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= Abstract =

A Clinical study of the Lateral Humeral Condyle Fractures in Children

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Fracture of the lateral humeral condyle is a relatively common injury in children. It is an intraarticular fracture involving the growth plate so, the treatment should be done very carefully to reduce additional damage and complication. The authors analyzed 34 fractures of the lateral humeral condyle in children who were treated from Mar. 1993 to Feb. 1998, to know the relationship between the factors affecting the development of complications and the results.

The results were summerized as follows ;

1. There were 1 case (2.9 %) of Milch type I and 33 cases (97.1 %) of Milch type II, and according to Jakob ' stage , 9 cases (26.5 %) of stage I, 19 cases (55.9 %) of stage II, and 6 cases (17.6 %) of stage III.
2. They were treated with cast immobilization in 5 cases (14.7 %), with closed reduction and percutaneous K-wire pinning in 8 cases (23.5 %), and with open reduction and K-wire fixation in 21 cases (61.8 %).
3. According to the criteria of Hardacre, the result of 5 cases of cast immobilization were excellent, 8 cases of closed reduction and percutaneous K-wire pinning were 3 excellent, 4 good, 1 poor, and 22 cases of open reduction and K-wire fixation were 19 excellent, 2 good, so there were 22 cases (64.7 %) excellent, 11 cases (32.4 %) good, and 1 case (2.9 %) poor.
4. The complications were 11 cases (32.4 %) of bony spur, 6 cases (17.6 %) of overgrowth of

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the lateral condylar or capitellum, 1 case (2.9 %) of premature epiphyseal fusion, and 2 cases (5.9 %) of pinning site infection.

Key Words : Humerus, Lateral condyle, Fracture , Children

2.

Milch¹⁴⁾

Jakob¹⁰⁾ stage

6,15).

가

K-

K-

Hardacer⁹⁾

1.

1-

25

13

6.2

4,6,15).

, 5 7 가 14 (41.2 %) 가
, 34 23
(67.6 %), 11 (32.4 %) (Table 1).

Table 1. Age and sex distribution

Age	Male	Female	Total (%)
below 3	2	1	3 (8.8 %)
3-5	6	4	10 (29.4 %)
5-7	9	5	14 (41.2 %)
7-9	4	1	5 (14.7 %)
above 9	2	0	2 (5.9 %)
Total	23 (67.6 %)	11 (32.4 %)	34 (100 %)

2.

가 18 (52.9 %)

12 (35.3 %),

3 (8.8 %),

1 (2.9 %)

1

43

가 가

34

3.

1)

Milch¹⁴⁾

, 34

Milch type

1.

1993 3

1998 2

1

가 가

34



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I 1 (2.9 %), Milch type II 33 (97.1 %)

Milch type II 33

5.

2)

Jakob 10), , 34

stage I 9 (26.5 %), stage II 19 (55.9 %), stage III

7 6 (17.6 %) (Table 2).

가

K-

Table 2. Type of fracture and degree of displacement

Milch	I	Jakob			Total
		I	II	III	
	I	0	1	0	1 (2.9 %)
	II	9	18	6	33 (97.1 %)
Total		9	19	6	34 (100 %)

4.

34 2

(Fig 1-A,B,C).

가

Jakob stage I 5

,

가

Jakob stage I

4

Jakob stage II 4

K-

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

Jakob stage II 15

Jakob stage III

6

Kocher

2-3

K-

(Table

3).

34

Milch type I

1

Milch type II



Fig 1-A. A 7-year-old male patient had lateral condylar fracture of left humerus associated with ipsilateral olecranon fracture.
B. Both fracture were operated with open reduction and internal fixation.
C. Union of both fracture site was achieved at 6 weeks after operation and the clinical result was good.

