



15, 2, 2002 4

The Journal of the Korean Society of Fractures
Vol.15, No.2, April, 2002

- Ilizarov -

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: 2, 3

Ilizarov

Ilizarov

: 1996 1 2001 2 2, 3

Ilizarov

1 가 가

Ilizarov

Ilizarov 20 Ilizarov

(Secondary IM nailing) 14

Ilizarov 16, 4

13, 1 . Ilizarov 38.1 (19-66) ,

42.5 (18-80) . Gustilo

Ilizarov

Type-II 2, IIIA 7, IIIB 9, IIIC 2 ,

II 2, IIIA 7, IIIB 5 14

9 Ilizarov

24.5

, 5

7.8

: Ilizarov 35.4 ,

Ilizarov 16.7

Ilizarov

1.3

17.3

33.8

Ilizarov

5 ,

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13 ,

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Ilizarov

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1 가

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Ilizarov

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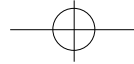
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II 2 , IIIA 7 , IIIB 5 Ilizarov

가

가

. Gustilo ⁹⁾

2, 3

Ilizarov

. 가

10

가

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Ilizarov

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3 , 5

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가

2, 3

Ilizarov

가 3 , 2

. 가

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2-3

Ilizarov

4-6

Ilizarov

Gustilo II

1 , IIIA

3 , IIIB

1 ,

IIIA

2 , IIIB

1 .

14

9

Ilizarov

24.5

1996 1

2001 2

Gustilo 2,3

, 5

7.8

Ilizarov

1

가가

34

Ilizarov

Ilizarov

Ilizarov 20

가

Ilizarov

ESR, CSR CRP가

(Secondary IM

nailing) 14

Ilizarov

16 , 4

13 , 1 ,

Ilizarov

38.1 (19-66) ,

42.5 (18-80) .

Ilizarov

8 ,

가 9 ,

가 3

5 ,

8

< 1>

1 . Gustilo

42

가

Ilizarov

Type-II 2 , IIIA 7

, IIIB 9 , IIIC 2

Open Type-IIIB

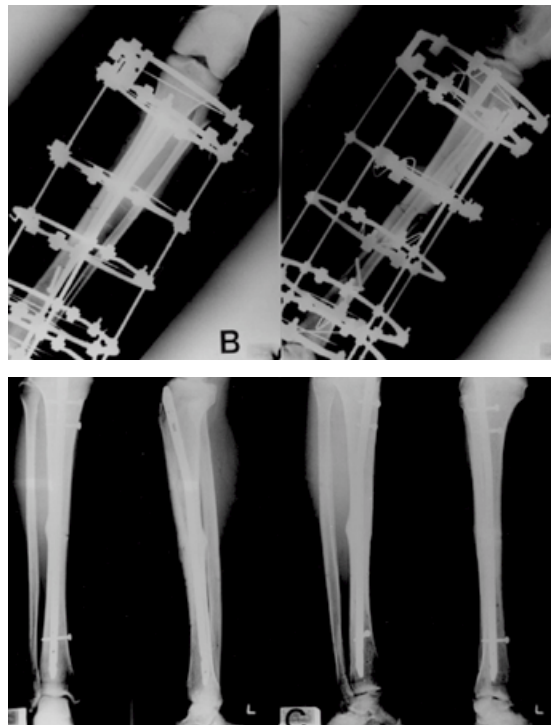
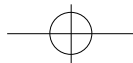


Fig 1. Gustilo grade IIIB open communitied tibial shaft fracture of 42 -year old male

- A.** Preoperative anteroposterior and lateral radiographs of the left tibia
- B.** Immediate postoperative radiographs after Ilizarov application
- C.** 36 weeks after secondary IM nailing, the radiographs showed bony union.
- D.** 2 years after first operation, the IM nail was removed.

