



13, 3, 2000 7

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Kirschner

Danis-Weber B

. . . .

&lt; &gt;

: Danis-Weber B

: 13 Danis-Weber B 73  
(1, 36), 2 (2, 13)

K 가 (3, 24) , 가 Meyer 가

: 1 0.44mm, 3 0.17mm  
(p = 0.003) 가 ,  
3 가 가

: Danis-Weber B K

: , Danis-Weber B , K

가 가 2,3,8)

Danis-Weber B

:

1 280-1

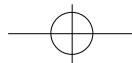
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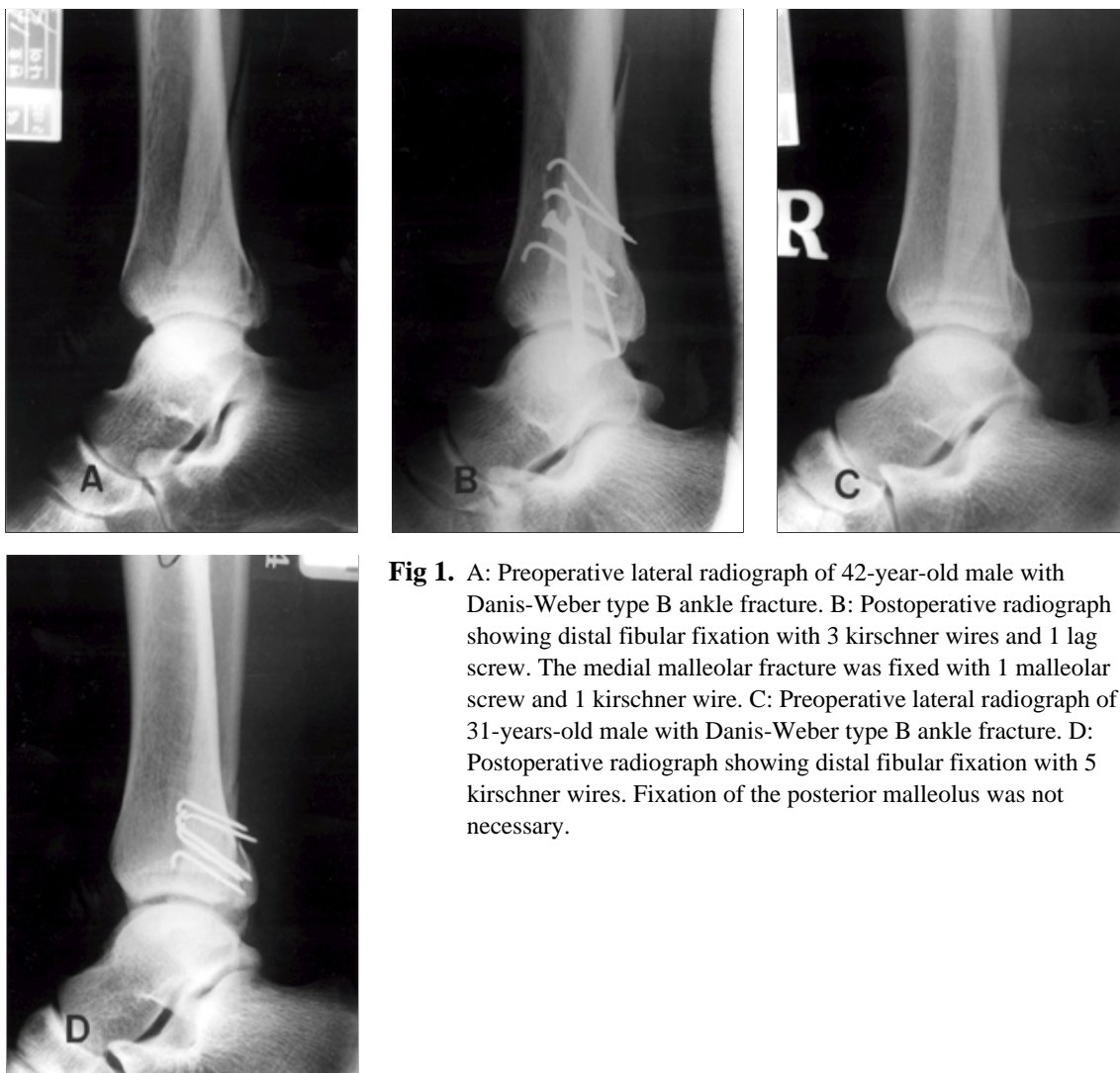
: Group ) 36 (49.3%), 2  
 (2 ; Group ) 13 (17.8%),  
 6,7,9) 2 K (3 ; Group ) 24  
 (32.9 %) (Fig. 1).  
 1 36 18 1.3 K  
 2  
 13 1 3  
 5 1.6 K . 3  
 24 K 8  
 가 2 5,13,14).  
 Weber B Danis-  
 K K 3.8 1  
 K K 2.4 16  
 가 36 , 37  
 16 83  
 47.6 41 50 가 21 (28 %) 가  
 가  
 55 , 가 7 ,  
 6 , 5  
 71 , 2  
 8 2 3 13 .  
 4  
 1995 3 1998 12  
 8  
 159  
 8 가 가  
 111 Danis-Weber 2  
 A 13 , B 75 , C 23 B 가  
 75 가 2 73  
 (Table 1).  
 Danis-Weber B 73 Rolfe<sup>10)</sup>  
 (Bimalleolar angle; BMA)  
 (1

