailing. 95% of patients were 15-55 years old. In our hospital, Femoral Shaft Fractures accounted for 12% fractures of limbs and spine.

The classification based on fracture configuration. There were 5: Transverse; Oblique; Spiral; Comminuted; and Segmental. In Vietnam before 1995, surgical treatments for fresh diaphyseal fractures of femur were Open Reduction and Internal Fixation with Kuntscher nail. In our institution, the fractures were intensified by Loops of Cerclage Wiring if judged unstable. Plate and Screws were not our usual technique of treatment.

Postoperatively, Physical Therapy started as soon as possible. 2 crutches were used for first month, Weight Bearing depended on stability level of bone fixation. Usually, Full Weight Bearing allowed at the end of 2th month. Some cases whose bone healing came sooner, Full Weight Bearing permitted more early. Exercises to improve Range of Motion for knee, ankle, and hip were consistently practised.

This paper (98 femurs / 96 patients) treated by Intramedullary Kuntscher Nailing were studied and reported.

Patient and Method

Method: Series cases, clinical retrospective trial, self-control: before and after surgery.

Patient: From March 1985 to March 1987, 98 surgeries (of 96 patients) of Intramedullary Kuntscher Nailing were performed to treat fresh closed shaft fractures of femur including 74 males, 22 females. These surgeries /patients were enrolled in study (table 1)

Table1: Patients Detail: Pre-Operation and Postoperation

| Pat. No. | Age | | Nail removal | Classification | Open Kuntscher Nailing | Cerclage Wiring | Follow-up | Bone healing | ROM knee ankle hip | Complication | Results |
|----------|------|--------|--------------|----------------|------------------------|-----------------|-----------|--------------|--------------------|--------------|---------|
| | Male | Female | | | | | | | | | |
| 1 | 23 | | | Ob | + | + | 1y | + | F | | E |
| 2 | 20 | | | Ob | + | | 8m | + | F | | G |
| 3 | | 29 | | Ob | + | + | 5y | + | F | | E |
| 4 | 33 | | + | T | + | | 3y | + | F | | E |
| 5 | 28 | | + | T | + | | 4y | + | F | | E |
| 6 | 17 | | + | T | + | | 4y | + | F | | E |
| 7 | 40 | | | Ob | + | + | L | | | | |
| 8 | 24 | | | T | + | | 3y | + | F | | E |
| 9 | 32 | | | T | + | + | L | | | | |
| 10 | 32 | | | T | + | | 2y | + | F | | G |
| 11 | 24 | | + | T | + | | 3y | + | | -2cm | G |
| 12 | 18 | | | T | + | | L | | | | |
| 13 | 28 | | + | T | + | | 9y | + | F | -3cm | Fair |
| 14 | 23 | | | Sp | + | + | 2y | + | F | | G |
| 15 | 16 | | + | T | + | | 2y | + | F | | G |
| 16 | 15 | | | T | + | | L | | | | |
| 17 | 25 | | | T | + | | 2y | + | F | | G |
| 18 | 38 | | | Ob | + | + | L | | | | |
| 19 | 28 | | | T | + | | 1y | + | 1 R | A 30 | Fair |
| 20 | | 38 | + | T | + | | 3y | + | 1 R | A 60 | Fair |
| 21 | 28 | | | T | + | | 3y | + | 1 R | | Fair |
| 22 | 28 | | | C | + | + | 2y | + | F | | G |
| 23 | | 51 | | T | + | | 2,5y | + | F | | G |
| 24 | 24 | | | T | + | | 2y | + | F | | G |
| 25 | 60 | | | T | + | | L | | | | |
| 26 | 54 | | | T | + | | 2y | + | F | | G |
| 27 | | 28 | | T | + | | 1,5y | + | F | | G |
| 28 | 55 | | | T | + | | 1,5y | + | 1 R | D 6y | Fair |
| 29 | 63 | | | T | + | | 2y | + | 1 R | A 40 | Fair |
| 30 | 26 | | | T | + | | 2y | + | F | | G |
| 31 | 36 | | | T/T | + / + | | L | | | | |
| 32 | | 18 | | T | + | | 1,5y | + | F | | G |
| 33 | 30 | | | T | + | | L | | | | |
| 34 | | 25 | | Ob | + | + | L | | | | |
| 35 | | 31 | | T | + | | L | | | | |
| 36 | 18 | | + | T | + | | 3y | + | F | | E |
| 37 | 17 | | | T | + | | 2y | + | F | | G |
| 38 | 31 | | + | T | + | | 2y | + | 1 R | | Fair |
| 39 | 42 | | | T | + | | L | | | | |
| 40 | 32 | | | Ob | + | + | 2y | + | F | | G |
| 41 | | 23 | + | Ob | + | + | 2y | + | F | | E |
| 42 | | 17 | + | T | + | | 2,5y | + | F | | E |
| 43 | 23 | | | T | + | | 1y | + | F | | G |
| 44 | | 35 | | T | + | | 6m | + | 1 R | | Fair |
| 45 | | 23 | | T | + | | 6y | + | 1 R | -4cm | Fair |
| 46 | 26 | | | T | + | | 8m | + | F | | G |
| 47 | 22 | | | T | + | | 1y | + | 1 R | | G |
| 48 | 34 | | | T | + | | L | | | | |
| 49 | 32 | | | T | + | | L | | | | |