10

36

2

. (Fig.1)

Ilizarov

< 2>

80

IIIA

Open Type-

4
23 가

10 가

MRSA

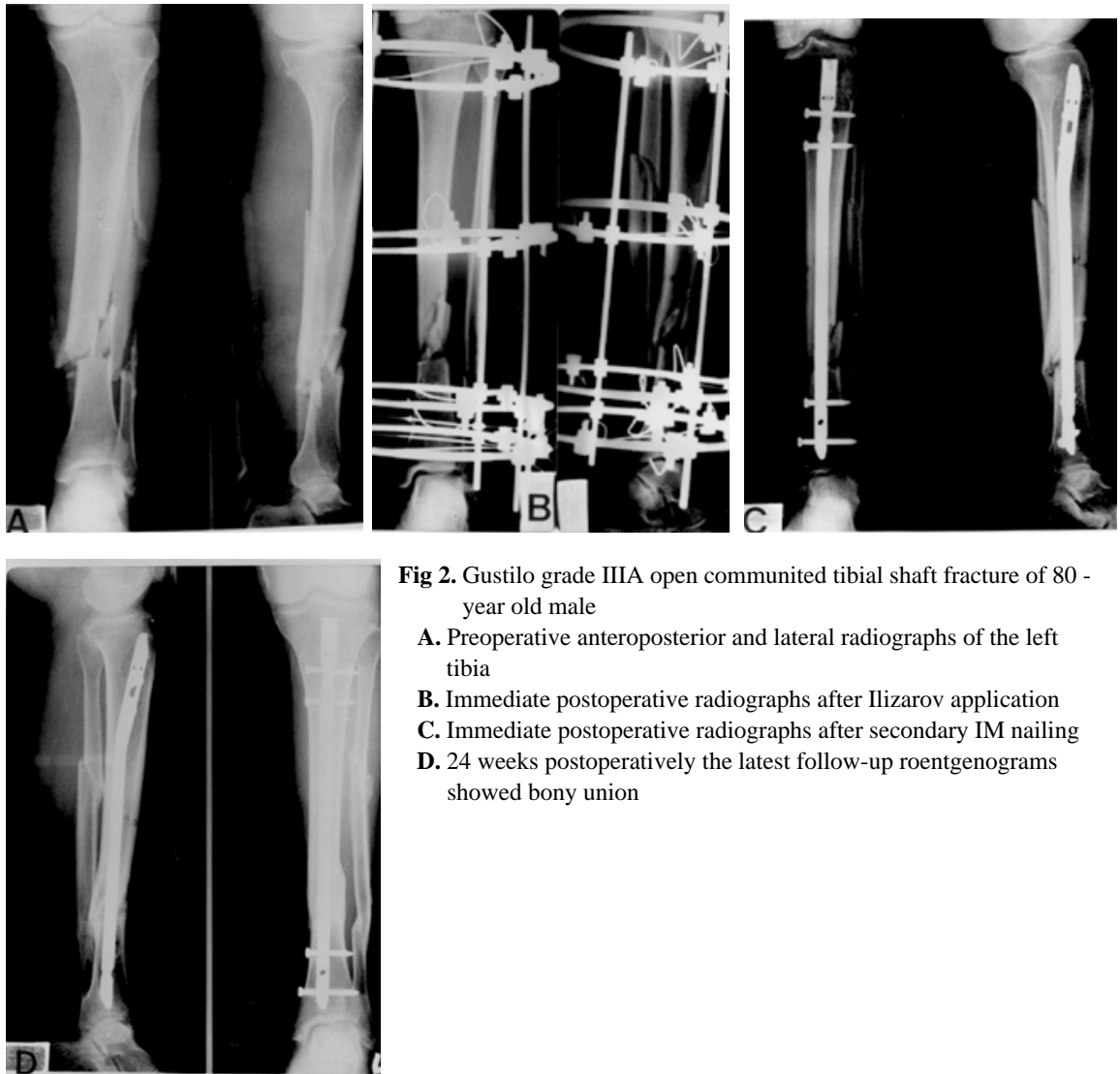
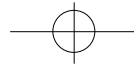


Fig 2. Gustilo grade IIIA open comminuted tibial shaft fracture of 80 - year old male

- A.** Preoperative anteroposterior and lateral radiographs of the left tibia
B. Immediate postoperative radiographs after Ilizarov application
C. Immediate postoperative radiographs after secondary IM nailing
D. 24 weeks postoperatively the latest follow-up roentgenograms showed bony union

가

가

6

1)

4

Ilizarov

35.4 ,

2

Ilizarov

16.7

8 가

Ilizarov

1.3

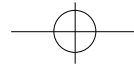
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17.3

. (Fig.2)

33.8

(Table.1)



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Table 1. Union time (mean week)

