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= Abstract =

## Results and Problems of open Intramedullary Nailing of Femoral Shaft Fracture

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The intramedullary nailing is one of the most available methods in treatment of femoral shaft fracture. The closed intramedullary nailing is known to be the best method of treatment of femur shaft fracture, but it is not always available in cases of deficit of equipment, severe associated injury, and some fracture pattern. The open intramedullary nailing has advantage of easily obtaining anatomical reduction but it increases the risk of infection, the incidence of delayed union and additional operations inevitably.

We reviewed 33 cases of open intramedullary nailing in femur shaft fracture from September 1994 to September 1997.

The results were as follows :

1. The average union time was 27.3 weeks.
2. Location of fractures was middle one-thirds in most cases, and Winquist-Hansen classification type II was the most common.

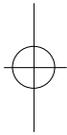
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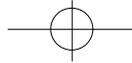
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\*

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- 3. The complication included 8 delayed unions, 3 nonunions, 2 infections, shortening of more than two centimeters in 3 patients.
- 4. In 4 cases, we did open intramedullary nailing with bone graft initially, but all of them has complication as delayed union and nonunion.

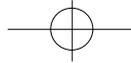
We can use open intramedullary nailing method in some femur shaft fractures, but there are many problems and complications. So we must consider it carefully before using this method.

**Key Words** : Femur, Shaft fracture, Open intramedullay nailing



1  
 가가 33  
 가  
 13)  
 1965 Küntscher<sup>13)</sup>가  
 1994 9 1997 9  
 가 . 1972 Klem  
 Schnellman<sup>12)</sup>, 1974 Kempf Grosse<sup>10)</sup>, 1984  
 Winquist Hansen<sup>17)</sup> 가가 33 1  
 가  
 11)  
 가 17 78 ,  
 38.6 가23 가10 가  
 2 가5 , 가4 , 가20 ,  
 가가 4  
 가  
 fracture table 33  
 가 1/3 6 , 1/3 22 , 1/3 5  
 Winquist-Hansen 16-18). Winquist-  
 Hansen I 7 , II 12 , III IV  
 가 7 . 5 ,  
 1994 9 1997 9 16 , 3 , 5 ,  
 4 가 16).





30 • / 12 1

33 19 (56%)  
 10 2  
 6 가  
 3 , 2 ,  
 , 2 ,  
 6 .  
 1-2  
 2  
 2  
 가 가  
 1995  
 Winquist-Hansen I, II 12  
 가  
 4  
 1.  
 Kempf<sup>10)</sup>  
 가 ,  
 가  
 가 , 가  
 72 27.3 . 15 Muller<sup>15)</sup>  
 8  
 가 6  
 가<sup>16)</sup> 6  
 가 11 (33.3%)  
 (Table 1).  
 2. 가  
 33  
 가4 ,

**Table 1.** Union Time

Duration(weeks)	Patient Number
15-18	2
19-22	8
23-26	12
27-30	5
31-34	3
>34	3
Total	33
Average (27.32wks)	

**Table 2.** Additional Operations after Primary Nailing

Additional Operation	Patient Number
Dynamization	4
Dynamization + Autogenous bone graft	5
Nail Exchange + Autogenous bone graft	2
Total	11

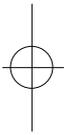
**Table 3.** Complications

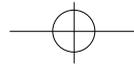
Entities	Patient number
Infection	2
LLD*	3
Delayed Union	8
Nonunion	3
Joint Stiffness	5
Trochanteric bursitis	1
Total	22

\* LLD : leg length discrepancy

**Table 4.** Functional results (Denker H)

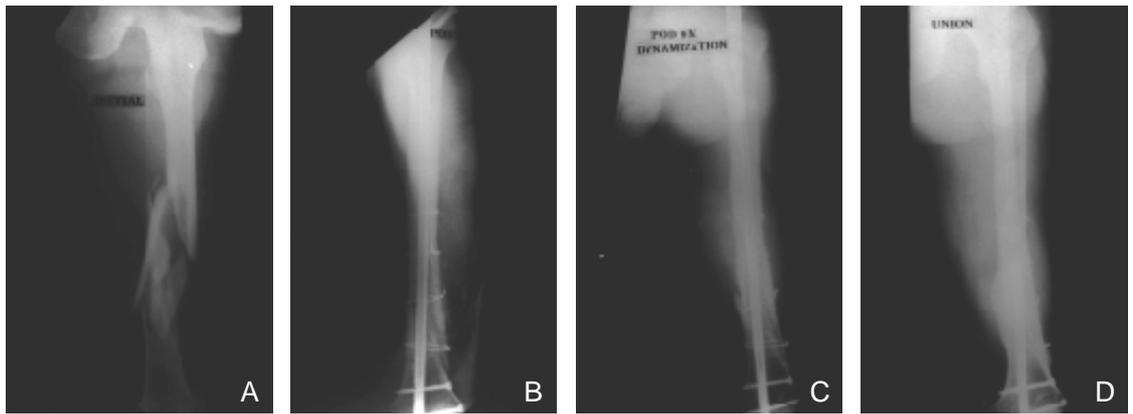
Result	Patient number
Excellent	7 (21%)
Satisfactory	10 (30%)
Fair	13 (40%)
Poor	3 ( 9%)
Total	33





