

14, 2, 2001 4

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## Hybrid

. . . . .

&lt; &gt;

: Hybrid

: 1997 1 2000 1 Hybrid

가

19

AO

Gustilo type

, MPTA (medial proximal tibial angle)

10 : 19 A2 1, A3 7, C1 1, C2 8, C3 2, Hybrid  
13 (8-36 )  
14 (8-36 ) . MPTA 87.9, 2 82 92  
6 (31.6%), 1 (5.2%), 4 (21%)  
6 AO C2 3, C3 1, 1  
1 type IIc 1, Hybrid  
1, type IIIb

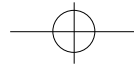
: , Hybrid

:

290 (682-714)

Tel : (052) 250-7129  
Fax : (052) 235-2823  
E-mail ; bskim@uuh.ulsan.kr





4

(21%) 6

1

5. 4 AO C2 3 , C3  
1 , type IIIb 1 type IIIc 1 Gustilo type I

가

Hybrid

1

43

C2, Gustilo IIIb AO 41  
hybrid

1997 1 2000 1 Hybrid 3

가

19

AO , 125 . (Fig 1)

Gustilo type

2

20

MPTA (medial proximal tibial angle)

C2 , Gustilo IIIb AO 41  
hybrid

3

14

1. 19 A2 1 , A3 7 , C1 1 , C2  
8 , C3 2 10 MPTA 82  
Gustilo type I 5 , type II 1 , type (Fig 2)  
III 5

2. 13 (8-36 ) 3

Hybrid

14 (8-36 ) 8

5 (extension lag)

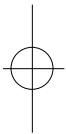
3. MPTA 87.9 , 2 AO 41 C1  
hybrid

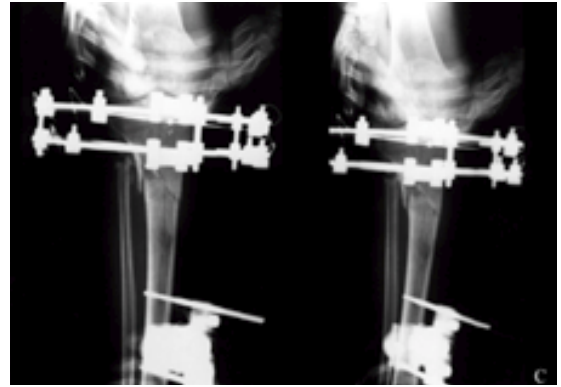
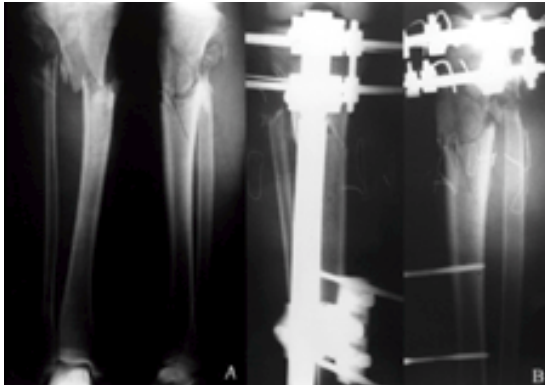
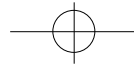
82 92 8

1mm

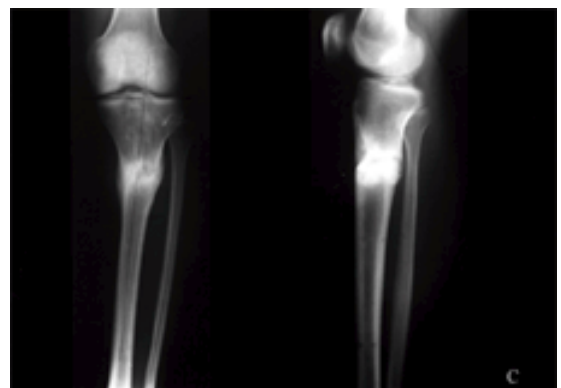
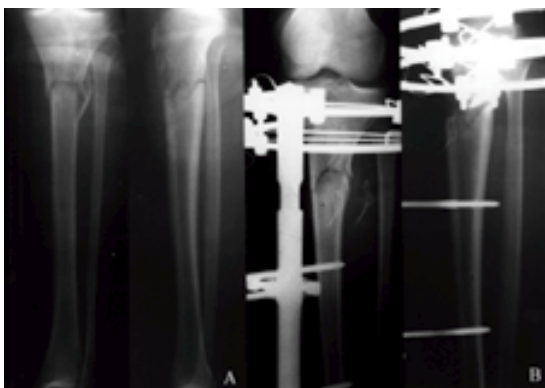
4. 6 (31.6%) 5 . (Fig 3)

1 (5.2%)

