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= Abstract =

Treatment of Supracondylar Fracture of the Humerus in Children

- by Early Closed reduction & K-Wire Fixation -

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We treated supracondylar fracture of the humerus in children by early closed reduction and K-wires fixation using two lateral parallel K-wires for partially displaced fractures(Gartland Ib, II) and three K-wires,two lateral and one additional medial crossed K-wire for type III fractures. This study is to analyze our method for the treatment of supracondylar fracture of the humerus in children. Sixty-two fractures(4 type Ib, 20 type II and 38 type III) underwent K-wires fixation after closed reduction of the fracture from October 1994 to April 1997 were included in this study. The patients age ranged from 2 years and 2 months to 12 years and 7 months, averaging 6 years and 2 months. All the fractures were treated within 24 hours after arrival in the hospital . After general anesthesia, each fracture was reduced manually and fixed by K-wires under fluoroscopic control. Two lateral parallel K-wires were used for fixation of all type Ib and II

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fractures. We tried to keep the gap between two K-wires be 1 cm or more. In type III fractures, fractures were fixed by two parallel lateral K-wires and followed by one medial crossed K-wire. The K-wires were removed after averaging 3.2 weeks after operation in out patient clinic. The follow-up period ranged from 6 months to 34 months, averaging 14 months. By Flynn's functional and cosmetic criteria, 37 fractures (97.4%) among 38 type III fractures resulted in satisfactory criteria. All of the type I and II fractures (100%) resulted in satisfactory criteria. In conclusion, our decision is considered as safe and reliable option for the treatment of supracondylar fractures of the humerus in children.

Key Word : humerus, supracondylar fracture, early closed reduction and K-wire fixation

가 ,

1)
Volkmann 1994 10 1997 6 77 (78)
Gartland I . 78 Gartland I 11 , II 22
III 45 . I 11

7 4 K-
Ib . II 22
K-
가 . III 45 2 43 가
, 41 4
Flynn 13) , 가 . 78 I 7 ,
6,8) 3 (II 2 , III 1)
K- 가 13,15,21,22,24,30) K-
K- , 4 ,
, K- 2 6
17,32) 가 III 4 I , 20 II 38
62 (61)
2 6
2 12 7 6 2 가 40 ,
가 21 31 , 29 ,
1 1
(dominant) 24 36
24





636 •

/ 11 3

8 5 . III III 가
 , 3 1 , 2 K- K-
 (anterior 1 K-
 interosseous nerve) 6 .
 , 3
 2 , 1 , 1 , 6 I II 가가 III
 1 , 2 2 K-
 2) 가 2 4 K-
 1994 10
 24
 , I Baumann 5
 Ib II K-
 K-
 III 가 K- 가가
 , Ib 가 K- K- 가
 II 2 K- K-
 K- , K-



Fig 1. Type Ib fracture. 5 yr- 4 month-old girl.