	Ilizarov external fixator (n=20)	Secondary IM nailing (n=14)
Ilizarov removal	35.4	16.7
Interval after removal	-	1.3
IM nailing		17.3
Average union time	35.4	33.8

n : number

Table 2. Complication

	Ilizarov external fixator (n=20)	Secondary IM nailing (n=14)
superficial infection	15	2
Deep infection	3	2
Delayed union	5	2
nonunion	2	1
Ankle stiffness	10	1

n : number

2)

Ilizarov

13

5 ,

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Ilizarov

1

Ilizarov

, 1 가
(Table.2)

, 2
1 (12 %),
3 (10 %; 11 %, 12 %),
1 (7 %)

10

1.3cm

1.6cm

가

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2

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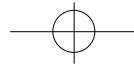
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Smith¹⁹⁾

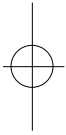
1-3

Vidal²²⁾

Hoffmann



2, 3 가 . , Aho¹⁾ Hoffmann Kuntscher
²⁰⁾ 5 , ,
^{5,17)}
 Ilizarov 20 . Bone
 Johnson⁶⁾ 5 ,
 14 ,
 Gustilo type III 1 Pseudomonas
 Ilizarov 가
 7-10
^{2,8)} . 1989 Maurer¹⁴⁾
 25%
 가 가
 가 , 가가 71%, 7%
 25% 1990 Blachut⁵⁾ 41 17
^{2,8,12)} 9
 4). , Puno¹⁶⁾
 , 5-7
 , 12.3 (25.5 ,
 , 7.8) Ilizarov
 2 9.1
^{3,10,20)} IIIB
 가 1
 5
 가 ,
 가 2 가
 Tucker²¹⁾ 97-100%
 Rommens Schmit- Bone Johnson⁶⁾
 Neuerberg¹⁷⁾ 21% , ,
 . 1975 Karlstrom Olerud¹³⁾가 8 , 1 ,
 5
 가 Tucker²¹⁾
 1 , 1983 3 Ilizarov 19%, Whittle²³⁾
 2 0%, Tornetta²⁾ 13% ,
 McGraw Lim1) 0%
 16 44% Ilizarov 6 가
 50% ,
 , Ilizarov





240 • / 15 2

,
가
Ilizarov
Skirving 가 가
Demmer¹⁸⁾ 가 , 가 ,
, Ilizarov 가 ,
Holbrook 11) 35%
10 가
1/3,
1/3 , 2 ,1 , 2, 3
Ilizarov Ilizarov

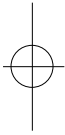
4,7). Tucker 21) 26
Ilizarov
가 75% ,
Chan 7) 가 60%
. Tometta 20) Gustilo IIIb
29 10%
가 . Holbrook 11) 가
11% 10
Ilizarov
, 1
Ilizarov
2,3
Ilizarov
Ilizarov
Ilizarov

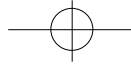
REFERENCES

- 1) **Aho AJ, Nieminen SJ and Nylamo EI** : External fixation by Hoffmann-Vidal-Adrey osteotaxis for several tibial fractures. Treatment scheme and technical criticism. Clin Orthop, 181: 154-164, 1983.
- 2) **ASAMI group** : Operative principles of Ilizarov. 1st Ed.pp. 91-124, Williams and Wilkins 1991.
- 3) **Bagnoli G** : The Ilizarov method. 1st Ed. pp 1-2 Philadelphia, B.C. Decker Inc. 1990.
- 4) **Behrens F, Comfort TH, Searls K and Denis F** : Unilateral external fixation for severe open tibial fractures. Preliminary report of a prospective study. Clin Orthop, 178:111-120,1983.
- 5) **Blachut PA, Meek RN and O'Brien PJ** : Sheets RE and Smith K : External fixation and delayed intramedullary nailing of open fractures of the tibial shaft : A sequential protocol. J Bone Joint Surg, 72-A :729-735, 1990.
- 6) **Bone LB and Johnson KD** : Treatment of tibial fractures by reaming and intramedullary nailing. J Bone Joint Surg, 68-A:877-887,1986.
- 7) **Chan KM, Leung YK and Cheng CY, et al** : The management of type III open tivial fractures. Injury,



