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= Abstract =

Management of Displaced-Extension Type Supracondylar Fractures of Humerus in Children

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From June 1996 to February 1998, we reviewed the cases of 27 patients who had a displaced - extension type supracondylar fracture of the humerus retrospectively. The mean length of follow-up was 1.3 years. According to Gartland classification, type II was 7 cases (26%), type III-A was 11 cases (41%), type III-B was 9 cases (33%). We treated with three different methods, including closed reduction and percutaneous Kirschner-wire fixation, skeletal traction, and cast application after closed reduction. In type II fractures, we used two parallel lateral pins. In type III fractures, we used 2 lateral parallel pins followed by 1 medial crossed pin predominantly. The results of treatment were assessed using the criteria of Flynn et al. We graded cosmetic and functional factors separately. Satisfactory results were achieved by percutaneous K-wire fixation(96%). There were seven neural lesions. These were the result of injury and not of the treatment, with exception of one case. Neural injuries spontaneously resolved at a mean of 2.5 months(range 1.5 to 5 months) after injury. Varus deformity was present in one patient. There was no Volkman 's ischemic contracture. Percutaneous Kirschner-wire fixation is advocated as the method of choice for the majority of displaced-extension type

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* 1998



supracondylar humerus fractures in children.

Key Words : Supracondylar fractures, Humerus, K-wire fixation, Children

1 4
3
가 5 8 가 2.
가 가
가 가
가 II 7 (26%), III-A 11 (41%), III-B
Volkman
가 9 (33%) (Table 1).
1996 6 1998 3.
2 45
1 가 27 가
II 7
(26%)
1.
1996 6 1998 2
45 1 90
가 27
1.3 16 (59%), 11
(41%), 19 (71%), (Jones view)
6 (22%), 2 (7%)
7 10 40 ,
4 가 , 1 wire 1.6mm K-
가 1
1 1cm





III
가

Baumann 가 5

2

가

,

Flynn ¹²⁾ (Table 3).

5

4. 가

가 Baumann

,

Table 1. Classification of Fractures by Gartland

Type	No. of cases(%)
I : Undisplaced	-
II : Displaced Fx. with intact post. cortex	7(%)
III-A : Posteromedial Displaced Fx. with no cortical contact	11(41%)
III-B : Posterolateral Displaced Fx. with no cortical contact	9(33%)
Total	27(100%)

Table 2. The relationship between pin number and Gartland type

Type	2 pins	3 pins
II	6 cases(2 lat.)	
III	2 cases(2 lat.)	
	3 cases(1 lat. + 1 med.)	14 cases (2 lat. + 1 med.)

Table 3. Flynn 's Criteria

Resulting rate		Cosmetic factor (change in carrying angle)	Functional factor (motion loss)
Satisfactory	excellent	0-5 °	0-5 °
	good	6-10 °	6-10 °
	fair	11-15 °	11-15 °
Unsatisfactory poor		>15 °	>15 °



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Table 4. Relationship between loss of motion and each treatment group

Definite treatment	Motion loss(Degrees)			
	0 ~5 °	6 ~10 °	11 ~15 °	>15 °
C/R & Cast		1		
C/R & K-wire fixation				
Type II	5	1		
Type III	18	1		
Skeletal traction		1		

*C/R : Closed Reduction

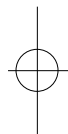
Table 5. Relationship between change of carrying angle and each treatment group

Definite treatment	Change of carrying angle(Degrees)			
	0 ~5 °	6 ~10 °	11 ~15 °	>15 °
C/R & Cast		1		
C/R & K-wire fixation				
Type II	5	1		
Type III	16	2		1
Skeletal traction			1	

*C/R : Closed Reduction

Table 6. Summary of the result by Flynn 's criteria

Resulting rate		Cosmetic factor	Functional factor
Satisfactory	excellent	21(77%)	23(85%)
	good	4(15%)	3(11%)
	fair	1(4%)	1(4%)
Unsatisfactory	poor	1(4%)	0



Gartland II 7 . 1 가3
2
1 가 가 . III 3
1 2
3
1
(Table 2), Gartland II 5 2
, 1
2 2 15
(torque force) . III 1
III 가
1 6
III 2 가 3
2 1
3 , 가 3
가
5 2