**Table 1.** Internal Fixation Methods of the Fibular Fracture in Ankle Injury

IF* \ D-W type†	A	B	C	Total
Group ‡	2	36	6	44
Group §	2	13	15	30
Group	8	24	1	33
Others	1	2	1	4
Total	13	75	23	111

\*, Internal fixation; †, Danis-Weber classification type; ‡, Plate

§ More than 2 lag screws; , Multiple K wires with less than 1 lag screw.



**Fig 1.** A: Preoperative lateral radiograph of 42-year-old male with Danis-Weber type B ankle fracture. B: Postoperative radiograph showing distal fibular fixation with 3 kirschner wires and 1 lag screw. The medial malleolar fracture was fixed with 1 malleolar screw and 1 kirschner wire. C: Preoperative lateral radiograph of 31-year-old male with Danis-Weber type B ankle fracture. D: Postoperative radiograph showing distal fibular fixation with 5 kirschner wires. Fixation of the posterior malleolus was not necessary.

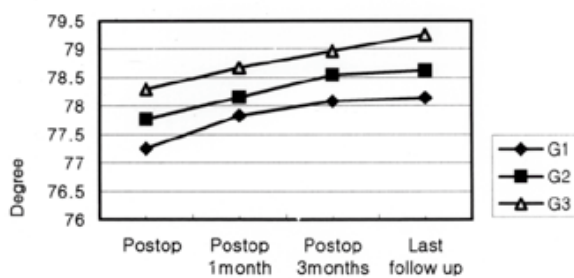
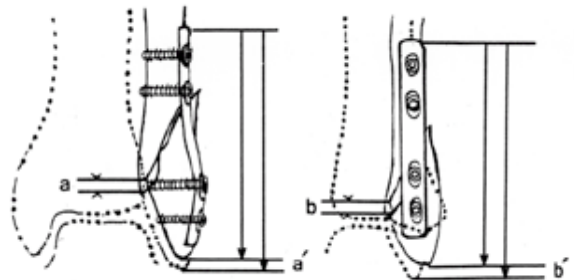
(mortise view) (p-value) 0.05  
 가  
 SPSS for windows(Ver 7.5)  
 Meyer<sup>7)</sup>  
 1 3 가 : , : 15  
 (axial displacement) 가 : , : 15  
 가 가 . 30  
 가 가 : 30  
 chi-square test  
 (p) 0.05  
 (Fig. 2 and 3). ANOVA .

**Table 2.** Radiological Assess at Follow-up.

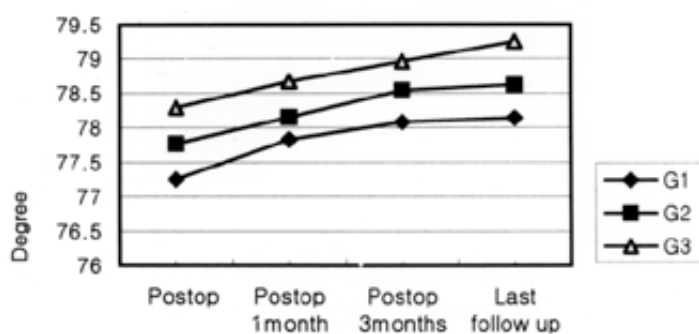
	Group	Post-op	Post-op 1 month	Post-op 3 months	Last follow up	Fibular shortening mean $\pm$ SD †	P-value
BMA * (degree)	Gr.	77.25	77.83	78.08	78.14	$0.89 \pm 0.57$	0.825
	Gr.	77.77	78.15	78.54	78.62	$0.85 \pm 0.69$	
	Gr.	78.29	78.67	78.96	79.25	$0.96 \pm 0.46$	
Axial Displacement on A-P view (mm)	Gr.	0.44	0.58	0.64		$0.20 \pm 0.22$	0.136
	Gr.	0.21	0.41	0.54		$0.33 \pm 0.29$	
	Gr.	0.17	0.33	0.47		$0.30 \pm 0.24$	
Axial Displacement on lateral view (mm)	Gr.	0.49	0.71	0.78		$0.29 \pm 0.29$	0.081
	Gr.	0.42	0.55	0.75		$0.33 \pm 0.25$	
	Gr.	0.48	0.67	0.79		$0.31 \pm 0.29$	

\* , Bimalleolar angle; † , Standard deviation.

