



14, 3, 2001 7

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15

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22

21

18 (85.7%)

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12)

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3,5,8,9,10,13,18)

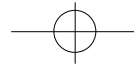
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6-2 (T 134-791)

Tel : (02) 2225-1352

Fax : (02) 487-0754





21 12 8 2 empty hole  
, 4

1993 1 1999 12 2  
21  
15 ( 12 6  
38 ) 가 3 ,  
9 가 3 21  
3 가 6  
가 3  
9.5  
39 11.6  
Weber 4.4 ( 3 ,  
Brunner<sup>20)</sup> 21 7 )  
(hypervascular type) 11 , (avascular type) 10 가  
elephant foot type 5 , 3  
horse hoof type 4 , oligotrophic type 2 ,  
torsion wedge type 8 , communiton type 2  
(Table 1).

14 (66.7%) 가 , 4.5 )  
가 6 가  
(28.6%), (Fig. 1). 12  
가 1 (4.8%)  
14 12 가 ,  
2

**Table 1.** Types of nonunion

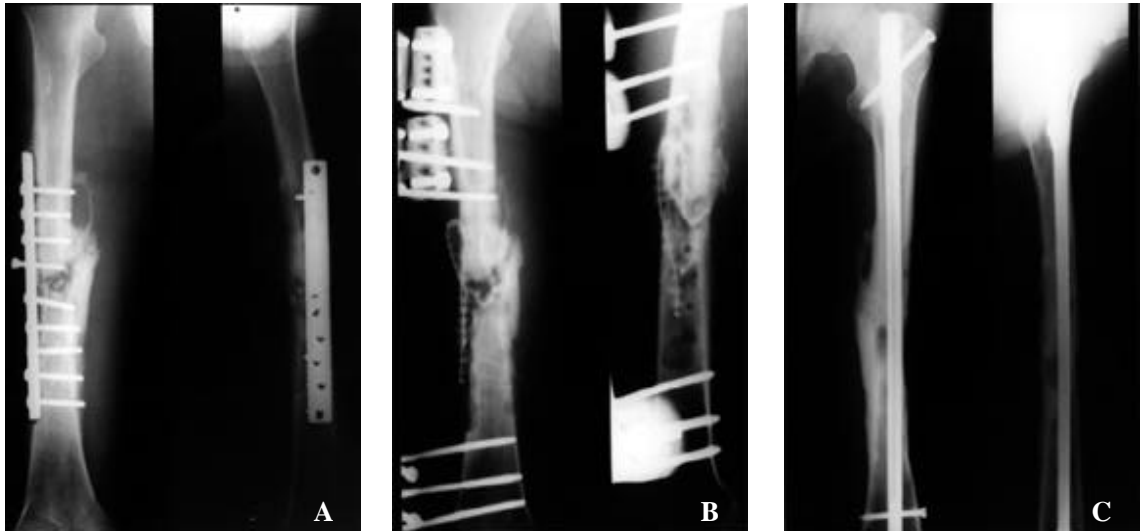
Type	
Hypervascular	
elephant foot	5
horse foot	4
oligotrophic	2
Avascular	
torsion wedge	8
communited	2
Total	21

8 8

12

3

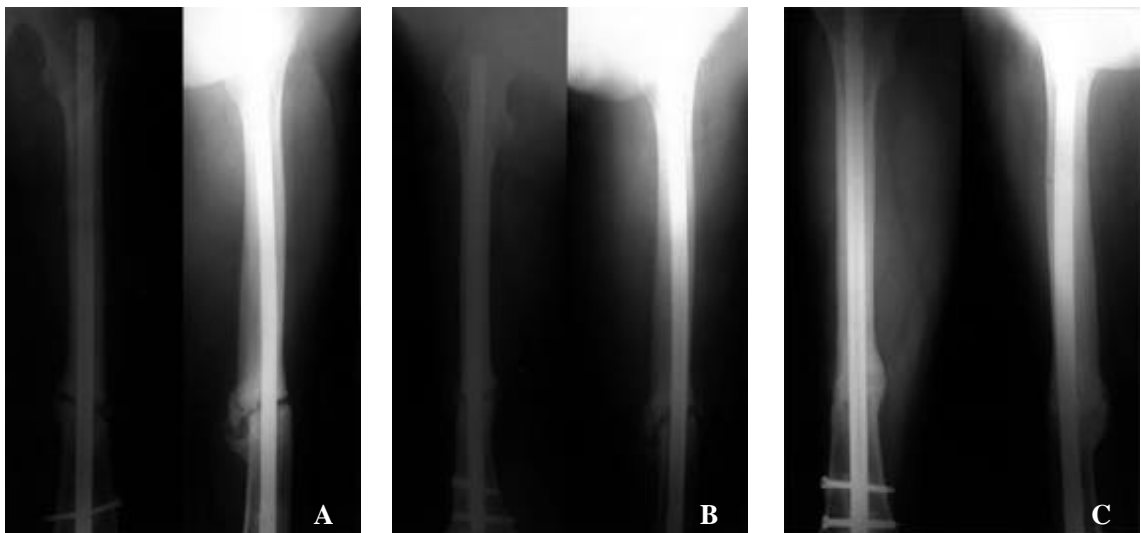
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**Fig 1.** A 39 years old male patient with infected nonunion of femur shaft fracture.