A. Preop. AP. radiograph showed coronal tilting and decreased Baumann 's angle.

B. AP. radiograph of 3 weeks after Closed reduction and K-wire fixation.

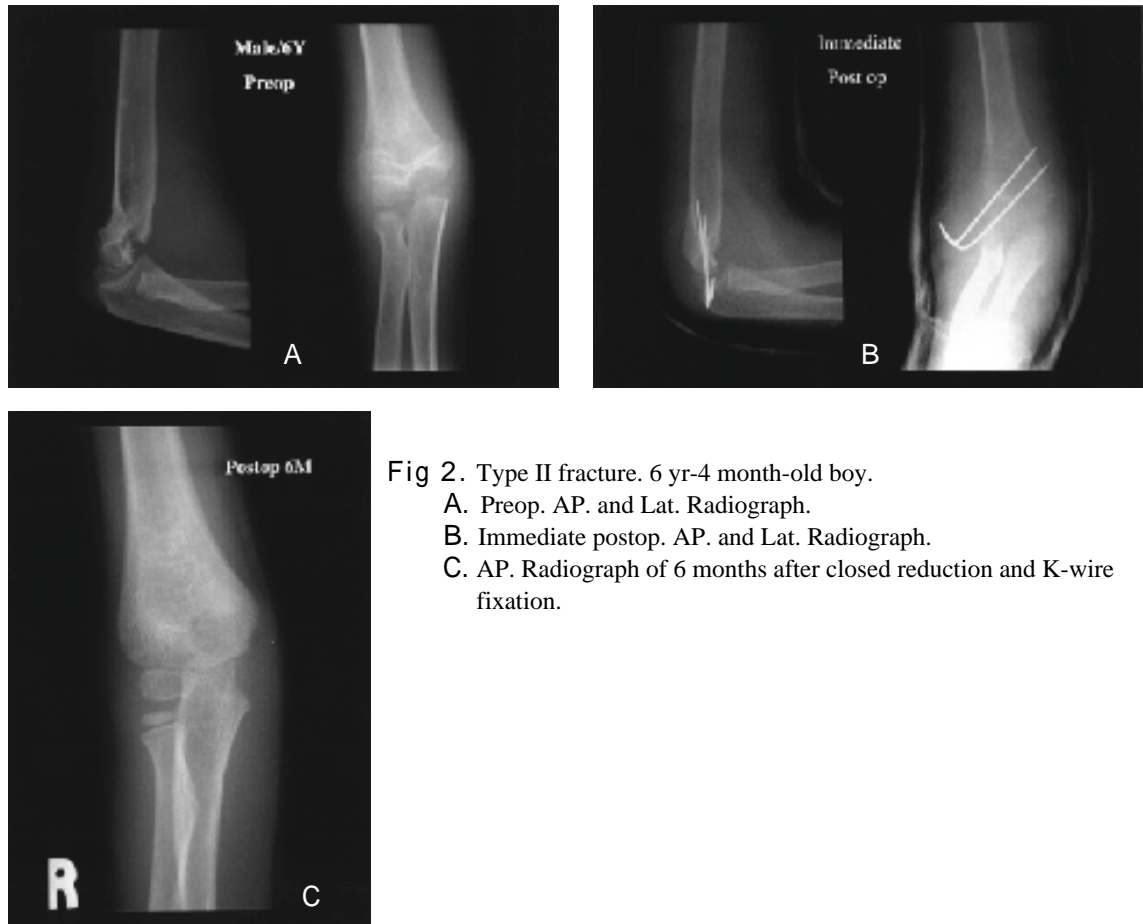


Fig 2. Type II fracture. 6 yr-4 month-old boy.

A. Preop. AP. and Lat. Radiograph.

B. Immediate postop. AP. and Lat. Radiograph.

C. AP. Radiograph of 6 months after closed reduction and K-wire fixation.

1cm

K-

(Fig 1 A-B, Fig 2 A-C).

가 1 K-

가

K- 1.6mm(0.062 inch)