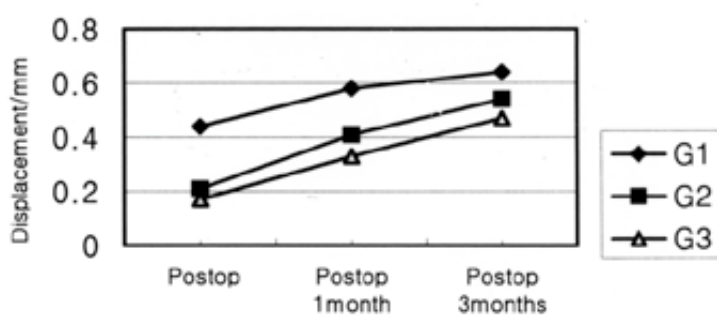
Fibular shortening was a change from post-op. to last measurement of the BMA angles or axial displacement. P value, ANOVA.

**Fig 2.** Postoperative illustrations of the axial displacement on the anteroposterior and lateral view. We chose more accessible site(a or a', b or b') for measurement.**Fig 3.** The alternative method to measure the increment of the axial displacement when definite landmark exist(a or a', b or b').

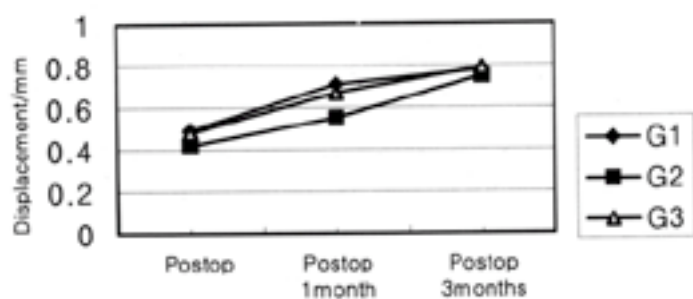
			0.44mm, 2	0.21mm	3	0.17mm
			1	3		
1.			(p=0.003)		1	2
					(p=0.052).	
	1	0.89 ± 0.57 °; 2		1	0.49mm, 2	0.42mm
		0.85 ± 0.69 °				3
3		0.96 ± 0.46 °	0.48mm			
		(p=0.825) (Table 2, Fig. 4).		(p=0.941).		가 가
			1	3		가
					1	0.20 ± 0.22mm, 2
						0.33 ±



**Fig 4.** BMA results at follow up.



**Fig 5.** Axial displacement on anteroposterior view.



**Fig 6.** Axial displacement on the lateral view.

0.29mm 3 0.30 ±  
0.24mm  
(p=0.136)  
1 0.29 ± 0.29mm, 2  
0.33 ± 0.25mm 3  
0.31 ± 0.29mm  
(p=0.081)(Table 2,  
Fig. 5 and 6).

3 1

가

가

가 가 .

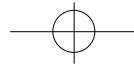
2.  
Meyer

1  
76.3%, 2 75.0%,  
3 76.0%  
1 5.3%, 2 8.3%,  
3 4.0%

(p=0.4718)(Table 3).

3.  
1 3

, 2 1  
가

**Table 3.** Clinical Result in Meyer 's Criteria.

Result	Group	Group	Group
Excellent	20(55.6%)	3(23.1%)	9(37.5%)
Good	8(22.2%)	7(53.8%)	10(41.7%)
Fair	5(13.9%)	2(15.4%)	3(12.5%)
Poor	3(8.3%)	1(7.7%)	2(8.3%)

2

가

가

K

K

가

가

가

Rolfe가

3,6,13)

10,11)

Sarkisian<sup>12)</sup>

(Talocrural

angle)

Rolfe

1 °

1mm

10)

(anatomical landmark)

11)

Danis-Weber B

가 (

75-86 ° ;

72-86 ° )

가 ,

가

3.0 °

2.5 °

K- , ,

6,13)

가

10),

가

1).

가

(Fig. 2).

가

4).

4,5,6,14)

(bending)

(torsion)

가

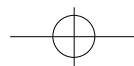
2

. 2

(Fig. 3)

3

1



Danis-Weber B 2

K

, , , , ,  
6,11)

Danis-Weber B

2

K

가

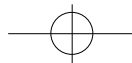
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## Abstract

## The Treatment of Danis-Weber Type B Fractures of the Distal Fibula by Multiple Kirschner Wires Fixation

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**Purpose :** To evaluate the accuracy of reduction and stability of fixation according to different methods of internal fixation for the Danis-Weber classification type B fractures of the distal fibula.

**Material and Methods :** Seventy-three cases with follow up of average 13 months were divided into three groups: plate fixation(Group , 36), more than two lag screws fixation (Group , 13) and multiple K wires fixation with less than one lag screw(Group , 24). We measured the bimalleolar angle and axial displacement of the fracture ends for radiographic evaluation, and used the Meyer 's classification for clinical evaluation.

**Results :** There was significant difference of postoperative fibular shortening between group (0.44mm) and (0.17mm) on the anteroposterior view( $p=0.003$ ), but no difference of it on the lateral view. The changes of bimalleolar angle and the increment of fibular shortening showed no significant difference among three groups.

**Conclusion :** Multiple K wires fixation combined with less than one lag screw for Danis-Weber type B fractures of distal fibula demonstrated that it provides accurate reduction and stable internal fixation.

**Key Words :** Distal fibula, Danis-Weber classification type B fractures, Multiple K wires fixation.

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