Ankle fractures treated with a stabilizing shoe

Adelgunde V. C. M. Zeegers, Jos J. A. M. Van Raay and Christian van der Werken

Twenty-four patients with a Lauge-Hansen Stage II supination-eversion fracture of the lateral malleolus were treated with a stabilizing shoe, which prevents supination and eversion of the foot, but allows a tibiotalar motion. In 23 patients the result was excellent, without secondary dislocation during healing. We therefore conclude that this fracture type can be treated functionally.

Several series with a long follow-up (Yde and Kristensen 1980, Bauer et al. 1985, Cedell 1985, Kristensen et al. 1985) have demonstrated that the supination-eversion Stage II fracture of the lateral melleolus (Lauge-Hansen 1948) has a high intrinsic stability. This stability is due to the intact posterior tibiofibular ligament and the tension-band effect of the peroneal tendons. The fracture seldom causes arthrosis even when healed with a displacement up to 3 mm (Bauer et al. 1985). Based on our favorable experience with the Adidas Adimed Stable Shoe in treating lateral ligament ruptures of the ankle (Riemenschneider 1983, Biegler 1985, Eggert 1986), we have used this shoe to treat the supination-eversion Stage II ankle fractures.

Patients and methods

A stabilizing shoe (Adidas Adimed Specialschuh®; Figure 1) was developed by Spring (1981) for the functional treatment after lateral ankle ligament reconstruction. The shoe is high-laced and reinforced laterally to allow flexion and extension in the tibiotalar joint without supination, pronation, eversion, and inversion of the foot. The patient can walk normally without crutches. Patients with sutured lateral ankle ligaments walking in the shoe went back to work 3 weeks earlier than those with postoperative cast fixation.

From April 1986 to September 1987, all the patients between 15 and 60 years of age admitted to our emergency department with a fresh Type SE-II fracture with a dislocation less than 2 mm in any direction were included in the series. Rupture of the deltoid ligament in association with the lateral malleolus fracture, signifying a supination-eversion fracture Stage IV, was excluded by clinical and radiographic examination (Seligson et al. 1986).

Figure 1. The stabilizing shoe.

Department of Surgery, St. Elisabeth Hospital, Tilburg, The Netherlands

Correspondence: Dr. A. V. C. M. Zeegers, Department of Orthopedics, St. Maartens Kliniek, Hengstdal 3, 6522 JV Nijmegen, The Netherlands

Table 1. 24 functionally treated supination-eversion Stage II ankle fractures

Case	Sex	Age	A	B	C	D	E	F	G	H	I	J
1	m	57	1.0	1,0	3	1	0	21	0	0	0	0
2	f	15	0	0	10	1	0	22	0	0	0	0
3	f	52	0	0	1	1	0	20	0	0	0	0
4	f	15	2,0	0,5	3	1	0	19	0	0	0	0
5	m	30	1.0	0	1	1	0	19	0	0	0	0
6	m	36	2,0	2,0	4	1	0	18	0	0	0	0
7	f	35	1.0	0	3	1	0	18	5	0	0	0
8	m	25	1,0	1,0	7	1	0	18	0	5	0	0
9	f	37	1,0	1,0	3	1	1	15	0	0	0	0
10	f	33	1.0	0,5	5	1	0	16	5	5	5	5
11	m	26	0,5	0	4	1	0	15	0	0	0	0
12	m	42	2,0	1,0	6	3	1	17	0	0	0	0
13	m	56	0,5	0	3	1	1	15	0	0	0	0
14	f	18	0,5	1,0	6	8	1	14	0	5	0	0
15	m	21	0.5	0	5	1	1	14	0	0	0	0
16	m	32	2,0	2,0	2	1	0	13	10	0	0	0
17	f	19	2,0	1,0	4	1	0	13	0	0	0	0
18	m	25	2,0	0,5	1	1	0	13	0	0	0	0
19	f	27	0,5	0,5	5	1	1	9	0	5	5	5
20	f	43	2,0	0	4	1	1	8	0	0	0	0
21	f	26	1,5	0,5	7	1	0	9	0	0	0	0
22	f	59	0,5	1,0	5	1	0	15	0	0	0	0
23	m	27	1,0	1,0	3	1	0	7	0	0	0	0
24	m	24	1,0	0,5	7	1	0	7	0	0	0	0

A primary lateral dislocation
B primary dorsal dislocation
C pain score after 2 weeks
D pain score after 6 weeks
E pain at follow-up: 0 no, 1 yes
F follow-up time (mon)
G loss of dorsal flexion
H loss of plantar flexion
I loss of inversion
J loss of eversion (degrees)

Cases 10, 17, and 19 had lateral ankle swelling, and Cases 12, 19, and 20 had tenderness at follow-up.

