

· · · · ·

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.

: 1994 2 2002 2 8 가

16 11 5 21.6

19.2 , 21.7

16.5 .

:

(carrying angle) 12

27.8

,

1

8

가

2 2

, Oppenheim

14

.

:

가

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130-011,

40-12

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1.

가 , 가 , 15 가 3 5 37 21.6 19% 31 5 31% . 15 가 81%

(Table 1).

1 10 가 13 81% . 15 (Table 2).

2.

가 가 16 0~20 가 9 56% 30 7 44%

(Table 3).

3.

16 (threaded steinmann pin)

Table 1. Age and sex distribution at operation

Age	Male	Female	%
0~15	3	0	19
16~20	2	3	31
21~30	1	0	6
26~30	2	0	13
Above 31	3	2	31
Total	11 (69%)	5 (31%)	100

Table 3. Degree of deformity

Degree	Number of case	%
0~-10	2	13
-11~-20	7	43
-21~-30	5	31
Above -31	2	13
Total	16	100

Table 2. Age on initial injury

Age	Number of case	%
Under 5	6	38
6~10	7	43
11~15	3	19
Above 16	0	0
Total	16	100

Table 4. Duration of initial injury

Duration	Number of case	%
Under 5	4	25
6~10	1	6
11~15	2	13
Above 16	9	56
Total	16	100

Table 5. Correction of carrying angle

Degree	Number of case	%
< -10°	0	0
-9°~0°	1	6
1°~10°	5	31
11°~20°	8	50
> 21°	2	13
Total	16	100

Table 6. Duration of immobilization

Days	Number of case	Average (Days)
26	1	27.8
27	5	
28	9	
29	0	
30	1	

Table 7. Criteria of result (by Oppenheim. et al.)

	Carrying angle	ROM	Complication
Excellent	Less than 5°	Less than 5°	No
Good	Less than 10°	Less than 10°	No
Poor	More than 10°	More than 10°	Yes

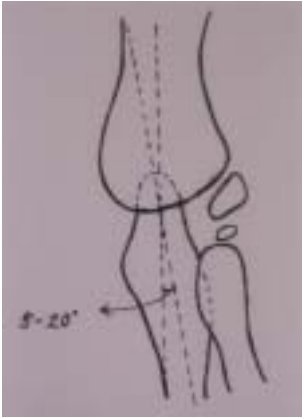


Fig. 1. A method of measuring the carrying angle: Midpoints were determined for the humerus at the flare of the metaphysis and in the distal diaphysis. Midpoints were determined for the ulnar at the level the radial tubercle and the most proximal ossification. The angle formed by connecting these midpoints is the carrying angle (by Beals).

(wiring)
15 9 56%
(Table 4). (Carrying Angle)
11 20 가 8 50%
(Table 5).

4.

(Carrying Angle) (Fig. 1).

(Closing Wedge Osteotomy)
(threaded steinmann
pin) (wiring)
가
(Fig. 2).

4
(Table 6).

5.

가 , 8 가
가 2 2



Fig. 2. Anteroposterior and lateral radiographs of the left elbow.

- 2A.** At the age of nineteen years, the elbow was in the state of cubitus varus deformity followed by a supracondylar fracture at the age of 4 years.
2B. The lateral closing osteotomy using threaded steinmann pin with wiring was done and the varus deformity was corrected.

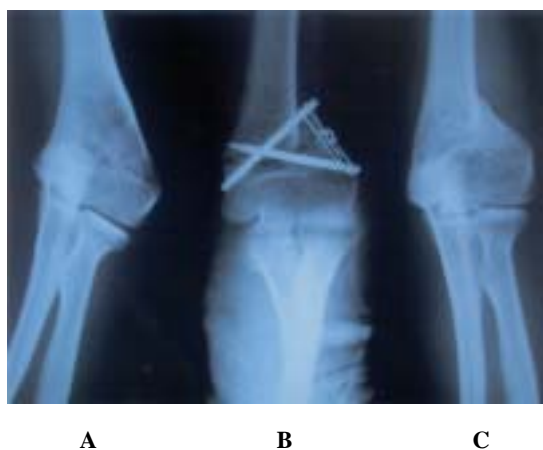


Fig. 3. Anterior radiographs of the elbow of the nineteen years old female patient.

- 3A.** Varus deformity is shown in the preoperative state.
3B. The lateral closing osteotomy was done using threaded steinmann pin with wiring.
3C. The last follow-up radiograph in thirteen months later after osteotomy.

