

13, 1, 2000 1

The Journal of the Korean Society of Fractures
Vol.13, No.1, January, 2000

Muller C

:

.

< >

: Muller C

: Muller(AO) Muller C 20 21

Schatzker 2가 13 ,
8 가 Schatzker Lambert 가 ,
(Excellent), (Good) , (Fair) (Failure)
: C2 7 , 3
, 6 (85.7%), 2 (66.7%)가 , C3
가 3
5 3 (60%)가
: C2
, C3 가 C3
가

: , , , ,

가

8)

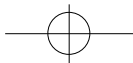
가 , , , , 가 ,

:

Department of Orthopaedic Surgery, Dankook University College of Medicine
16-5 Anseo-Dong, Chonan, Choongnam, 330-715, Korea
Tel: : (0417) 550-3059
Fax: : (0417) 556-3238
E-mail : doctorj@anseo.dankook.ac.kr

* 1999





2,3,4,5,18)

가 가 5) 1982 Mize

10) 'J'

Schatzker 15)

Mize Schatzker

Muller C 1 가가 20

21

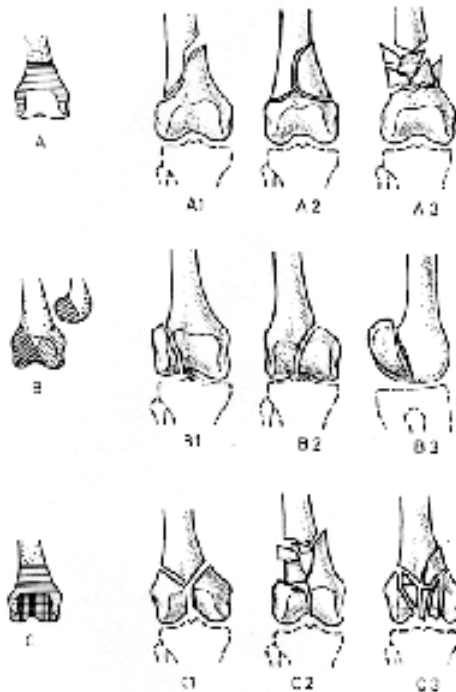


Fig 1. Muller Classification

Table 2. Association between Muller type and Approach

	Type C1	Type C2	Type C3
Lateral	3	7	3
Extensile	0	3	5
Total	3	10	8

1994 4 1997 10

56

- Muller C 20 21

(37.5%) (Table 1). 4

17.6 (12-27)

가 14 , 가 6 ,

42.5 (16 -71)

가 16 (80.0%)

가 2 , 2

15 6 (40%)

가 , 9 (60%)

(Fig. 1).

Muller C , C1 3 , C2

10 C3 8

가 3

15mm

Schatzker 가

8

(Table 2).

DCS, Angle 8 , 6 ,

AO

blade plate, S-

Table 1. Demographic data

Case	Sex	Age	AO Type	Mechanism of Injury	F/U(Mo.)	Approach	Devices	B.G.*	Union(Wks.)
1	F	71	C1	Fall	24	Lateral	Anat†	-	10
2	M	16	C1	Motor vehicle	20	Lateral	S-pin‡	-	12
3	M	41	C1	Fall	18	Lateral	S-pin	-	11
4	M	51	C2	Motor vehicle	15	Extensile	DCS§	Allograft	32
5	M	44	C2	Motor vehicle	24	Extensile	DCS	-	16
6	M	17	C2	Motor vehicle	12	Extensile	Anat	Xenograft	16
7	M	50	C2	Motor vehicle	12	Lateral	B.P	Autograft	24
8	M	58	C2	Motor vehicle	28	Lateral	DCS	Autograft	16
9	F	35	C2	Passenger	24	Lateral	DCS	Autograft	20
10	F	54	C2	Other	16	Lateral	Anat	Autograft	0
11	M	66	C2	Motor vehicle	12	Lateral	Anat	-	12
12	M	16	C2	Motor vehicle	48	Lateral	S-pin	-	15
13	M	52	C2	Pedestrian	24	Lateral	S-pin	-	14
14	F	40	® C3	Passenger	17	Extensile	Anat	-	14
15			® C3		17	Extensile	Anat	-	24
16	F	62	C3	Passenger	12	Extensile	Anat	-	14
17	M	36	C3	Driver	12	Lateral	B.P	Autograft	14
18	M	36	C3	Other	12	Lateral	DCS	-	16
19	M	45	C3	Motor vehicle	20	Lateral	DCS	Autograft	16
20	M	18	C3	Bicycle	24	Extensile	K-wire	-	10
21	F	42	C3	Passenger	27	Extensile	Anat	Autograft	15