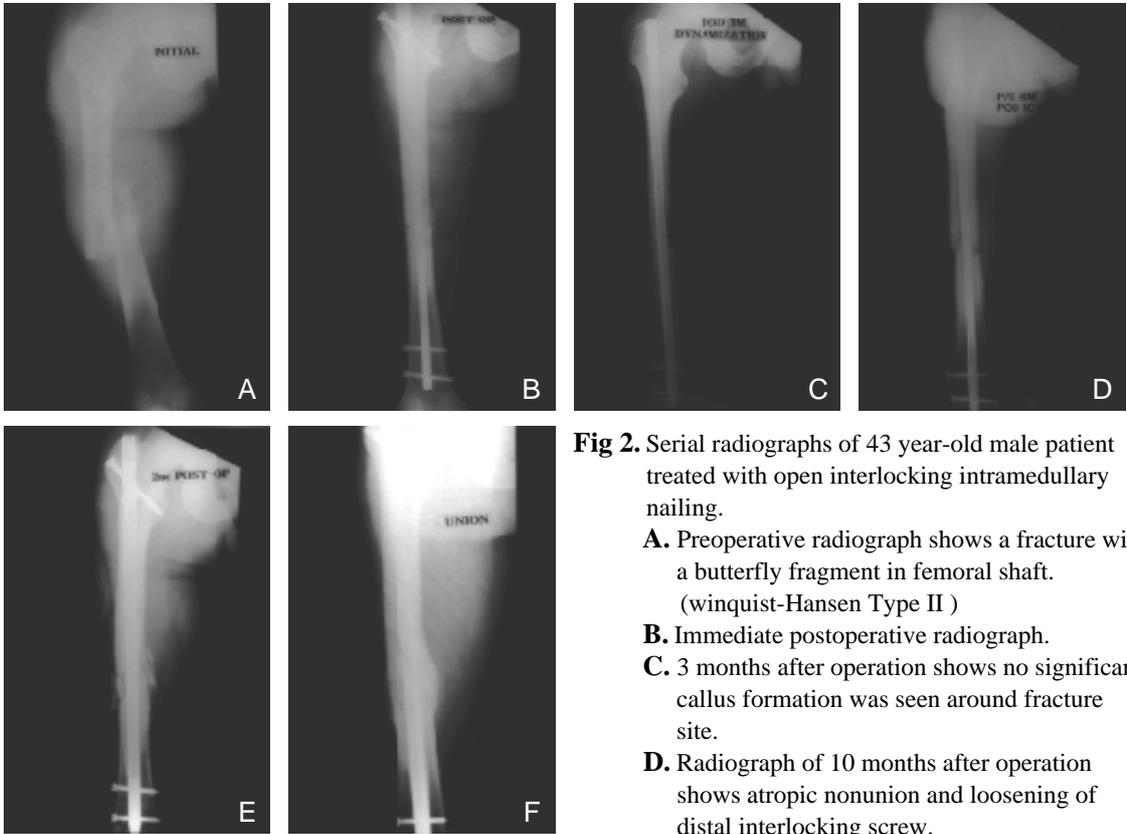
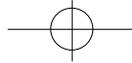
가  
4 , 3 가 2  
가 , 1 1.  
가 37  
(Table 2).

3. Winquist-Hansen type IV  
, 가  
, 가  
8 , 3  
, 2 ,  
5 ,  
2cm 3 . 9  
4. 가 18  
, , 2cm 가  
, , (Fig 1).  
Denker<sup>6)</sup> 가  
, 17 (51.5%) 2.  
(Table 4). 43  
Hansen II Winquist-



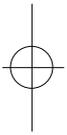
**Fig 1.** Serial radiographs of 37 year-old male patient treated with open interlocking intramedullary nailing.  
**A.** Preoperative radiograph shows comminuted femoral shaft fracture. (Winquist-Hansen type IV)  
**B.** Immediate postoperative radiograph.  
**C.** 9 months after surgery, dynamization was done.  
**D.** Union was obtained at 9 month after dynamization.





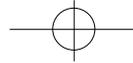
**Fig 2.** Serial radiographs of 43 year-old male patient treated with open interlocking intramedullary nailing.

- A.** Preoperative radiograph shows a fracture with a butterfly fragment in femoral shaft. (winquist-Hansen Type II)
- B.** Immediate postoperative radiograph.
- C.** 3 months after operation shows no significant callus formation was seen around fracture site.
- D.** Radiograph of 10 months after operation shows atropic nonunion and loosening of distal interlocking screw.
- E.** An wider nail was inserted with autogenous 10 months after first operation.
- F.** Union was obtained 7 months after second operation.



가 , , 3 , cast brace 18) Küntscher nail 가 가 6 (Fig 2). 1,2,13) 1972 Klemm<sup>12)</sup> 1974 Grosse, Kempf<sup>10)</sup>





fracture table

C-Arm 가

17) 가 1984 Johson 9) Grade III, IV 22%

가 , 13% 1

2 (6.06%) 1

33 Winqvist- Hansen Grade III Grade IV 14 , Winqvist-Hansen Grade I Grade II 가

2 가 7

Grade II 12 Winqvist-Hansen Grade I 가 가

가 , 가 , 1984 3)

23 , 1993 1)

26.9 1996 2) 20.5

27.32 .

Christensen 5) 가

20 가 , Muller 가

Harper<sup>7)</sup> 39 Thomas<sup>15)</sup> 가

80 Harper<sup>8)</sup> fluted rod 14 가 4

3 가 가

가 가

1,15-18) Winqvist Hansen<sup>17,18)</sup> Grade III, IV 3 2 .

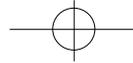
, IV 12 III 6-8 가 가 1

Grade III, IV 14 Winqvist-Hansen ,

6 가 가

9 가 , 2 1993 3)





가 III, IV

가 2 3

가

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