| | | | | | | | | | | | |
|----|----|----|---|---------|----------------|---|------|-----|-----|--------|------|
| 50 | | 28 | | T | + | | L | | | | |
| 51 | | 28 | | T | + | | 2y | + | F | | G |
| 52 | 29 | | | T | + | | 1y | + | F | | G |
| 53 | 43 | | | T | + | | 2y | + | F | | G |
| 54 | 27 | | | T | + | | 1y | + | 1 R | 100 ER | Fair |
| 55 | 19 | | | Ob | + | + | 1y | + | F | | G |
| 56 | 18 | | | T | + | | L | | | | |
| 57 | 20 | | | Ob | + | + | 2y | + | F | | G |
| 58 | 38 | | | T | + | | 1,5y | + | F | | G |
| 59 | 16 | | | T | + | | L | | | | |
| 60 | 24 | | | T | + | | 8m | + | F | | G |
| 61 | 18 | | | Ob | + | + | 6m | + | 1 R | | G |
| 62 | 19 | | | T | + | | 3y | + | F | | E |
| 63 | | 34 | | T | + | | 2y | + | F | | G |
| 64 | 20 | | | T / seg | +/+ plus plate | + | L | | | | |
| 65 | | 45 | + | T | + | | 1y | + | F | -1cm | Fair |
| 66 | 17 | | | T | + | | L | | | | |
| 67 | 18 | | | T | + | | L | | | | |
| 68 | 46 | | + | T | + | | 2y | + | F | | G |
| 69 | 49 | | | Seg | + | + | 1y | + | 1 R | -2,5cm | Fair |
| 70 | | 70 | | Sp | + | + | 2y | + | 1 R | | G |
| 71 | 27 | | | T | + | | 2y | + | F | | G |
| 72 | | 33 | + | T | + | | 2y | + | F | | G |
| 73 | 17 | | + | T | + | | 2y | + | F | | G |
| 74 | 22 | | | T | + | | 1,5y | + | F | | G |
| 75 | 33 | | | Ob | + | + | 2y | + | F | | E |
| 76 | | 20 | | T | + | | L | | | | |
| 77 | 48 | | | T | + | | L | | | | |
| 78 | 26 | | | T | + | | 8y | + | F | | E |
| 79 | 59 | | | T | + | | 2y | + | F | | G |
| 80 | 25 | | | T | + | | 1y | + ? | 1 R | I | Poor |
| 81 | 47 | | + | T | + | | 2y | + | F | | G |
| 82 | 31 | | | T | + | | 2y | + | F | | G |
| 83 | | 18 | | T | + | | L | | | | |
| 84 | 22 | | | T | + | | 2,5y | + | F | | G |
| 85 | | 25 | | T | + | | L | | | | |
| 86 | | 96 | | T | + | | 3y | + | F | | E |
| 87 | 31 | | + | T | + | | 3y | + | F | P | F |
| 88 | 20 | | | T | + | | 8m | + ? | 1 R | I | Poor |
| 89 | | 13 | | T | + | | 5y | + | F | | E |
| 90 | 17 | | | T | + | | 1,5y | + | F | | G |
| 91 | 20 | | | T | + | | 2y | + | F | | G |
| 92 | 21 | | | T | + | | 2,5y | + | F | | G |
| 93 | 47 | | | T | + | | 2y | + | F | | G |
| 94 | 17 | | + | T | + | | 3y | + | F | | G |
| 95 | 28 | | | T | + | | 2y | + | F | | G |
| 96 | 40 | | | T | + | | 1,5y | + | 1 R | -2cm | Fair |

Note: Abbreviation: Ob: oblique T: Transverse
 Sp: Spiral Seg: Segmental C: Comminuted
 1y: 1 year follow-up L: Lost follow-up F: Full ROM recovery
 1 R: limited ROM recovery -2cm: 2cm shortening A 3⁰: Angulation 3⁰
 10⁰ ER: External rotation 10⁰ I: deep infection

