

12, 2, 1999 4

The Journal of the Korean Society of Fractures  
Vol.12, No.2, April, 1999

, , , , , ,

= Abstract =

## Reamed versus Unreamed Intramedullary Nailing after External Fixator Application in the Treatment of Open Tibial-Shaft Fracture

Dong-Bae Shin, M.D., Joon-Cheol Choi, M.D., Young-Soo Lee, M.D.,  
Yong-Jeng Kim, M.D., Soo-Hong Han, M.D., Dong-Eun Shin, M.D and Yeun-Ho Lee, M.D.

*Department of Orthopaedic Surgery, Pochon Jungmun Medical College*

The authors reviewed 15 patients of open fracture of the tibial shaft who were treated by external fixation followed by intramedullary nailing. These fractures comprised two Type-I, two Type-II, four Type-IIIa, and seven Type-IIIb injuries. Ten patients were treated with unreamed intramedullary nailing and 5 patients were treated with reamed intramedullary nailing. The results were analyzed as followings:

1. All fractures had union at 5.2 months after intramedullary nailing and 4 true osteomyelitis were developed.
2. All osteomyelitis were developed for the patients who were treated with reamed intramedullary nailing.
3. There was no osteomyelitis who were treated with unreamed intramedullary nailing.

:

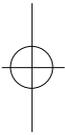
351 (463-070)

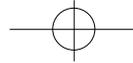
Tel:

Fax:

\*

1997





4. Delayed conversion to intramedullary nailing after control of pin tract infection had no effect for prevention of osteomyelitis.

**Key Words** : Open Tibia Fracture, External Fixation, Unreamed Intramedullary Nailing, Reamed Intramedullary Nailing

가

5.2

가 , 4

Gustilo type I 2 , II가2 , IIIa 4 , IIIb 7 , Gustilo type I 1 , II 1 , IIIa 1 , IIIb 1 가 (Table 1).

Staphylococcus aureus 2 , Staphylococcus epidermidis 1 , Enterobacter cloaca 1 가 Staphylococcus aureus가 2 , 2 (Table 2).

4

10 3

, 4 5 1

가 (Table 3).

1993 1 1997 1

15

3-4

, 3 3 , 5 , 6

14 , 1

22 63 ( 37 )

10

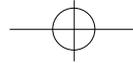
5

**Table 1.** Incidence of Infection according to Open Wound Type

Gustilo Type	I	II	IIIa	IIIb
Cases	2	2	4	7
Infection	1	1	1	1
Incidence	50%	50%	25%	14%

**Table 2.** Incidence of Infection according to Organism

Organism	S. aureus	S. epidermidis	E. cloaca	None
Initial	2	1	1	11
Infection	2	0	0	2



**Table 3.** Incidence of Infection according to Conversion Time

Conversion Time	<4wks.	>4wks.
Cases	10	5
Infection	3	1
Incidence	30%	20%

**Table 4.** Incidence of Infection according to Nailing Time

Nailing	Immediate after ext. fixator removal	Delayed after pin-site healing
Cases	12	3
Infection	2	2
Incidence	17%	67%

**Table 5.** Incidence of Infection according to Nailing Type

Nail	Unreamed	Reamed
Cases	10	5
Infection	0	4
Incidence	0%	80%

가  
5,6,7,10,11,16)

Court-Brown<sup>4)</sup> Gustilo type II, III  
41  
11.1%  
, Velazco<sup>15)</sup>  
(Lotte ) 6.0%

1975 Olerud Karlstrom<sup>8,9)</sup> Gustilo type II, III

, 1983 3 2

. 1983 Velazco Fleming<sup>14)</sup> Hoffmann  
Kuntscher 2 , Lotte

1  
McGraw Lim<sup>12)</sup> 16  
44% 5

Aho<sup>1)</sup> Hoffmann Kuntscher  
5

(Table 4).

10  
1 5  
, Bone Johnson<sup>2)</sup>  
,  
Gustilo

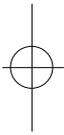
4

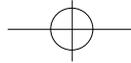
(Table 5).

5 type III 1 Pseudomonas  
7-10  
McGraw Lim<sup>12)</sup>

3 2

가 McGraw Lim<sup>12)</sup> 44%  
( 28%)





가  
 Gustilo type I 2 1 , II 2  
 1 , IIIa 4 1 , IIIb 7 1

Rhineland Wilson<sup>13)</sup>

Brookes<sup>3)</sup>

가

. McGraw Lim 16 1

가 가

10 1

5 4

가 가

1993 1

1997 1

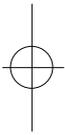
15

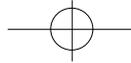
1.

가

### REFERENCES

1. **Aho AJ, Nieminen SJ and Nylamo EI** : External fixation by Hoffmann-Vidal-Adrey osteotaxis for severe tibial fractures. Treatment scheme and technical criticism. Clin Orthop, 181:154-164, 1983.
2. **Bone LB and Johnson KD** : Treatment of tibial fractures by reaming and intramedullary nailing. J Bone Joint Surg, 68A:877-887, 1986.
3. **Brookes M** : Blood flow in the diaphysis of long bones and its biomechanics. Proc of Advanced Course in intramedullary locking nailing, Howmedica International : 1-5, 1990.
4. **Court-Brown CM, McQueen MM, Quaba AA and Christie J** : Locked intramedullary nailing of open tibial fractures. J Bone Joint Surg, 73B: 959-964, 1991.
5. **Edge AJ and Denham RA** : External fixation for complicated tibial fractures. J Bone Joint Surg, 63B:92-97, 1981.
6. **Emerson RH Jr and Grabias SI** : A retrospective analysis of severe diaphyseal tibial fractures treated with external fixation. Orthopedics, 6:43-49, 1983.
7. **Goodship AE and Kenwright J** : The influence of induced micromovement upon the healing of experimental tibial fractures. J Bone Joint Surg, 67B:650-655, 1985.
8. **Karlstrom G and Olerud S** : Percutaneous pin fixation of open tibial fractures. Double-frame anchorage using the Vidal-Adrey method. J Bone Joint Surg, 57A:915-924, 1975.
9. **Karlstrom G and Olerud S** : External fixation of severe open tibial fractures with the Hoffmann frame. Clin Orthop, 180:68-77, 1983.
10. **Kenwright J and Goodship AE** : Controlled mechanical stimulation in the treatment of tibial





- fractures. Clin Orthop, 241:36-37, 1989.
11. **Kimmell RB** : Results of treatment using the Hoffmann external fixator for fractures of the tibial diaphysis. J Trauma, 22:960-965, 1982.
  12. **McGraw JM and Lim EVA** : Treatment of open tibial-shaft fractures. External fixation and secondary intramedullary nailing. J Bone Joint Surg, 70A:900-911, 1988.
  13. **Rhineland FW and Wilson JW** : Blood supply to developing, mature and healing bone. In: Sumner-Smith G, ed. Bone in clinical orthopaedics: a study in comparative osteology. Philadelphia, etc: WB Saunders Co, 81-158, 1982.
  14. **Velazco A and Fleming LL** : Open fractures of the tibia treated by the Hoffmann external fixator. Clin Orthop, 180:125-132, 1983.
  15. **Velazco A, Whitesides TE and Fleming LL** : Open fractures of the tibia treated with the Lottes nail. J Bone Joint Surg, 65A:879-885, 1983.
  16. **Weis EB Jr, Roberts JB and Curtiss PH Jr** : Salvage of complicated open fractures by transfixation. J Trauma, 16:266-272, 1976.