B : After plate & screws removed, the fracture was fixed with external skeletal fixator and antibiotics mixed cement beads were inserted in infected region.

C : Post-operative 1 year radiograph shows solid union after rigid interlocking intramedullary nailing and bone graft.



**Fig 2.** A : A 33 years old male patient with nonunion of femoral shaft fracture.

B : After over reaming and exchanged nail with the larger size nail, post-operative radiograph shows rigid interlocking intramedullary nailing and bone graft.

C : Post-operative 1 year radiograph shows solid union.

**Table 2.** Initial treatment and treatment of nonunion

Initial Tx.	Treatment of nonunion	Total
Plate and screws		
	->interlocking nail & BG *	15
Intramedullary nail		
interlocking nail	->exchange nailing & BG	2
External fixator	->interlocking nail & BG	3
Conservative	->inerlocking nail & BG	1
Total		21

\* BG : Bone Graft

exchange nailing : over reaming and exchange with the lager size nail

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2,20)

14 (66.7%) 가

가 6 (28.6%),

가 1

(4.8%) .

가

21 18 (85.7%)

11

30

22

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3.4

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19

, unlocked nail locked nail

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, Ilizarov

3,5,8,9,10,13,18), Boyd 2)

1

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16),

bone dust

6,17),

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9). Webb

19)

Boyd<sup>1)</sup>

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105

96%

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21

18 (85.7%)

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가<sup>4,7)</sup> .  
 Klemm<sup>11)</sup> 89.5%, 62.5%  
 , Muller<sup>15)</sup>  
 19 18 (95%)  
 Gustilo<sup>6)</sup>  
 Meyer Weilan<sup>14)</sup>

6

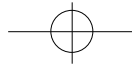
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## Abstract

## Surgical Treatment for Nonunion of Femoral Shaft Fractures

Jae-Ik Shim, M.D., Taik-Seon Kim, M.D., Sung-Jong Lee, M.D.,  
Suk-Ha Lee, M.D., Young-Bae Kim, M.D., Jong-Ro Yoon, M.D.,  
Eui-Sang Seol, M.D., Kwang-Yeol Park, M.D., and Dae-Woong Kang, M.D.

*Department of Orthopaedic Surgery, Korea Veterans Hospital, Seoul, Korea*

**Purpose :** The purpose of this study is to analyze the clinical and radiological result of surgical treatment for femoral shaft nonunion.

**Materials and methods :** From January 1993 to December 1999, 21 cases of femoral shaft nonunion were treated surgically and followed for an average of 15 months. We analyzed initial cause of injuries, classification of fractures, and cause of nonunion in clinically and radiologically. The authors analyzed the average time to union and results after surgical treatment by rigid internal fixation with interlocking intramedullary nail and autogenous bone graft.

**Results :** The mean duration of bony union was 22 weeks and bony union achieved in 18 cases(85.7%) of 21 cases. The complications were shortening of leg length and limping gait in 2 cases, partial limitation of knee joint in 2 cases, superficial infection in 2 cases.

**Conclusion :** Rigid internal fixation with interlocking intrameduallary nail and bone graft is useful method of treatment for femoral shaft nonunion according to cause and type of nonunion.

**Key words :** Femur shaft fracture, Nonunion, Interlocking intramedullary nail