P: Postoperative common peroneal paralysis recovered after 6 months

D 6y: die 6 years after surgery due to liver cancer

E: excellent

G: Good

P: Poor

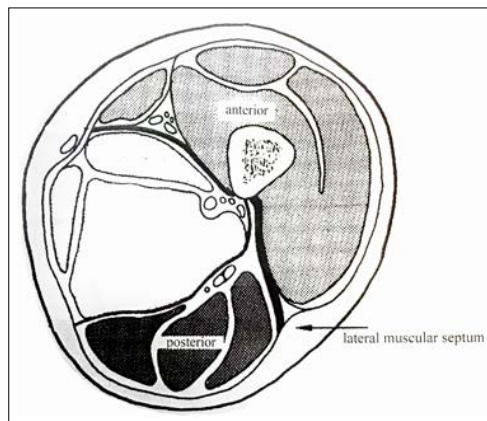
Operative Technique: Open Reduction by Posterolateral Approach, Internal Fixation with Kuntscher Nailing and Cerclage Wiring (if judged unstable) (Figure 1 A, B, C)

the fragments. Reaming the medullary canal, then reduced and stabilized by a Kuntscher nail. If the fractures judged not stable enough, intensifying with loops of 1,5 mm cerclage wiring. Possible removal of nail after at least 2 years. Removal of cerclage wires: not recommended

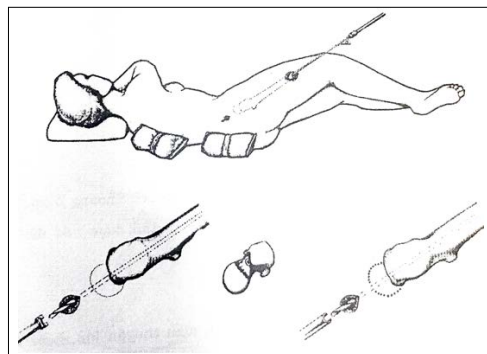
Results

Pre-Operation

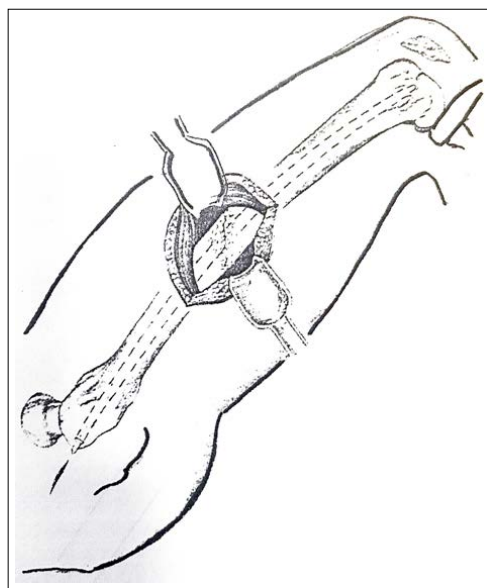
Seventy-four males, 22 females whose mean age: 30 years old [range 13–96]. Fractures were acute; surgeries at the mean day of 12 after fracture [6-22]. Fractures by traffic accident: 69 (70%). Fractures involved middle third of femur: 62 (63 %). Fracture configurations were as follows: Transverse and Short Oblique: 77 (78%); Long Oblique: 13 (13%); Spiral: 3 (3%); Comminuted: 2 (2%); Segmental: 2 (2%). 25 patients (26%) sustained additional injuries. Two patients had bilateral femoral fractures. Open degree-1 : 1(1%).



A



B

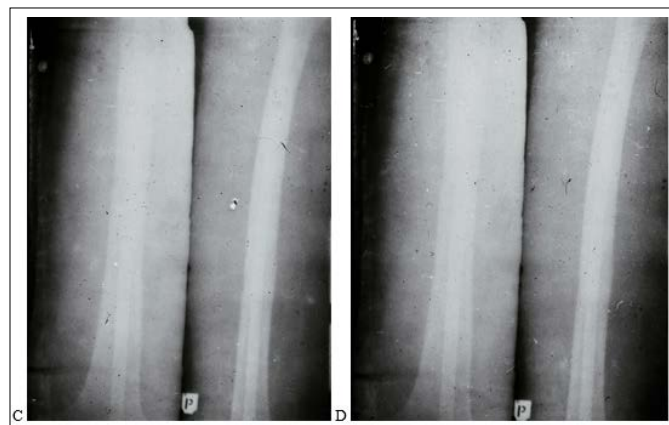


C



Right femur fractured

Day 1, after surgery



6 months

1 year

Figure 1 A, B, C: Patient’s position was lateral decubitus. Posterolateral approach skin incision 8-10 cm. Following the lateral intermuscular septum, access the fracture. Removing hematoma, soft tissue interposed inside fracture. Freshening



2 years

Removal of nail



Patient 2 Years after Surgery

Figure 2: Female 29 y.o. fracture of right shaft femur, operated August 1985. X-rays A: fracture; B: day 1; C: 6 months; D: one year; E: two years; F: removal of nail; G,H,I : patient after removal of nail, complete recovery.