가

가

가

Baumann 5

K-

가

1 cm 가

가

90

1-2 cm

padding

80

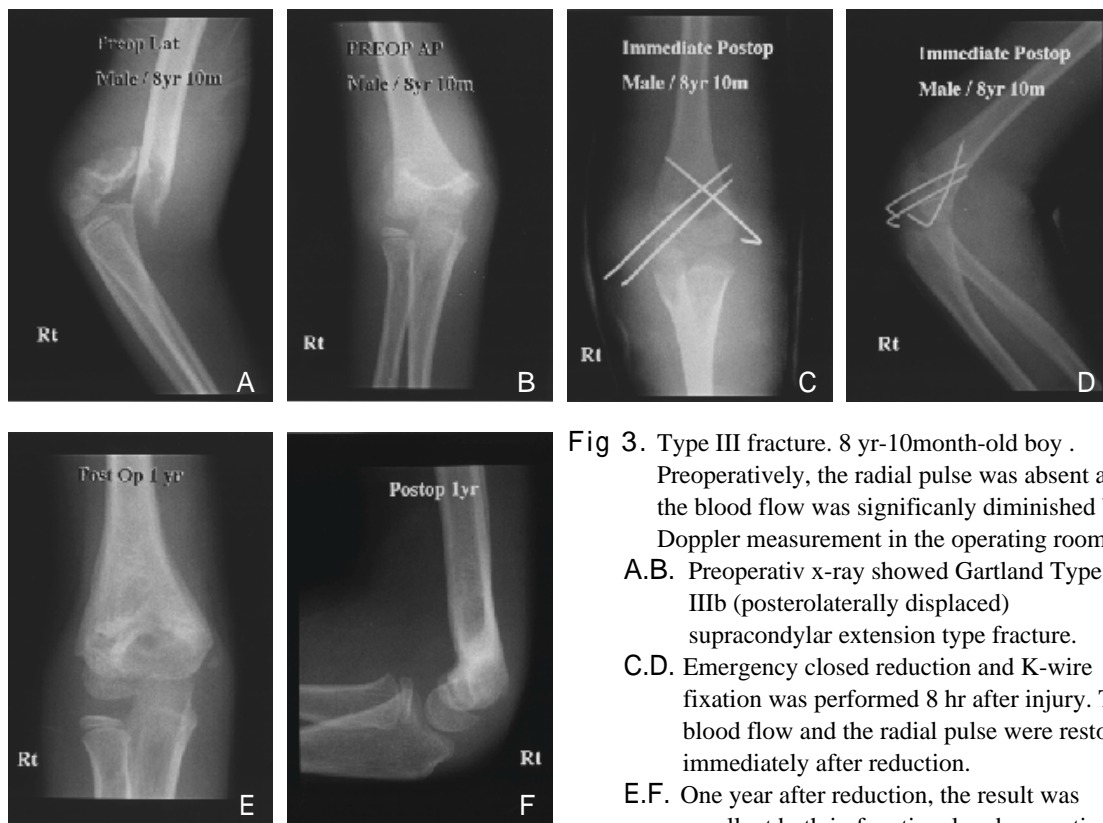


Fig 3. Type III fracture. 8 yr-10month-old boy .

Preoperatively, the radial pulse was absent and the blood flow was significantly diminished by Doppler measurement in the operating room.

A.B. Preoperative x-ray showed Gartland Type IIIb (posterolaterally displaced) supracondylar extension type fracture.

C.D. Emergency closed reduction and K-wire fixation was performed 8 hr after injury. The blood flow and the radial pulse were restored immediately after reduction.

E.F. One year after reduction, the result was excellent both in functional and cosmetic criteria by Flynn.

90

K-

가

1 (

가 4)

6

3.9

K-

K-

I II

3

4

3.3

(

3

, III

3.2

)

,

K-

, III

가

가

3

24

6

34

14

6

4

Flynn¹⁰⁾

(Table 1).



Table 1. 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

* : degrees

Table 2. Summary of the result by Flynn 's criteria
(Cosmetic factor)

Resulting rate	Gartland type			Total(%)
	I	II	III	
Satisfactory	4	19	28	51 (82.2 %)
excellent				
good		1	9	10 (16.2%)
fair				0
Unsatisfactory			1	1 (1.6%)
poor				
total	4	20	38	62 (100%)

Table 3. Summary of the result by Flynn 's criteria
(Functional factor)

Resulting rate	Gartland type			Total (%)
	I	II	III	
Satisfactory	4	20	34	58 (93.5%)
excellent				
good			4	4 (6.5%)
fair				0
Unsatisfactory				0
poor				
total	4	20	38	62 (100%)

(cosmetic factor)

62	61	(98.4%)
(satisfactory)	(Table 2).	
(satisfactory)	I 4	, II
20	19	III 37 28
51	(82.2%)	가
II 1	III 9	10 (16.2%)
good		fair
	III	1 (1.6%)

poor

(unsatisfactory)

2

(functional factor)

(100%) 가

I II 4

excellent III

20 excellent 4 good

34 (Table 3). 62 58

(93.5%) excellent , 4 (6.5%) good

K-

가

13,15,17,21)

가

가

가

가

가

가

가

24

3.9

가

Alburger

2)

6 , Fowles

14)

4

Gartland¹⁵⁾

I

가

(impacted)

가

Boeck⁵⁾

(impacted)

가

13

Palmer²³⁾

78

3

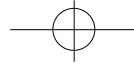
30)

Gartland Ib

Mubarak²²⁾, Wilkins

가

가



640 • / 11 3

가

가

Boeck ⁵⁾

K- 2 K-

I K-

11 (divergent)

I Baumann 5 Zions ³²⁾

가 4 (36.4%)

(coronal tilting), 2 K-

(horizontal rotation) (anterior angulation) 1 K- 3 K-

가

가 10,18),

가

(I II

2

K-

Baumann 18), 가 1cm 가 32)

Zions III

3 K- 2

0.062 inch(1.6 mm)

3), Worlock ³¹⁾ Baumann

K-

가 K-

2 K- K- 1 가

8,13,21),

1 K- Baumann

K-

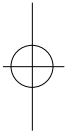
K-

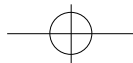
2 5 % 7,11,26)

K-

가 K-

1 K-





24

19,22,25) 1)

K-

가

K-

1cm

2

K-

61 (62)

K-

24

Ib (4) II (20)

2 K-

III (38)

2 K-

1 가 K-

가

Flynn

Ib II

K-

K-

(satisfactory)

, III 38 37

(97.4%)가

가

62

61 (98.4%)

가

가 가

K-

(anterior interosseous nerve)

가

가 4,20) Cheng 9) 180

10.5%

9

, Brown 7) 14.2%

6

, Culp 11)

5

6 (8.1%)

4

가

가

16,27,28)

3

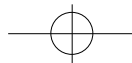
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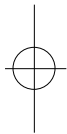
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