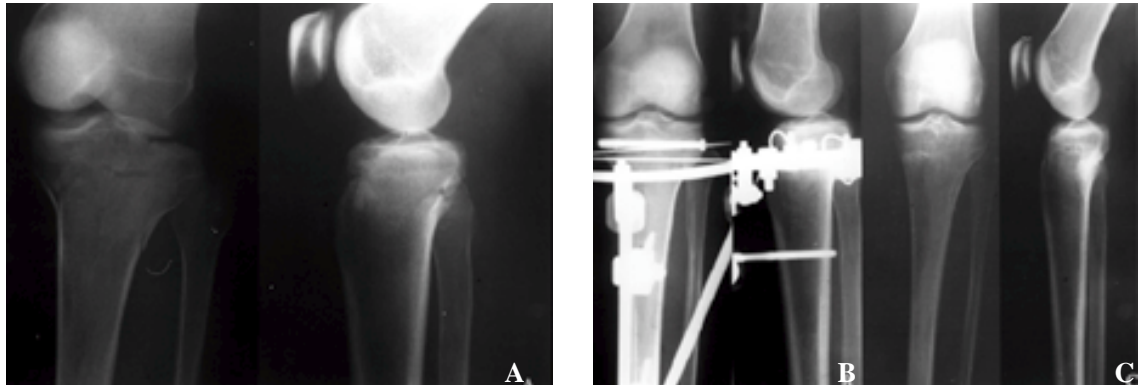
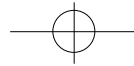




**Fig 1.** (A) The preoperative radiographs of 43-year-old man show a proximal tibia fracture of AO type 41C2 (B) Immediate postoperative radiographs show acceptable reduction after hybrid external fixation. (C) The valgus and varus stress radiographs at six months show nonunion. (D) Fracture was united at eight months after bone graft and internal fixation.



**Fig 2.** (A) The preoperative radiographs of 20-year-old man show proximal tibia fracture of AO type 41C2 (B) Immediate postoperative radiographs show a satisfactory reduction after hybrid external fixation. (C) The follow up radiographs at ten months show good union but varus deformity (MPTA 82 degree)



**Fig 3.** (A) The preoperative radiographs of 46-year-old man show a proximal tibia fracture of AO type 41C1 (B) Immediate postoperative radiographs show a satisfactory reduction after hybrid external fixation with limited internal fixation to stabilize the articular surface. (C) The postoperative radiographs at five months show good union.

2,3,4,7,9,11,14,15)

Hybrid

Hohl<sup>9)</sup> Gausewitz

가

3,5,6,7,10)

가  
3 (16%)

hybrid

Gaudinez<sup>8)</sup>

16

4.5  
(0%), 3 (15%)

가

가

10,12,13)

3.3 (2 -9 )

2

가

1,6,7,8,9,10,11)

Reminger<sup>15)</sup>

modified

AO single adjustable clamp adaptor

Ilizarov

4

AO

Hybrid

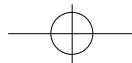
(Haksan, Dyna)

4

AO

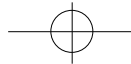
C2

3



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## Abstract

## TREATMENT OF PROXIMAL TIBIA FRACTURE WITH HYBRID EXTERNAL FIXATOR

Tae-Woo Park, M.D., Sung-Do Cho, M.D., Youg-Sun Cho, M.D.,  
Bum-Soo Kim, M.D., Sogu Lew, M.D., Su-Yeon Hwang, M.D.

*Department of Orthopaedic Surgery, Ulsan University Hospital,  
College of Medicine, University of Ulsan, Ulsan, Korea*

**Purpose** : To evaluate the results and usefulness of hybrid external fixator in the treatment of proximal tibia fracture.

**Material and method** : From Jan. 1997 to Jan. 2000, 19 proximal tibia fracture were treated with hybrid external fixator with or without limited internal fixation to stabilize the articular surface. All fractures were classified according to the AO classification. The results were analyzed by ROM(range of motion), bony union time, fracture reduction with MPTA(medial proximal tibial angle) and joint congruency.

**Result** : There were 1 A2, 7 A3, 1 C1, 8 C2, 2 C3 proximal tibial fractures according to the AO classification. Open fractures were 10 patients. The mean bony union time was 13 wks(range 8-36wks) and the mean length of time in the external fixator was 14wks(range 8-36wks). At last follow up, the MPTA of the proximal tibia was 87.9 degree. 2 patients developed varus(82 degree) and valgus(92 degree) deformity respectively. Complications were intermittent pin drainage in 6 patients(31.6%), deep infection in 1 patient(5.3%) and nonunion in 4 patients(21%) required bone graft and internal fixation with plate at 6 months postoperatively. Four nonunions were 3 C2 and 1 C3 according to the AO classification and three were open fracture(1 type I, 1 type IIb, 1 type IIc : Gustilo type)

**Conclusion** : Hybrid external fixation is a good treatment option for proximal tibial fractures. However, nonunion and angular deformity would occur in severe metaphyseal comminution and soft tissue injury. Accurate fracture reduction and careful soft tissue management is prerequisite and if necessary early bone graft should be considered in such cases.

**Key words** : Fracture, Proximal tibia, Hybrid external fixator

### Address reprint requests to

Bum-Soo Kim, M.D.

Department of Orthopaedic Surgery, Ulsan University Hospital,  
290 Cheonha-Dong, Dong-Ku, Ulsan 682-714

Tel; +82-52-250-7129

Fax; +82-52-235-2823

E-mail; bskim@uuh.ulsan.kr