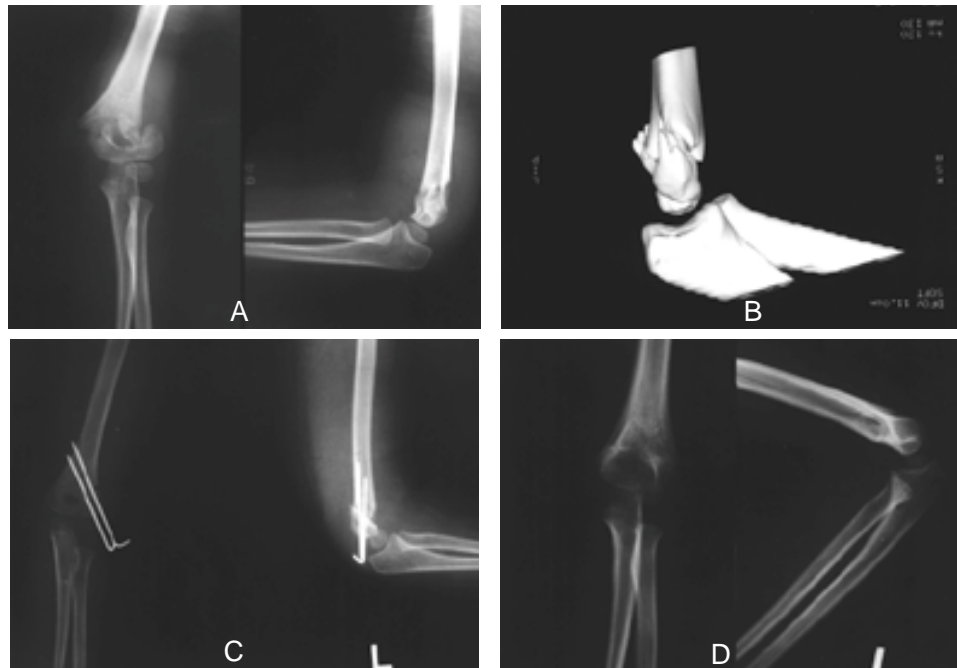
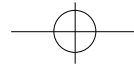


Fig 1-A. AP. and Lat. view of displaced supracondylar fracture in a 4-year-old girl (type II).
B. Preoperative 3-D CT showing intact posterior cortical contact.
C. Immediate postop. x-ray showing good reduction
D. 16 months after operation. we rated it as excellent result.

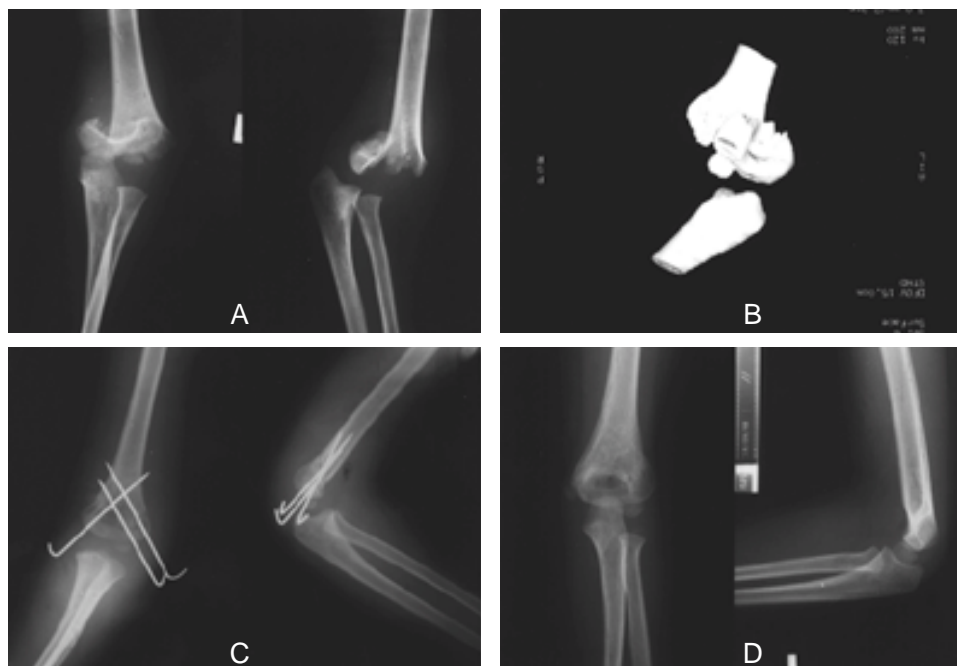


Fig 2-A. AP. and Lat. view of severely displaced supracondylar fracture in a 5-year-old male (type III).
B. Preoperative 3-D CT showing no posterior cortical contact.
C. Postoperative X-ray. we used 2 lateral parallel pins followed by 1 medial crossed pin.
D. 17 months after operation. we rated it as excellent result.