Post-Operation

17/98 femur fixation needed cerclage wiring intensification in which average loops were 2,5 [1-5]. 81 femur fixations by mere Kuntscher nail. 20 patients (22 femurs) were lost of following - up. One died 6 years after bone fixation due to liver cancer. 76 patients (76 femurs) were followed - up with average time of 27 months [6-108]. 61 femurs (patients)(80 %) achieved primary bone healing (evaluated on patients and X - rays) and good limb function recovery (Figure 2 A, B, C, D, E, F, G, H, I). 18 femurs / patients were removed Kuntscher nail after the mean of 32 months [22-48]. Full Weight Bearing allowed in average after 50 days if

fracture simple, after 70 days if there were additional injuries. All 13 patients who lost ROM of hip or knee more than 20°, sustained associated injuries of pelvis or legs. 5 femurs (patients) must be reoperated by the causes of delayed or nonunion (2 cases), deep infections (2 cases), or failure of bone fixation (1 case).

- Leg shortening in average 2,4 cm [1-4]: 6 femurs (patients) in which 2 shortened more than 2 cm.
- Postoperative common peroneal nerve paralysis : 1 case, recovered 6 months after surgery.
- One patient died 6 years after surgery due to liver cancer.
- Muscular dystrophy in average 3,2 cm [2,8-4,2]: 13 femurs (patients), not affected walking or running
- Algodystrophia registered in 6 and paresthesia in 3 patients which were not serious and almost disappeared after 4 months.
- Deep infection: 2 femurs (2%) needed debridements , reosteosynthesis then obtained bone healing and acceptable limb function.
- Remained external rotation 10°: one femur, not affected patient's daily activities.
- Angulation 3 -6°: 3 femurs, registered on X rays, not patient's complaint.
- Hip and / or knee and/or ankle limited Range of Motion more than 20°: 13 patients. All these patients had clearly or insidiously associated injuries of pelvis and / or legs.

Discussion

Before 1995, at our institution (Hospital for Traumatology and Orthopaedics of Ho Chi Minh City) surgical treatment for Femoral Shaft Fracture were Open Reduction and Internal Fixation (ORIF) with Kuntscher nail. If fractures were judged unstable with configuration of long oblique, spiral, comminuted, or segmental, intensification with loops of cerclage wiring were indicated. In this study, 17/98 fractures needed further fixation with the average 2,5 loops [1-5] of 1,5 mm wiring. 81 fractures were well stabilized by mere Kuntscher nail. Open technique permitted the surgeon to discover the fissures which were usually invisible on X-rays. Open technique also enhanced the surgeon to restore the fragments of comminuted fractures which will share the axial load with Kuntscher nail, facilitated the bone healing. Keep the bone attached with soft tissue as much as possible was one of the factor to obtain bone healing [1-6].

In current time, majority of femoral shaft fractures are treated by intramedullary nailing but closed technique (not open the fracture). However, for some special cases, open technique is still needed and presumably beneficial [3].

Loops of Cerclage Wiring aren't the cause of local bone ischaemia, don't delay bone formation , neither nonunion, whereas Loops of Wiring maintain the fragments restored as similar original shape of bone as possible which will share the axial mechanical loading with material (Kuntscher nail) , eased the bone healing [5].

In 1953, Boehler reported 151 femoral fractures treated by Intramedullary nailing, most of cases were intensified with cerclage wiring. After that Tscherne and Szyszkowitz and others reported the amazing success with the same technique [5].

Conclusion

During 2 years from March 1985 to March 1987, At Ho Chi Minh City Hospital for Traumatology and Orthopaedics (HTO), 98 fresh closed diaphyseal fractures of femur (96 patients) were treated by the technique of Intramedullary Kuntscher Nailing

and Cerclage Wiring. By this time, our treatments were advanced technique for this pathology. With experiences and final results obtained from this work we can conclude that the treatment as aboved presentation were considered as the treatment in the range of acceptable encouragement.

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Conflict of Interest

No financial disclosures

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