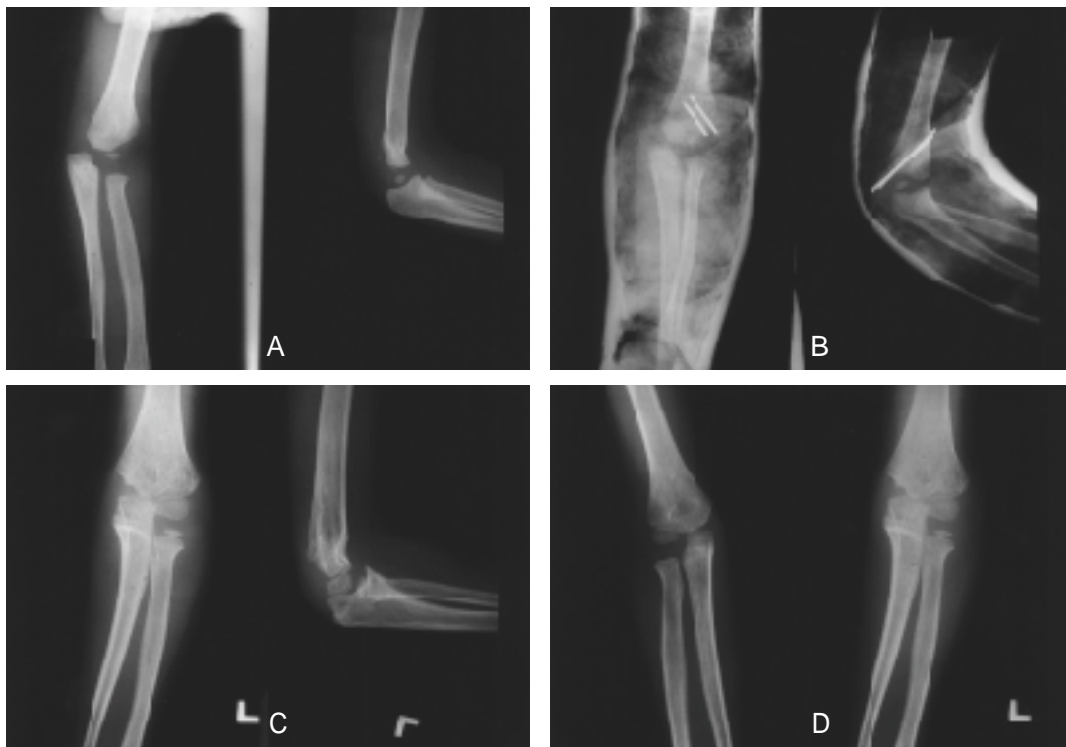


Fig 2-A. A 3-year-old male patient with Milch type II, Jakob stage I fracture.

B. Closed reduction and percutaneous pinning with 2 K-wire was done.

C,D. In the 36 months follow-up radiograph, lateral condylar and capitellar overgrowth and bony spur was seen. The clinical result was good.

Jakob stage			Hardacre		
2		2	22 (64.7 %),	10 (29.4 %),	2 (5.9 %)
가			(Table 5).		
4	6				
				5	
				K-	8
				3 ,	4 ,
				K-	21
		5		2	19
	7	, K-	Jakob stage I	3 ,	6 , Jakob stage II
			15 ,	3 ,	1 , Jakob stage III
6	11	8	3 ,	3 ,	1
		12			
			Milch type II, Jakob stage II		K-
		8 ° 가		2	
1	33	5 °			
가	(Table 4).				



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Table 3. Method of treatment

Method \ Jakob stage	I	II	III	No. of Patients (%)
Cast immobilization	5			5 (14.7 %)
Closed reduction and percutaneous K- wire pinning	4	4		8 (23.5 %)
Open reduction and K-wire fixation		15	6	21 (61.8 %)
Total	9	19	6	34 (100 %)

Table 4. Change of carrying angle

Change of carrying angle	No. of Patients
Below 5 °	33
Above 5 °	1
Total	34

2

11 (32.4 %),

6 (17.6 %),

1

(2.9 %),

2 (5.9 %)

가

11 K-

가

Rockwood ¹⁶⁾

16.8 %, 54.2 %

6-10

Jakob stage I 2 K-

Jakob stage II 1 , K-

5-7 가 14 (41.2 %) 가

3 Jakob stage II 1 Jakob stage III 2

가 25 (73.5 %) 가

Milch ¹⁴⁾

1

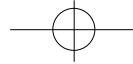
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8 ° 가

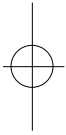
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Table 5. The result by Hardacre Criteria

result	Criteria	No. of patients (%)
Excellent	no loss of motion	22 (64.7 %)
Good	no alteration in carrying angle asymptomatic	
	lacked no more than 15 ° of complete extension	11 (32.4 %)
	inconspicuous difference in carrying angle	
Poor	no arthritic or neurologic symptoms	
	disabling loss of motion	1 (2.9 %)
	conspicuous difference of carrying angle	
	arthritic or neurologic symptoms	
	nonunion or avascular necrosis	
Total		34 (100%)



가 가 1 , , .
 . Jakob ¹⁰⁾ stage I, 4
 II, III K- 2
 stage I , stage II,III K-
 ,
 Milch type 2 33 (97.1 %), Jakob stage II가 Maylahn Fahey¹¹⁾가 28%
 19 (55.9 %) . 11 (32.4 %)
 , 가 , K-
 . Wadsworth¹⁹⁾
 McLearie Merson¹³⁾
 , Blount
 Irwin⁶⁾, Conner Smith⁷⁾, Hardacre 90, McDonnel 가
 Wilson¹²⁾ . Jakob stage II K-
 , Badelon ⁵⁾ 2mm 2
 1
 , Fontanetta ⁸⁾ 8° 가
 . 2
 .
 Jakob stage II, III
 21 K-
 .
 Rockwood ¹⁶⁾ 90°
 , Tachdjian¹⁸⁾ 90° 1993 3 1998 2
 ,
 . , 1
 , 가가 34
 Hardacre ⁹⁾ .
 22 , 11 , 1 . 1. Milch type II가 33
 , Jakob stage II가 19 가
 , , , , 2. 5
 , 8 K- , 21
 가 K- ,
 Wadsworth¹⁹⁾ 28%, Rang¹⁷⁾ 60%
 6 (17.6 %)가 3. Hardacre 22 (64.7 %),
 가 11 (32.4 %), 1 (2.9 %)
 가 ^{6,19)} Jakob stage I 3 , 6 , Milch type I
 6 Jakob stage II 15 , 3 , 1 ,
 Jakob stage III 3 , 3 ,





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5
K-
8 3 4 1
K-
21 19 2
4. 11 (32.4 %) 7
6 (17.6 %),
1 (2.9 %),
2 (5.9 %)
5. Jakob stage II, III
Jakob stage I
, K-
smooth K-

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