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# Taping the ankle for chronic instability

Twenty patients with chronic ankle instability were examined radiographically for anterior talar displacement and talar tilting. The examinations were carried out with the ankles untaped and taped, and the taped ankles were examined again after 20 min running. The measurable instability was significantly improved after taping, but after exercise this was seen only for talar tilting. Generally, the best stabilizing effect of taping was obtained in the ankles with the greatest degree of instability. After exercise, all but one of the adhesive taping bandages were loose and were mostly acting as canvas boots, affording the ankle only limited protection.

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Strapping the ankle with adhesive tape is widely used by athletes to prevent ankle injury or reinjury in those with chronic instability. Adhesive taping is an effective method of preventing edema and adhesions. Other important factors in its use are active muscle massage and a possibly improved proprioception (Bullard et al. 1979). The most commonly used adhesive taping method for protecting the ankle and subtalar joints consists of a basket weave combined with a heel lock and stirrup (Bullard et al. 1979, Rarick et al. 1962 and Garrick & Requa 1973).

The purpose of this study was to measure the support given by adhesive tape in ankles with chronic instability before and after exercise.

## Material and methods

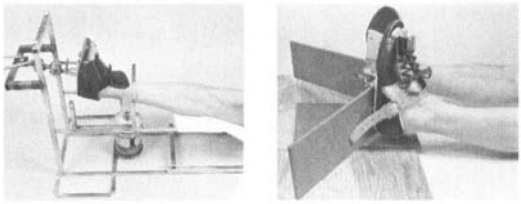
### Methods

The ankles were radiographically examined for anterior displacement (AD) and talar tilting (TT). In both examinations the foot was fixed in an adjustable, laced shoe with a soft leather front and a hard, nonflexible heelcounter (Figure 1). The shoes used in the examination for TT were supplemented by an adjustable leather strap in front and hard leather on the sides of the calcaneus.

In both examinations the apparatus secured the ankle joint at 10° plantar flexion and 25° inward rotation. All examinations were carried out by the author. The exposures for AD were made with and without a 9 kg load placed 5 cm above the apex of the lateral malleolus for at least 3 min. The measurements on the radiographs were carried out according to Lindstrand & Mortensson (1977) for the anterior displacement index (Figure 2). A displacement index of 90 was taken as the normal upper borderline value. The exposures for TT were made without stress and with maximal inversion of the foot. The open lateral angle between the surfaces of the tibia and the talus was measured in degrees (Figure 2). Six degrees was considered as the normal upper borderline value.

If the measurements disclosed positive AD and/or TT in an untaped ankle, adhesive tape was applied. New exposures were performed immediately after taping and after 20 min running on uneven ground; this also involved starts, stops and jumping.

Before taping, the skin was shaved, cleaned with 62 per cent ethylethanol and dried thoroughly to remove hair, perspiration, dry skin, etc. To obtain maximum support the adhesive tape was applied directly to the skin. The non-elastic adhesive tape (Mueller®) used was 1.5 inches in width, supplemented by



A B

Figure 1. Provocation of the ankle for radiographic examination of anterior displacement (A) and tilt of the talus (B).

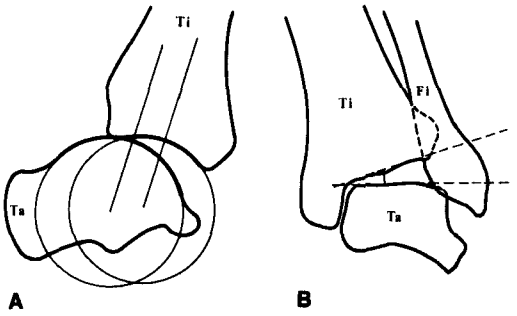



Figure 2. Radiographic analysis of anterior displacement (A) and tilt (B) of the talus. The displacement index was obtained by dividing the perpendicular distance between the two lines by the distance of the sagittal length of the tibial joint surface and multiplying by 1000 (Lindstrand & Mortensson 1977).

slightly elastic 3-inch wide tensoplast. The taping procedure was standardized and all strappings were applied by the author.

Non-parametric tests were used in the statistical analysis.

## Material

The series comprised 16 men and four women with chronic ankle instability, all previously active in sports; the median age in the men was 24 (17–44) years and in the women 20 (17–29) years. All patients were later operated by a modified Evans procedure. The initial ankle sprain had been caused during football in eight patients, handball in five, basketball in two, and each of badminton, skiing, running, trampolining and stairwalking in one patient.

The duration of ankle instability symptoms varied from 6 months to 13 years (median 4 years). All patients except two had ceased their sports activities because of ankle instability.