* B.G.: Bone Graft

† Anat: Anatomical Plate

‡ S-pin: Steinmann-pin

§ DCS: Dynamic Condylar Screw

|| B.P.: Angle Blade Plate

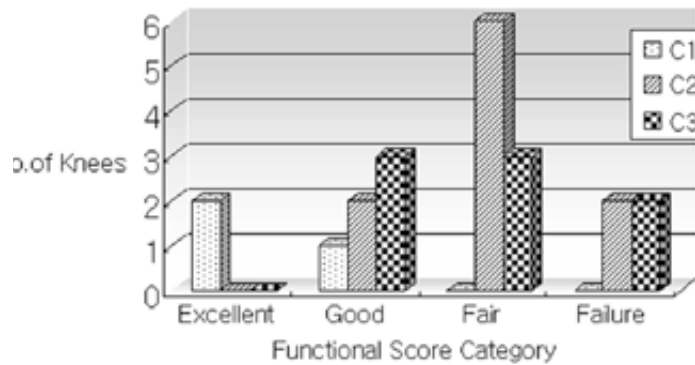
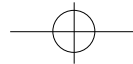


Fig 2. Functional Assessment Fracture Classification

Table 3. The Criteria for Postoperative Functional Assessment by Schatzker and Lambert

Criteria	
Excellent	All of the following : Loss of flexion of less than 10 degrees Full extension No varus, valgus, or rotatory deformity No pain Perfect joint congruity
Good	Not more than one of the following : Loss of flexion of more than 20 degrees Loss of extension of more than 10 degrees Varus or valgus deformity of more than 10 degrees Minimum pain
Fair	Any two of the criteria listed in the previous category
Failure	Any of the following : Flexion to 90 degrees or less Varus or valgus deformity exceeding 15 degree Joint incongruity Disabling pain No matter how perfect the radiographic appearance

2 5 .

가 7 , 1 .

2 CPM

, 4-12

가 ,

Schatzker

Lambert¹⁵⁾ 가

(Excellent), (Good)

(Fair) (Failure)

(Table 3).

Schatzker Lambert 가

C1 3

, C2 10 6 (60%)

2 (20%) C3 8 , ,

3 , 3 , 2 (Fig. 2).

C2

가 7 6 (85.7%)

3 2 (66.7%)가

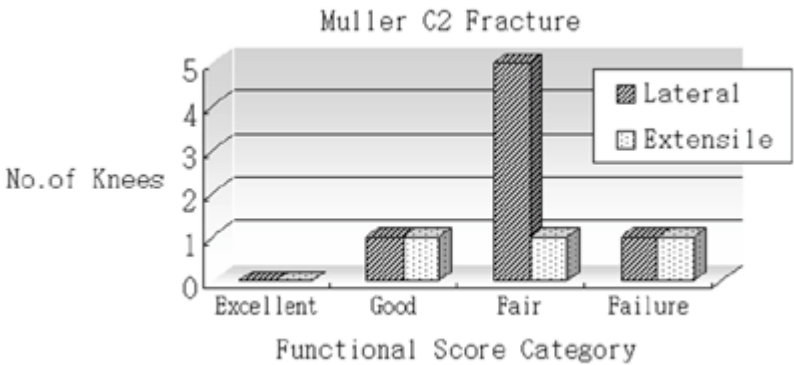
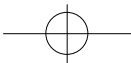