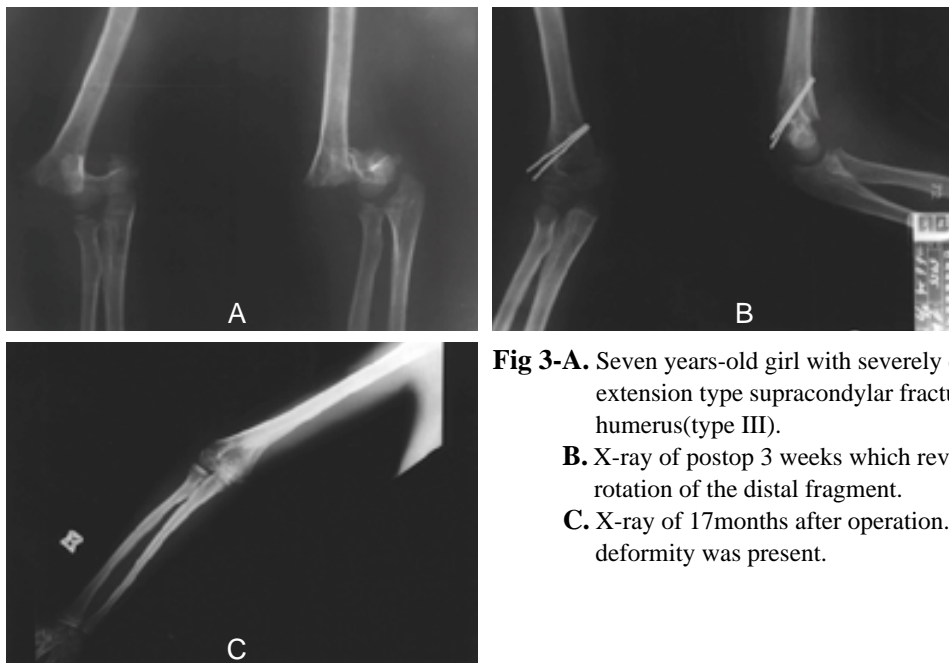


Fig 3-A. Seven years-old girl with severely displaced extension type supracondylar fracture of the right humerus(type III).

B. X-ray of postop 3 weeks which reveals horizontal rotation of the distal fragment.

C. X-ray of 17months after operation. cubitus varus deformity was present.

4

(cosmetic factor)

(satisfactory) 26 (96%) 21

(77%), 4 (15%), 1 (4%) . 1 (4%)

(unsatisfactory),

(functional factor)

23 (85%) , 3 (11%) , 1

(4%)

(satisfactory)

25 24 (96%)

(Table 4,5,6).

(Fig.1-B),

2 1.6mm K-wire

(Fig. 1-C). 1 4

(Fig 1-D).

III-A

(Fig. 2-A). 3-D CT

(Fig.

2-B),

2

(Fig.

2-C). 1 5

1.

4

II

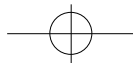
(Fig. 1-A),

3.

3-D CT

7

3



III-A

(Fig. 3-A).

2

3-6

3

(Fig. 3-B).

1 5

15

7

가

(Fig. 3-C),

2.5

4.6-10%

가

2,4,13,19)

가

60-

69%

1,20)

가

, Volkmann

Gartland 1

2

2-3

14,16,30)

3,23,28)

5-8

가가

97%

30)

가 가

2:1

11,12)

19)

30%(0-60%)

Pirone

, Volkmann

가

22)

14%,

3%

13,15,25,28)

가

10,27,29)

3,5,22,30)

6-16%

2,13,19,30)

가

6,22,30)

2,4,13,19)

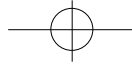
가

가

가

14,24) Wilkins³⁰⁾

90 가



Baumann .

Baumann

40 가 가

, 10 가 , 72 95%가 64

81 , Worlock³¹⁾

Swenson²⁶⁾, Flynn¹²⁾ Casiano⁹⁾ 5

, Fowles¹³⁾ Arino .

⁶⁾ 2 , Kallio¹⁸⁾

2

가

Zionts³²⁾ .

. Herzenberg¹⁷⁾

Wilkins , 1996 6 1998 2

Aronson Prager⁷⁾ - 45

가 1 가 27

Mubarak²¹⁾ 2 2 , III 2

1 1 , K-

25 24 (96%)

3 1

K- 25 24

(96%) (satisfactory) .

가 . Flynn¹²⁾ 1.3%

. Royce²⁴⁾ 143

2

III 1

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(0.062-inch)

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K-

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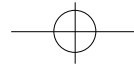
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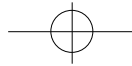
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