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— Abstract —

## Internal Fixation with Plate and Bone Graft of Mid-shaft Clavicle Nonunion

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**Purpose:** The causes of twelve cases of the mid-shaft clavicle nonunion and the results of internal fixation with plate and bone graft were investigated.

**Materials and method:** From August 1997 to March 2003, twelve cases of the mid-shaft clavicle nonunion were operated with internal fixation with plate and bone graft. The duration of follow-up was average 13 months.

**Results:** The causes of the mid-shaft clavicle nonunion included severe associated injury, severe initial displacement of the fracture fragments and insecure fixation. All cases were operated with internal fixation with plate and bone graft. According to the factor for evaluations of results, using a rating scale of excellent (no apparent factors), good (one factor), fair (two factors), poor (more than three factors), the results showed 10 excellent, 1 good and 1 poor. Screw loosening was developed in only one case.

**Conclusion:** The internal fixation with plate and bone graft of the mid-shaft clavicle nonunion after failed conservative treatment achieved excellent results and seemed to be the procedure of choice for mid-shaft clavicle nonunion.

**Key Words:** Clavicle, Nonunion, Bone graft, Internal fixation with plate.

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— 8 1 —

12 1 11

가 .

5 ~ 10%

12 8

8

0.1 ~ 1.9%

<sup>8)</sup> 6 ~ 10

<sup>6)</sup> .

5.3(3 ~ 10)

12

가

가

<sup>3)</sup> .

1995 8 2003 3

12

가

가 , 가 ,

가 , 가 ,

10

1997 8 2003 3 (80%), 1 (6.7%) 1

682 12 (13.3%) 11 (Fig.

1 1 (3 ~ 30 ) 1,2,3). 가

. 12 가 7 , 가 5 가 3 (metal failure)가 1

, 30 60 가 11 (Fig. 4).

18

5 가

4

12 8 (66%)

3 , 2 가 80% 가

1/3

가

9 , 4 , 가 가

7 , 1 ,

2 가 . 10% <sup>3,6)</sup> , 8 5%

Sakellari<sup>8)</sup>가

1)

0.1 ~ 1.9%

<sup>3,5,6,8)</sup> .

12 9

2 ,1 . 682 12 가

1.75% : 가 —

Rhieneland<sup>7)</sup> Wilkins<sup>8)</sup>

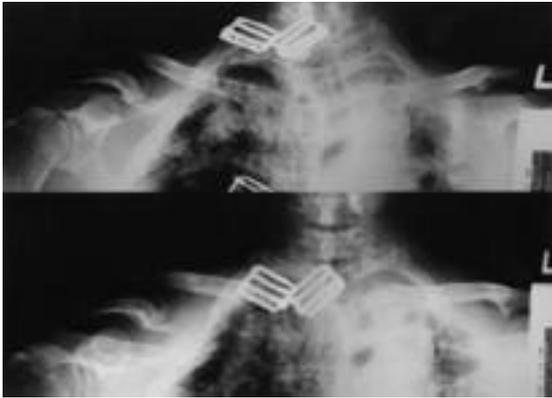
4 8

Sakellari<sup>9)</sup> 가 Wilkins<sup>10)</sup> 가

8 (75%) 6 12 11 12 11

4 1 가 8 가

(66%) 가



**Fig. 1.** Fracture of mid-shaft clavicle nonunion in 31-year-old man. Pre-op posteroanterior (PA) and lordotic view shows wide separation of fracture fragment with sclerotic margin.



**Fig. 2.** Post-op PA and lordotic view



**Fig. 3.** Post-op 6 months after operation, PA and lordotic view shows good union.



**Fig. 4.** In 45-year-old man with alcoholic abuse, 3 months after operation, metal failure developed in PA and lordotic view.

가 가 , (13.3%) 11 (Metal Failure)가 1  
가 가

1) , 2)  
가

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<sup>2,4)</sup> Wilkins Johnson<sup>10)</sup>  
75%

1) , , , :  
19-2 : 367-372, 1984.

가 가  
12 (Recon-  
struction plate) 가 1  
11 3

- 2) , :  
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semitubular plate small DCP  
Reconstruction plate  
가

1995 8 2003 3  
682 12  
10 (80%), 1 (6.7%) 1