Fig 3. Postoperative Functional Results according to Surgical Approach : Type C2 Fractures

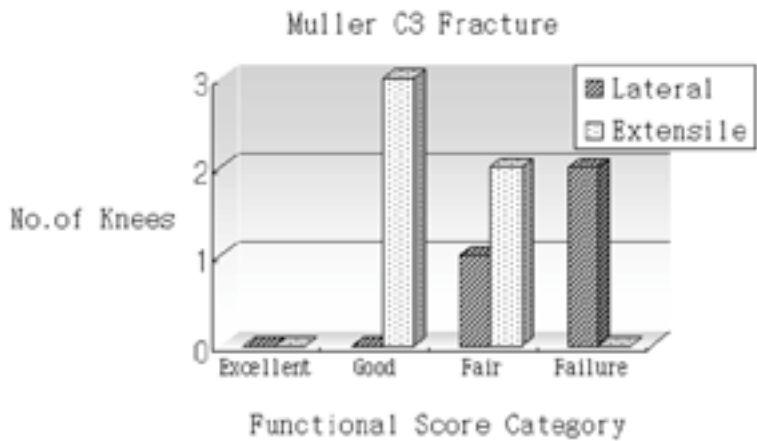
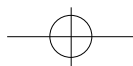


Fig 4. Postoperative Functional Results according to Surgical Approach : Type C3 Fractures

(Fig. 3).

C3
가 3 가
5 3 (60%)
11 , C2 18.5 , C3 16.2
32 15.3
9 4 (44.4%) 가
, ,
가 , C3
Herbert
36
, C3
24
DCS
4
, 2
가 5 115
(Fig.5-A,B,C)



DCS

가 10

90

2,19)

10-15%

(Fig.6-A,B,C)

3.

40

C3

9

1,2,7,13,20)

, Watson-Jones²¹⁾

4

19

가 0

140

(Fig.7-A,B,C,D).

가

가

가

3,6,14,15,19)

Mahoner	Bradburn ⁹⁾	35	1
Weil	²²⁾	58	



Fig 5-A. Pre-operative radiograph shows Müller type C2 fracture.

B. Rigid fixation of fracture was done with DCS by extensile approach.

C. Post-operative 4Mo F/U plain radiography shows complete union of fracture site.

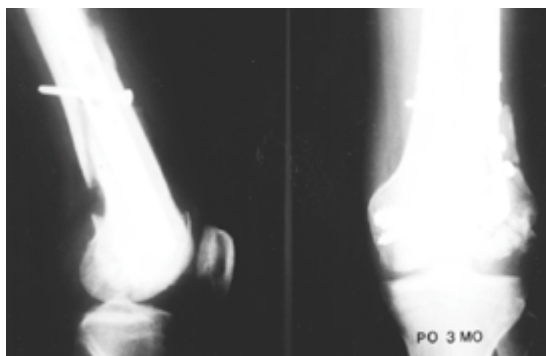
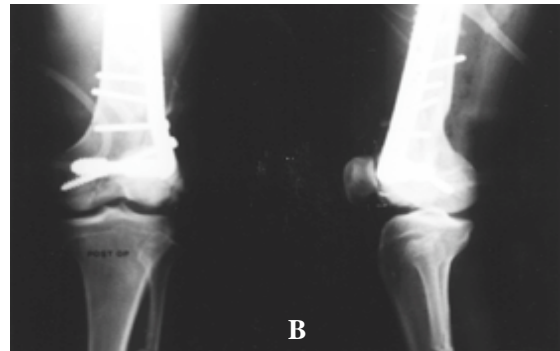
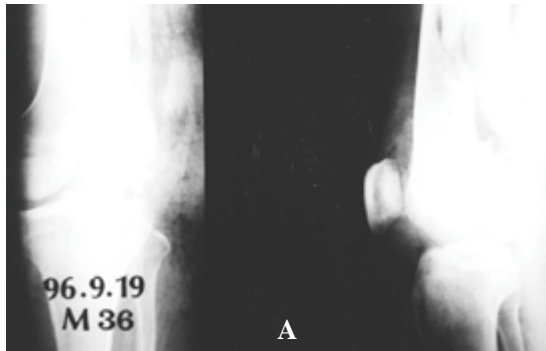
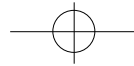