- 16:157-165,1984.
- 8) **Fleming B, Paley D and Kristiansen T** : A biomechanical analysis of the Ilizarov external fixator. Clin Orthop, 241:95-105,1989.
 - 9) **Gustilo RB, Anderson JT** : Prevention of infection in the treatment of one thousand and twenty-five open fractures of long bones: Retrospective and prospective analysis. J Bone Joint Surg, 58-A:453-458, 1976.
 - 10) **Gustilo RB, Merkow RL and Templeman D** : Current concepts review : The management of open fractures. J Bone and Joint Surg, 72-A:299-304,1990.
 - 11) **Holbrook JL, Swiontkowski MF and Sanders R** : Treatment of open fractures of the tibial shaft:Ender nailing versus external fixation. A randomized, prospective comparison. J Bone and Joint Surg,71-A:1231-1238,1989.
 - 12) **Johnson WD and Fixcher DA** : Skeletal stabilization with a multiplane external fixation device. Clin Orthop, 180:34-43,1983.
 - 13) **Karlstrom G and Olerud S** : External fixation of severe open tibial fractures with the Hoffmann frame. Clin Orthop, 180:68-77,1983.
 - 14) **Maurer DJ, Merkow RL and Gustilo RB** : Infection after intramedullary nailing of severe open tibial fractures. Initially treated with external fixation. J. Bone Joint Surg, 71-A:835-838,1989.
 - 15) **McGraw JM and Lim EVA** : Treatment of open tibial-shaft fractures. External fixation and secondary intramedullary nailing. J Bone Joint Surg. 70-A:900-911,1988.
 - 16) **Puno RM, Teynor JT, Nagano J and Gustilo RB** : Critical analysis of results of treatment of 201 tibial shaft fractures. Clin Orthop, 212:113-121, 1986.
 - 17) **Rommens P and Schmit -Neuerberg KP** : Ten years experience with the operative management of tibial shaft fractures. J Trauma, 27:917,1987.
 - 18) **Skirving AP and Demmer P** : Conservative treatment of the tibia. A review of 500 cases. J Bone and Joint Surg, 59-B:256,1977.
 - 19) **Smith JEM** : Results of early and delayed internal fixation for tibial shaft fractures. J Bone Joint Surg, 56-B:469,1974.
 - 20) **Tornetta P 3rd, Bergman M, Watnik N, Berkowitz G and Stever J** : Treatment of Grade-IIIB open tibial fractures : A prospective randomized comparison of external fixation and non-reamed locked nailing. J Trauma, 6:113-115,1992.
 - 21) **Tucker HL Kendra JC and Kinbrew TZ** : Management of unstable open and closed tibial fractures using the Ilizarov method. Clin Orthop, 280:125-135,1992.
 - 22) **Vidal J** : External fixation. Yesterday, today and tomorrow. Clin Orthop, 180:7, 1983.
 - 23) **Whittle AP, Russel TA, Taylor JC and Lavelle DG** : Treatment of fractures use of interlocking nailing without reaming. J Bone Joint Surg ,74-A:1162-1171,1992.





Abstract

Treatment of Severe Open Fractures of Tibial Shaft - Comparison Between Ilizarov External Fixation and Secondary Intramedullary Nailing -

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Purpose : We tried to compare the results of Ilizarov external fixation cases with the cases of secondary intramedullary nailing after tempory Ilizarov fixation.

Materials and Methods : From the January 1996 to February 2001 , 34 cases of severe open tibial shaft fracture in adults were treated with Ilizarov external fixation and secondary intramedullary nailing after temporary Ilizarov fixation. According to Gustilo- Anderson classification, it consisted of type II 2 ,IIIA 7 ,IIIB 9 ,IIIC 2cases in Ilizarov group ,and type II 2, IIIA 7, IIIB 5cases in secondary intramedullary nailing group.

Results : There was no significant difference in the union time of Ilizarov external fixation and secondary intramedullary nailing after temporary Ilizarov fixation. But the secondary nailed group had slightly better motion , less final angulation and felt more comfortable . It is the treatment preferred by patients and does not require the same high level of patient compliance as external fixation.

Conclusion : Secondary intramedullary nailing after temporary Ilizarov fixation is the useful method in the treatment of open fractures of tibia.

Key Words : Open tibial shaft fracture. Ilizarov. secondary intramedullary nailing

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