Twenty-four consecutive patients were treated with the stabilizing shoe. The group consisted of 12 men and 12 women with a mean age of 33 years (Table 1). The mean initial dislocation measured at the initial radiographs was 1.1 mm in the lateral direction and 0.6 mm in the dorsal direction. All the patients were initially treated in a pressure bandage combined with a splint for 1 week to diminish pain and swelling. After that week the Adidas Adimed Stable Shoe, which is available in all common sizes, was applied over an elastic Struva® sock. To estimate the size, the circumference of the lower leg was measured at three levels. In bed only the Struva sock and not the shoe was worn. All the patients were immediately mobilized to bear weight progressively depending on pain and swelling using crutches as they wished. During treatment the patients were asked to scale their pain from 1 to 10 weekly (1 no pain, 210 unbearable pain).

After 2 and 3 weeks, radiographs were taken through the shoe (Figure 2) in the neutral position and in maximal plantar and dorsal flexion.

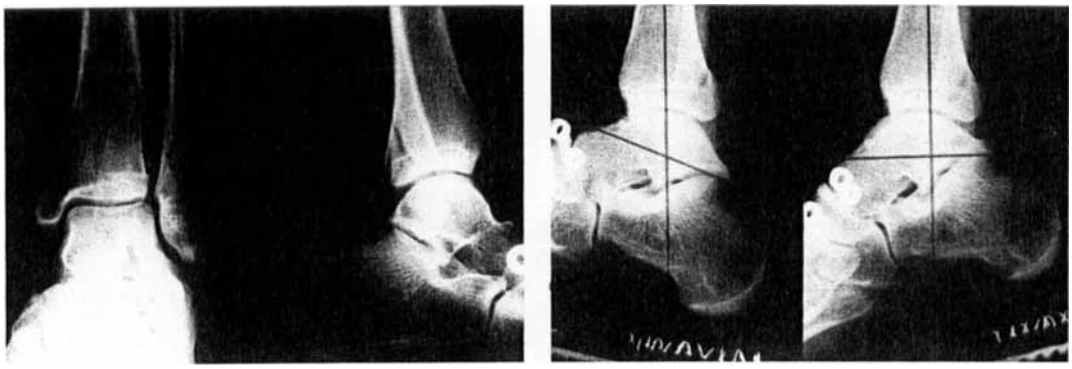
After 6 weeks, the shoe was removed followed by a final radiograph.

All the patients were examined clinically and radiographically after 15 (6–22) months. History of pain, swelling, and activities were recorded. Swelling, stability of the ankle joint, and ranges of motion were compared with the uninjured side.

Results

During treatment there were no complications, and there was no increase of the dislocation. In 23 cases the fracture healed in its initial position. A 33-year-old female with epilepsy and severe mental retardation (Case 10) developed an asymptomatic pseudarthrosis, which was operated on.

Two weeks after the injury, the median pain score was 4; 9 patients were more or less free from pain, walking without crutches, and 6 patients had returned



Neutral position.

Maximal plantar and dorsal flexion. No secondary dislocation of the fracture, which healed in its initial position.

Figure 2. Case 4. Radiograph taken through the stabilizing shoe after 1 week's use.

to work. After 6 weeks, the pain score was 1; only 1 patient was still using one crutch, and 16 of the patients were working again.

At follow-up 7 patients had some pain, and 6 had mild periodic swelling usually after exertion. Four patients had negligible pain, and 3 complained of moderate pain after exertion. Of the 13 active athletes, 11 had resumed preaccident activities without complaints or restrictions. Three patients had slight tenderness upon palpation of the lateral malleolus, and 3 patients had minimal swelling. On the average, there was no relevant decrease of motion in the ankle joint (Table 1). Only 4 patients were treated with physiotherapy in the period from the day of the accident to the day of follow-up.

Discussion

Our study confirms that the supination-eversion Stage II fracture is stable and allows conservative, even functional, treatment. Our treatment was based on the principle of prevention of the mechanism of injury—namely, supination and eversion of the foot, leaving plantar and dorsal flexion of the ankle joint free. However, our only case of nonunion suggests that the shoe should only be used in patients who are able to cooperate fully. All the patients were satisfied with their shoe, which seemed more convenient than a plaster cast. We conclude that a stabilizing shoe is a convenient way of treating the supination-eversion fracture Stage II, making the off-work period very short.

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