Fig 6-A. Pre-operative radiograph shows Müller type C3 fracture with comminuted lateral femoral condyle.
B. Immediate post-operative radiograph shows fixation of fracture site with DCS by lateral approach.
C. Last F/U plain radiography. This case showed fair result with poor knee range of motion(5 °-90 °).

Olerud¹³⁾, Schatzker Lambert¹⁵⁾, Slatis¹⁹⁾

가 1982 Mize¹⁰⁾

가 'J'

가 75% 가

Neer¹²⁾

Seinsheimer

AO

가

12,15,17,20),

Lambert¹⁵⁾
16)

Schatzker

angle blade plate, DCS

, DCS

가
가

11,23),

가

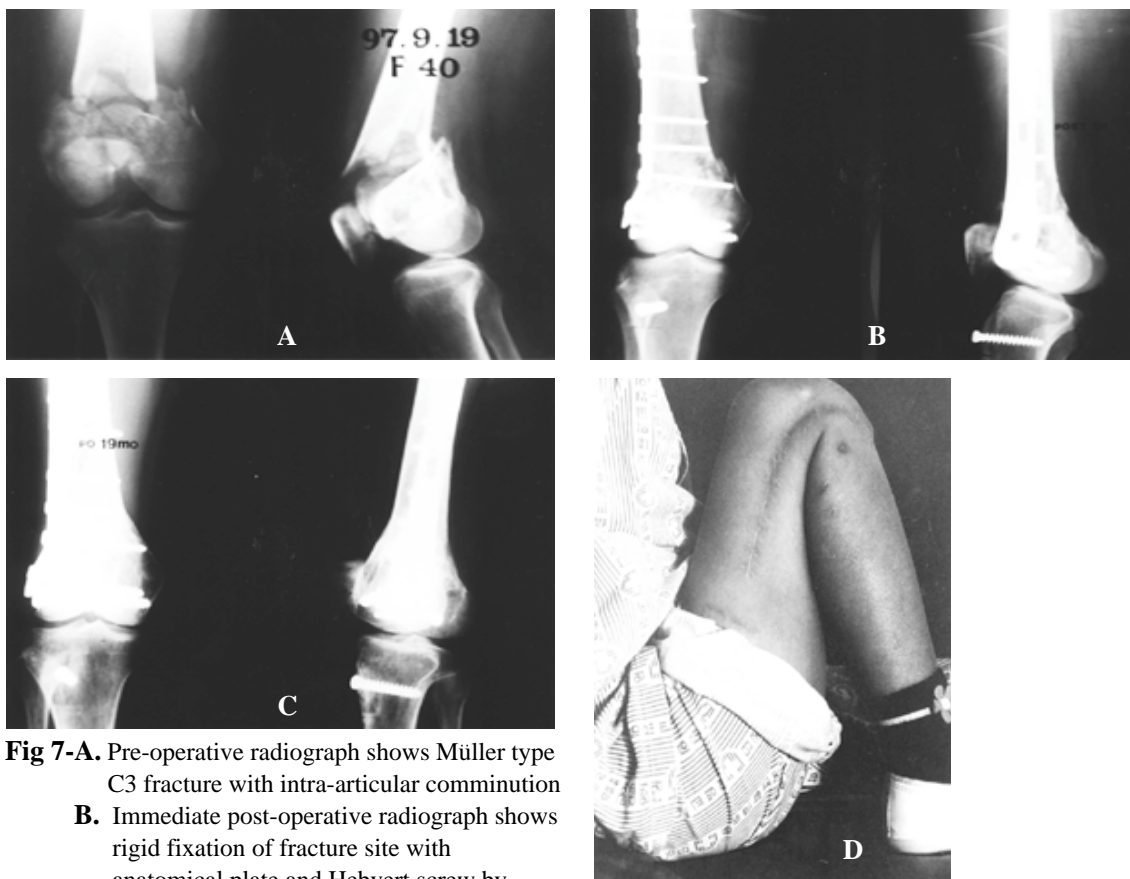
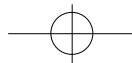


