

[]

: Gartland 3 14

: 1996 3 2001 2 5
58 1~2

14 18 Flynn et al.
가 (Table 1) Mark et al. 가 (Table 2) 가 .
: Flynn et al.²⁾ Mark et al.¹¹⁾ 가 14 11
3 Mark et al.
, Flynn et al. 2 1 .
가 , 가
. 1 Flynn et al. Mark et al. 가

:

1~2

: , , , ,

: 607-711, 1 530-1

: (051) 554-8996, Fax: (051) 553-7575
e-mail: joy46@hanmail.net

1 48

3 30 , 5 30

Gartland III

가 가 3 5

가 가 2 1

가 가 (Fig. 1~2) K- 8

6 , 6 , 2

가 3 . 14 8

가 8,15,17)가 , 6

가 K- K-

2,14),

K- 3,12)

가 2 1 4

, 3 6

가

9 10 2

1996 3 2001 2 5

Gartland 5) III

58 , 2 ~7 3

4 ~6

18 38

2 2

가 Flynn et al. (Table 1)

가 Mark et al. (Table 2) 가

9 14 , 14

가 Mark et al. 가

6 , 7 ,

1 7 , 7

3 11 5.8 ,

, 4

10

et al.	가	가	Mark et al.	Flynn	Flynn et al.	가	1	3	2
Mark et al.	가	3		11	8	7	1		2
	3	Flynn		2	Mark et al.				
	1				Flynn et al.				1
		(Table 3).			가	14			
		4	3	2	3	2			1

Table 1. Functional criteria of Flynn et al. for the evaluation of elbow injuries

Result grade	Loss of carrying angle	Loss of motion
Excellent	0~5°	0~5°
Good	6~10°	6~10°
Fair	11~15°	11~15°
Poor	>15°	>15°

Table 2. Functional criteria of Mark et al. for the evaluation of elbow injuries

Result grade	Loss of motion	Loss of carrying angle	Pain/neurovascular lesion
Excellent	None	None	None
Good	<20°	<10°	None
Fair	20~50°	10~20°	Minimal pain with excessive use No neurovascular lesion
Poor	>50°	>20°	Pain or neurovascular lesion

Table 3. Results of primary open reduction of type III supracondylar fracture

	Flynn et al.		Mark et al.	
	No.	Nature of deficit	No.	Nature of deficit
Excellent	11		11	
Good	2	Flexion deficit 7° Carrying angle loss 8°	3	Flexion deficit 8° Carrying angle loss 8° Flexion deficit 14°
Fair	1	Flexion deficit 14°	0	
Poor	0		0	



A B

Fig. 1. Pre-operative X-ray of Gartland type III completely displaced supracondylar fracture of humerus (1A. A-P view, 1B. Lateral view).



A B

Fig. 2. Post-operative X-ray of Gartland type III completely displaced supracondylar fracture of humerus (2A. A-P view, 2B. Lateral view).

Furrer³⁾ Mohammed¹²⁾

가

Mulhall¹³⁾ 16

K- 13, 3

Choi¹⁾ 84%

66%

가

14 Murhall¹³⁾

78.6% 11, Mark

et al.¹¹⁾ 3 (21.4%), Flynn et al.²⁾

2 (14.3%)

Zionts¹⁸⁾

. Lee¹⁰⁾ 2

Hardlow⁶⁾ Grant⁴⁾ 3

8~10,13)

