# Treatment of acute ankle sprain

## Comparison of a semi-rigid ankle brace and compression bandage in 73 patients

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**We randomized 73 patients with grades II and III ankle sprain to treatment with an Air-Stirrup® ankle brace or a compression bandage. All patients were instructed to attempt early motion and weight bearing when comfortable. Ankle function was evaluated after 3–5 days and 2, 4, and 10 weeks with a clinical examination, the Sickness Impact Profile questionnaire, Karlsson's scoring scale and recording of sick leaves. The group treated with the Air-Stirrup® ankle brace was more mobile in the initial phase of rehabilitation and had a shorter sick leave. Ankle brace treatment resulted in socioeconomic savings.**

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Functional treatment of ankle sprains with bandaging, early motion and weight bearing gives good results, with an early return to activity at the previous level and a low incidence of late symptoms (Broström 1966, Klein et al. 1991, 1993). In the study by Klein et al. (1993), there was no difference in radiographic stability between immobilization in a cast for 6 weeks and functional treatment in an Air-Stirrup® ankle brace. We compared the early clinical outcome of the Air-Stirrup® ankle brace treatment with compression bandage and evaluated the potential cost savings gained by the use of the brace.

## Patients and methods

Inclusion criteria were: patients (aged 15–55 years) with an ankle joint supination trauma of grades II and III, normal radiographs and time from injury to treatment less than 24 hours. Patients with recurrent sprains, neurological diseases or other injuries in the lower extremities were excluded.

At the time of the initial examination, the patients were allocated at random to either treatment with a compression bandage or an Aircast Air-Stirrup® ankle brace for 3 weeks. Both groups were instructed to attempt early motion and weight bearing when comfortable. Follow-up examination was performed after 3–5 days and 2, 4, and 10 weeks after the injury and included:

1. Clinical examination with regard to localized tenderness, degree of swelling and range of plantar flexion-dorsiflexion of the ankle.

2. SIP score. The Sickness Impact Profile (SIP) is a self-scoring questionnaire that includes physical, psychological and social aspects of well-being. The questionnaire quantifies the impact of the injury on everyday life, and the test is useful in detecting therapeutic changes in patients with disabilities in the musculoskeletal system (Augustinsson et al. 1986, Sullivan et al. 1986, Sullivan 1988). For this study, we used the Physical Dimension covering sleep and rest, household, mobility, ambulation and recreation.

3. Recording of sick leave from work.

4. Karlsson's score for the evaluation of ankle function in a modified form for acute injuries with a maximum score of 85 points. This score was developed for the evaluation of chronic lateral instability of the ankle joint (Karlsson and Peterson 1991), but can also be used to evaluate ankle function after acute injuries.

73 consecutive patients were included in the study, 48 men and 25 women. The mean age was 28 years. 2 out of 3 injuries involved the right ankle and the ratio of grade II to grade III injuries was approximately 2:1. There was no difference between the groups regarding these data. The groups were also similar with regard to type of employment. 39 patients were treated with an ankle brace and 34 with a compression bandage. 58 patients completed the 10-week follow-up. The Student's t-test and analysis of variance, ANOVA, were used for statistical analysis. For the analysis of the Sickness Impact Profile, a non-parametric statistical method was used (Mann-Whitney).

Table 1. The active range of motion in dorsiflexion-plantar flexion at follow-up. Values are percentage of the uninjured ankle

| Follow-up | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| Group | | | | |
| Air-Stirrup | 65 | 77 | 84 | 95 |
| Compression bandage | 58 | 77 | 86 | 87 |

Table 2. Karlsson's functional score at follow-up

| Follow-up | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| Group | | | | |
| Air-Stirrup | 23 | 53 | 63 | 71 |
| Compression bandage | 20 | 57 | 64 | 73 |

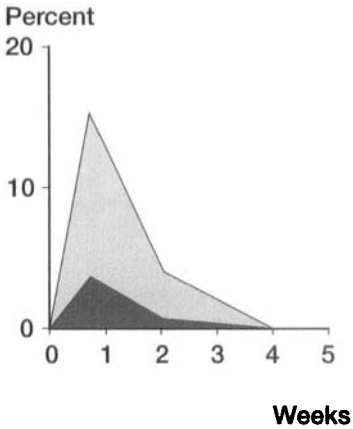


Figure 1. The figure shows the Sickness Impact Profile scores for the item mobility. The higher the score, the larger the impact of the injury on the mobility of the patient. Dark grey is Air-Stirrup and light grey is compression.

## Results

### *Clinical examination*

There was no difference between the groups in dorsiflexion-plantar flexion during the follow-up period (Table 1).

At the first follow-up, the women showed a more restricted range of motion in the injured ankle than the men ($p < 0.05$). This difference was not noted in the following examinations.

### *Score profile*

The group treated with compression bandages demonstrated higher SIP-scores at the examinations 3–5 days and 2 weeks after the injury. However, with the exception of mobility, the difference was not significant. The patients in the ankle brace group were more mobile in the first week after the injury than the group treated with a compression bandage ($p < 0.05$) (Figure 1). The SIP scores after 4 and 10 weeks were low for both groups, which means little impact of the injury on daily living.

The women demonstrated higher scores than the men at the 2-week follow-up regarding sleep and rest ($p < 0.01$), mobility ($p < 0.05$) and total score ($p < 0.05$). This difference was not noted in the following examinations.

The modified Karlsson's functional score did not differ between the treatment groups (Table 2).

The women scored lower than the men at the 2-week follow-up ($p < 0.05$). This difference was not noted at the following examinations.

### *Sick leave*

The sick-leave in the group using compression bandage was 9.1 (0–21) days, compared with 5.3 (0–26) days in the ankle brace group ($p < 0.05$). One third of the patients in the ankle brace group reported no sick leave at all, compared to one fifth in the compression bandage group.

### *Socioeconomic cost*

The mean socioeconomic cost (the daily income and the employer's expenses) per sick day per patient was USD 67 (SEK 481). The savings for the community were estimated at USD 237 (SEK 1750) per patient per injury.

## Discussion

Sommer and Schreiber (1993) found functional treatment to be superior to immobilization in a cast regarding both ankle stability and the cost of treatment. In our study, the costs of treatment either with an ankle brace or a compression bandage were equal, with the exception that an ankle brace is about USD 34 (SEK 250) more expensive than a compression bandage. In contrast to a compression bandage, it is easy to use, comfortable and can be used for a long period. Therefore it may be assumed that the patient's compliance would be better with an ankle brace. The mobility of the patients with an ankle brace was better during the first week, which also resulted in a shorter sick leave.

According to our findings, the socioeconomic savings are potentially significant with ankle brace treatment after an ankle sprain. The cost of the brace was already regained after a half-day earlier return to work, while the difference between the groups was 4

days of sick leave.

On a national basis, the potential yearly savings in Sweden using this treatment (based on the incidence in de Loës' study (1990)) was estimated to be USD 8 million (SEK 61 million). In the study by de Loës, some of the injuries probably were minor or grade I. The incidence is based on injuries in sports. The fact that in our study a minority (48%) of the injuries occurred during sport activities means that our calculated savings could be even higher.

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