Fig 7-A. Pre-operative radiograph shows Müller type C3 fracture with intra-articular comminution
B. Immediate post-operative radiograph shows rigid fixation of fracture site with anatomical plate and Hebert screw by extensile approach.
C. Post-operative 19Mo F/U plain radiography shows complete union of the fracture site.
D. This case showed good result on functional assessment by Schatzker and Lambert.
 (ROM : 0 ° 140 °)

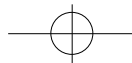
가 가
 iliotibial band sling
¹⁶⁾ Angle blade plate
 blade plate
⁸⁾
 C1 1 , C2 3 , C3
 4 4 (50%)
 C3
 가
 Muller C1 3
 , C2 7 , 3
 6 (85.7%), 2 (66.7%)
 가
 . C3
 가
 3
 ,
 5 3 가
 C3



가 4 가 Muller C
Schatzker Lambert 가 가 6 (28.6%),
9 (42.9%)
20
가
가 가
90
가
Muller C3 Schatzker Lambert
가 가 6 (28.6%), 9 (42.9%)
가
C2
가
C3
가 C3
8 4
C3

REFERENCES

- 1) **Brown, A. and D 'Arcy, J.C.** : Internal fixation for supracondylar fracture of the femur in the elderly patient. *J. Bone and Joint Surg*, 53-B:420, 1971.
- 2) **Bogren D and Sprau BL** : Treatment of the distal femoral fractures with early weight bearing. *Clinical Orthop*, 111:156-162, 1975.
- 3) **Chiron, H.S., Tremoulet, J., Casey, P. and Muller, M.** : Fracture of the distal third of the femur treated by internal fixation. *Clinical Orthop*, 100:160-170, 1974.
- 4) **Connolly, J.F. and King, P.** : Closed reduction and early cast-brace ambulation in treatment of femoral fractures. *J. Bone and Joint Surg*, 55-A:1559-1599, 1973.
- 5) **Kang CH, Sohn SW and Oh ST** : Surgical treatment of comminuted supracondylar and intercondylar fractures of the femur in adults using the extensile approach. *J. Korean Orthopaedic Association*, 6:1213-1222, 1987.
- 6) **Kim HS, Kang SH, Lee SH, AN JH and Yoo MC** : Surgical treatment of the femur supracondylar fracture. *J. Korean Orthopaedic Association*, 11:700-706, 1976.
- 7) **Kim KY, Cho DY, Kim YT and Yang SB** : A clinical study on the fracture of the distal femur involving the knee joint, *J. Korean Orthopaedic Association*, 23:421-429, 1998.
- 8) **Lee SH** : Supracondylar fracture of the femur. *J. Korean Society of Fractures*, 6:213-216, 1993.
- 9) **Mahorner, H.R. and Bradburn, M.** : Fractures of the femur. Report of three Hundred and eight cases. *Surg., Gynec. and Obstet*, 56:1066-1079, 1933.
- 10) **Mize, R.D., bucholz, R.W. and Grogan, D.P.** : Surgical treatment of displaced, comminuted fractures of the distal end of the femur. An extensile approach. *J. Bone and Joint Surg*, 64-A:161-169, 1982.
- 11) **Moehring DH** : Regional fractures of the knee. From Larson RL and Grana, WA(eds) : The knee. ed Philadelphia, WA *Saunders Co* : 147-174, 1993.
- 12) **Neer, C.S. II., Grantham, S.A., and Shelton M.L.** : Supracondylar fracture of the adult femur : a study of one hundred and ten cases, *J. Bone and Joint Surg*, 49-A:591-598, 1967.
- 13) **Olerud, S.** : Operative treatment of supracodylar fractures of the femur. Technique and results in fifteen cases, *J. Bone and Joint surg*, 54.A:1015-1032, 1972.
- 14) **Park JS, Lee CJ, Park SL, Park WC, Oh DS and Oh HK** : Supracondylar and Intercondylar fracture of the femur in adult, *J. Korean Orthopaedic Association*, 19:864-872, 1984.