가

Wilkins¹⁷⁾ Pirone et al.¹⁵⁾

가

Volk-

mann's¹⁵⁾

K-

2 3
가
Han 7)
8 72
가
가
Sibley 13)
Mulhall¹³⁾

REFERENCES

- 1) **Choi WS, Shin HD, Kim HJ, Lee KW, Baik BS and Kim NH:** Displaced supracondylar fractures of the humerus in children. J of Korean Society of Fractures, 9: 330-340, 1996.
- 2) **Flynn JC, Matthews JG and Benoit RL:** Blind pinning of displaced supracondylar fractures of the humerus in children. Sixteen years experience with long-term follow-up. J Bone Joint Surg [Am], 56: 263-272, 1974.
- 3) **Furrer M, Mark G and Ruedi T:** Management of displaced supracondylar fractures of the humerus in children. Injury, 22: 259-262, 1991.
- 4) **Grant HW, Wilson LE and Bisset WH:** A long-term follow-up study of children with supracondylar fractures of the humerus. Eur J Pediatr Surg, 3: 284-286, 1993.
- 5) **Gartland JJ:** Management of supracondylar Fractures of the Humerus in children. Surg Gynecol Obstet, 109: 145-154, 1959.
- 6) **Hadlow AT, Devane P and Nicol RO:** A selective treatment approach to supracondylar fracture of humerus in children. J Pediatr Orthop, 16: 104-106, 1996.
- 7) **Han SH, Cho DY, Yoon HK, et al.:** The correlation between surgical timing and perioperative complications in the treatment of displaced supracondylar humeral fractures of children. J of Korean Society of Fractures, 16: 278-283, 2003.
- 8) **Kim BH, Shin KS, Kim JH and Kim DJ:** Clinical analysis of supracondylar fracture of the humerus in children. J of Korean Society of Fractures, 5: 325-333, 1992.
- 9) **Lee DY, Shim JI, Kim TS, et al.:** Treatment of supracondylar fractures of the humerus in children. J of Korean Society of Fractures, 12: 179-186, 1999.
- 10) **Lee SM, Jung SH, Jang JH, Son JH and Kim JD:** The analysis of the percutaneous pinning of supracondylar fractures in children. J of Korean Society of Fractures, 16: 284-291, 2003.
- 11) **Mark G, Innocenti M, Ruedi T and Yacchia GE:** Die supracondylar Humerus fracktur beim Kind. Helv Chir Acta, 51: 617-620, 1985.
- 12) **Mohammed S and Rymaszewski LA:** Supracondylar Fractures of the distal humerus in children. Injury, 26: 487-489, 1995.
- 13) **Mulhall KJ, Abuzakuk T, Curtin W and O'Sullivan M:** Displaced supracondylar fractures of the humerus in children. International Orthopedics, 24: 221-223, 2000.
- 14) **Paradis G, Lavalee P, Gagnon N and Lemire L:** Supracondylar fractures of the humerus in children: technique and results of crossed percutaneous K-wire

-
- fixation. Clin Orthop, 297: 231-237, 1993.
- 15) **Pirone AM, Graham HK and Krajchich JI:** Management of displaced extension-type supracondylar fractures of the humerus in children. J Bone Joint Surg [Am], 70: 641-650, 1988.
- 16) **Sibley TF, Briggs PJ and Gibson MJ:** Supracondylar fractures of the humerus in childhood: range of movement following the posterior approach to open reduction. Injury, 22: 456-458, 1991.
- 17) **Wilkins KE:** Supracondylar fractures: what's new? J Pediatr Orthop, B6: 110-116, 1997.
- 18) **Zionts LE, McKellop HA and Hathaway R:** Torsional strength of pin configurations used to fix supracondylar fractures of the humerus in children. J Bone Joint Surg [Am], 76: 253-256, 1994.

Abstract**Treatment of Completely Displaced Supracondylar Fracture of Humerus in Children****Bu-Hwan Kim, M.D., Mu-Jung Heo, M.D., Won-Jun Hwang, M.D.***Department of Orthopedic Surgery, Daedong General Hospital, Busan, Korea*

Purpose: We performed a retrospective study of completely displaced supracondylar fracture of humerus in children to evaluate the result of primary open reduction and internal fixation for this injuries, and also to know whether it is recommendable or not for such injuries.

Materials and Methods: For 5 years duration from March '96 to Feb. '01, we treated 58 cases of completely displaced supracondylar fractures of humerus in children. Among them we performed primary open reduction and internal fixation of this fracture in 14 cases. We followed up those cases more than 18 months and evaluated the results by Flynn et al. and Mark et al. criteria.

Results: Eleven of them resulted in excellent grading by both Flynn and Mark criteria. Three cases not involved in excellent grading proved to be good result by Mark criteria. But by Flynn criteria, 2 cases showed good results and the other one proved to be fair. In all cases, the patient and parents were satisfied cosmetically and functionally. Only in one case, the recorded grading was different, fair by Flynn and good by Mark criteria.

Conclusion: Primary open reduction and internal fixation in the treatment of completely displaced and not easily reduced supracondylar fracture of humerus in children resulted excellent and good results with few complications, and patients were satisfied with the results functionally and cosmetically. So we recommend proceeding to primary open treatment and internal fixation for these difficult fractures with low threshold to open reduction.

Key Words: Primary open reduction, Completely displaced supracondylar Fx. humerus, Children

Address reprint requests to _____

Bu-Hwan Kim

530-1 Myoungryun 1 Dong, Dongrae-Gu, Busan, Korea

Department of Orthopaedic Surgery, Daedong Hospital

Tel : 051-554-8996, Fax : 051-553-7575

E-mail : joy46@hanmail.net