			(excellent)가 8
(good) 6	(poor) 2		(excellent)
	가 14		
	가 87.5%		(Table 7).
	15		15
3			31
2			
	1		
19	1		
	-16		
		(derotation)	
	20		1 1
K-			
(Fig. 3).			
2			
29	4		가
			1



A B C

Fig. 4. Anterior radiographs of the elbow of the twenty nine years old male patient.

- 4A.** Varus deformity is shown in the preoperative state.
4B. The lateral closing osteotomy was done using threaded steinmann pin with wiring.
4C. The last follow-up radiograph in six months later after osteotomy.



A B C

Fig. 5. Anterior radiographs of the elbow of the twenty seven years old male patient.

- 5A.** Varus deformity is shown in the preoperative state.
5B. The lateral closing osteotomy was done using threaded steinmann pin with wiring.
5C. The last follow-up radiograph in 4 months later after osteotomy.

,
 -10
 (derotation)
 0 6
 (Fig. 4).
 3
 27 5
 ,
 , -30
 (dero-
 tation) 4
 4
 (Fig. 5).

가
 9,20,22)
 Siris²¹⁾
 (medial displacement) 가
 Madsen¹⁷⁾ French¹²⁾
 , Smith²²⁾,
 D'Ambrosia⁹⁾, Dowd¹¹⁾ Hopcroft
 Smith²²⁾, Langen-
 skioid¹⁴⁾, Dowd¹¹⁾
 가
 5)
 11), 가 , 가
 ,
 Smith²²⁾ 가 5.4 (4~20) 가 6.1
 (0~12) Rodney²⁰⁾
 4 15.0 ,

17.8 가 가 가 가
 4)
 1959 French
 가 10.9 가 13.1 2
 Siris²¹⁾
 1964 Amspacher⁷⁾
 , Oppenhe- 1975
 im¹⁹⁾ Sweeney²³⁾ 2 K-
 가 . 1982 Carlson Rosman⁸⁾ staple
 1984 Oppenheim¹⁹⁾
 (threaded steinmann pin) 1988
 3), 1) 15 Derosa Graziano¹⁰⁾ (step cut
 osteotomy) 1 .
 McCoy¹⁸⁾
 French
 15
 가
 , (medial opening wedge 가 가
 osteotomy), (oblique 가
 osteotomy with derotation), (lateral 가
 closing wedge osteotomy), French Method (pin angle) ,
 (two-hole lateral plate)
 (medial percutaneous pin)
 11,14,21) 15 3
 (step cut osteotomy) Derosa 4
 Graziano¹⁰⁾ . 15 가 가
 가 1
 Wilkins²⁴⁾ 16
 1 (threaded stein-
 Isao Yamamoto¹⁵⁾ mann pin) (cross wire) 15
 , 6) 10~15 가 3 4
 1951 King Secor¹⁶⁾가

1994 2 2002 2 8

16

(threaded steinmann pin)

(wiring)

1. (threaded steinmann pin)

(wiring) 가 8 , 가 6 ,

2 14 (87.5%)

2. 15 13 2 11

3. (threaded steinmann pin) (wiring)

4. 15

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Abstract**The Lateral Closing Osteotomy using Threaded Steinmann Pin for the Cubitus Varus Deformity Followed by Supracondylar Fracture around the Elbow**

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Purpose: To investigate the usefulness of closing wedge osteotomy with threaded steinmann pin and wiring for the treatment of cubitus varus deformity after elbow fracture during childhood.

Materials and Methods: From February 1994 to February 2002. We performed closing wedge osteotomy with threaded steinmann pin and wiring in 16 elbows with cubitus varus deformity. There are 11 men and 5 women. Mean age was 21.6 years and mean follow-up was 19.2 months. Mean deformed carrying angle was varus 21.7 degree. Mean period from initial injury to treatment was 16.5 years.

Results: Mean angle that was corrected by above operation methods was valgus 12 degree. Average periods of immobilization was 27.8 days. One tardy ulnar nerve syndrome before surgery was solved at 8 weeks after operation. 2 cases with superficial infection was treated easily. 14 cases of all were estimated as good with Oppenheim's criteria.

Conclusion: Closing wedge osteotomy with threaded steinmann pin and wiring makes early range of motion exercise being possible as rigid fixation. The supracondylar closing wedge osteotomy with threaded Steinmann pin and wiring is thought to be the useful method.

Key Words: Cubitus varus, Osteotomy, Lateral closing osteotomy, Threaded steinmann pin

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