Sixteen patients complained of pain in relation to activity. Fifteen of the patients had been active in competitive sports. Sixteen of the patients had used some kind of external support during sports activity.

## Results

Eight patients with untaped ankles had a displacement index below 90; all eight patients had talar tinting of the untaped ankle of at least 7 degrees.

In general, the best results from taping were obtained in ankles with the highest displacement indices (Figure 3). In the total material there was a reduction in displacement between the untaped and the taped ankles averaging 128 to 74, i.e. an improvement of 42 per cent (Mann-Whitney test, $p < 0.02$).

After 20 min running, the average displacement index of the ankles was 105, i.e. reduction in the initial taping effect of 24 per cent, and not different from the untaped ankles (Mann-Whitney test, $p > 0.10$).

In two patients the displacement index increased with tape and after running, and must be interpreted as an exhaustion phenomenon.

Four patients had tilting of 6 degrees or less; all four patients had a displacement index of at least 106. Also in these patients, the best mechanical stability after taping was obtained in the ankles with the greatest talar tilting (Figure 4). Between the untaped and taped ankles there was a reduction in talar tilting averaging from 10.3 degrees to 5.3 degrees, i.e. an improvement of 48 per cent (Mann-Whitney test, $p < 0.002$).

After 20 min running, the average talar tilt was 7.3 degrees, i.e. a reduction in the initial taping effect of 19 per cent, but nevertheless significant (Mann-Whitney test, $p < 0.02$).

In two patients there was no measurable stabilizing effect of taping, and in one of them talar tilting after taping and running was

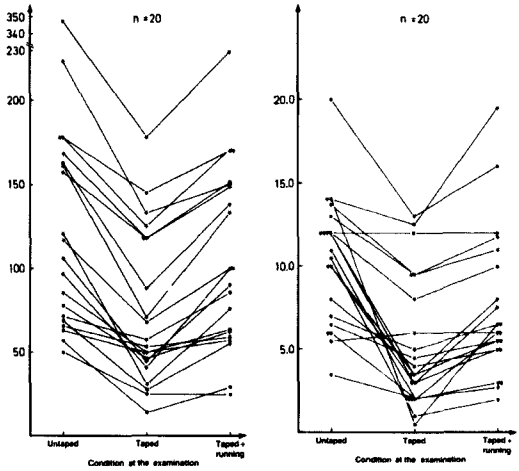



Figure 3. The displacement indices of the ankles untaped, taped and taped after 20 min running.

Figure 4. The talar tilting, in degrees, of the ankles untaped, taped and taped after 20 min running.

greater than before, presumably because of exhaustion.

Compared with the untaped ankles, the taped ankles showed no cases of reduction in the total dorsal or plantar flexion of more than 10 degrees.

After running, four patients complained that the tape had tightened. Eighteen patients felt that running with the tape gave better stability than running without. In all cases except one, the tape had loosened after running because of perspiration. No skin lesions were seen.

## Discussion

Garrick & Requa (1973) found the incidence of ankle sprains in 2562 participants in a college intramural basketball program to be 6.5 per 1000 with and 33 per 1000 without taping. However, the methods of taping and the degree of lesions in the sprained ankles were not described, nor was the number of participants with previously sprained ankles reported.

Rarick et al. (1962) assembled a device to measure the resistance of four different strappings while the subject's foot was passively moved in plantar flexion and inversion. The examination was performed with taped ankles before activity and after a 10-min period of standardized activity in four normal men. The greatest support was provided with a basket weave in combination with stirrup and heel lock, and was, thus, the taping method chosen. In most instances they found the measurable holding power to be approximately 40 per cent lower after exercise.

In this study, taping gave the best support to the patients with the highest degree of ankle instability. This is best explained by the elasticity of the skin and the repeated sliding movements between skin and muscular fasciae during activity: in lower degrees of ankle instability this will partly or totally compensate for the stabilizing effect of the tape.

The general loosening of tape adhesiveness is due to perspiration and the unevenness of the skin during muscle activity, and also to the interchanging movements between tape and skin during activity. In some cases the tape mostly functioned as a canvas boot. Skin preparation before taping, and uniform and accurate tape application are also important factors which can explain some of the variability of the support provided.

In the whole material the examinations for anterior displacement and talar tilting showed that, compared with the untaped ankles, the taped ankles were significantly more stabilized. After exercise this could only be measured in the examination for talar tilting. The results are in accordance with those of Rarick et al. (1962). Whether the increase in external support given by taping suffices to prevent new ankle sprains was not clarified in this study.

Taping alone is clearly not sufficient for many athletes with chronic ankle instability: our patients sought treatment in spite of having used external support during sports activities.

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