- 15) **Schatzker, J. and Lambert, D.C.** : Supracondylar fractures of the femur. *Clinical Orthop*, 138:77-83, 1979.
- 16) **Seo KT** : Intercondylar fracture of the femur. *J. Korean Society of Fractures*, 6:217-225, 1993.
- 17) **Shelbourne, K.D and Brueckmann, F.R.** : Rush-pin fixation of supracondylar and intercondylar fracture of the femur, *J. Bone and Joint Surg*, 64-A:161-169, 1982.
- 18) **Shelton, M.L., Grantham, S.A., Neer, C.S. and Singh, R.** : A new fixation device for supracondylar and low femoral shaft fractures, *J. Trauma*, 14:821-835, 1974.
- 19) **Slatis, P., Ryoppy, S. and Huittinen, V.M.** : osteosynthesis of fractures of the distal third of the femur, *Acta Orthop. Scand.*, 42:162-172, 1971.
- 20) **Stewart, M.J. and Wallace, S.L.** : Fracture of the distal third of the femur, *J. Bone and Joint Surg*, 40-A: 235-240, 1985.
- 21) **Watson-Jones, R.** : Fractures and joint injuries Ed. 4, Baltimore, *The Williams & Wilkins Co*, 1957.
- 22) **Weil, G.C., Kuehner, H.G. and Henry, J.P.** : The treatment of 278 consecutive fractures of the femur, *Surg. Gynec. and Obstet*, 62:435-41, 1936.
- 23) **Wise DA** : Fractures of the knee. In Rockwood, CA, Green DP and Bucholz RW : Fracture in adult. 3rd ed, vol 2, Philadelphia, *J B Lippincott Co*:1778-1797, 1991.

Abstract

Muller Type C Intercondylar Fractures of Femur : Comparative Analysis by Surgical Approach

**Hong-Geun Jung, M.D., Myung-Ho Kim, M.D., Moon-Jib Yoo, M.D.
Suk-Joo Yoo, M.D., Sung-Churl Lee, M.D., Jin-Young Park, M.D.
Sang-Hyuk Min, M.D.**

Department of Orthopaedic Surgery Dankook University College of Medicine, Chonan, Korea

Purpose : The purpose of this study is to compare the functional results of Muller type C intercondylar fractures treated by 2 different surgical approaches : lateral and extensile approach.

Materials and Methods : The study is based on 20 patients 21 knees of Muller type C intercondylar fractures. Two surgical approaches, i.e. 13 cases with lateral and 8 cases with extensile approach were used. The functional evaluation of results was done with criteria by Schatzker and Lambert. Excellent and good was grouped superior while fair and failure was grouped inferior.

Results : Comparative analysis by surgical approach showed that among total 10 cases of C2 fractures, 6 cases(85.7%) of lateral approach and 2 cases(66.7%) of extensile approach were categorized in inferior group. Among the 8 cases in type C3 fractures, 3 cases treated surgically using the lateral approach showed fair and failure results and 3 cases(60%) of the remaining 5 cases using the extensile approach showed good results.

Conclusion : There was no significant result difference between lateral and extensile approach in type C2 fractures, but in C3 fracture, cases with extensile approach showed better results. Therefore the extensile approach should be recommended in C3 intercondylar fractures with intra-articular comminution.

Key Words : femur, supracondylar-intercondylar fractures, surgical approach

