The Effect of Taping on Ankle Stability
Practical Implications

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Summary
Ankle ligamentous injuries are very common in sports. One of the most popular methods of supporting the weakened ankle is external support with ankle tape. The tape can be used to prevent ankle injuries, to stabilise the injured ankle to prevent further injury, and as a stabiliser during the rehabilitation phase. Of the various taping methods, basket weaves (combined with stirrup and a heel-lock) are the most effective for increasing the mechanical stability of the ankle, especially in the frontal plane (talar tilt). A combination of increased mechanical stability, decreased range of ankle motion and an improvement in the proprioceptive function of the ankle ligaments are factors associated with effectiveness of ankle taping. The major drawbacks of ankle taping are the high costs and decreased support after exercise.

Injuries to the ankle ligaments are among the most common injuries to the lower extremities, especially in sports. Between 20 to 25% of time lost to injuries in running and jumping sports involve the ankle (Mack 1982). Chronic ankle joint instability, mechanical and/or functional, is common amongst athletes. Mechanical instability refers to objective measurements (clinical and/or radiological) whereas functional instability is the subjective symptom of repeated giving way. More than 50 different surgical procedures have been described to correct chronic lateral ankle joint instability. Although the results after surgical procedures are satisfactory in most cases (Karlsson 1989; Karlsson et al. 1988, 1989; Karlsson & Lansinger 1990), surgery is time consuming and many athletes prefer other methods of treatment (e.g. functional treatment with continuous training of strength and co-
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ordination, ankle braces, and ankle tape). External support with ankle tape is the most commonly used functional method of supporting the chronically unstable ankle. Many athletes use ankle tape either temporarily or permanently to deal with ankle instability.

1. Chronic Ankle Joint Instability

Chronic ankle joint instability occurs in about 10 to 20% of cases after acute lateral ankle joint ligament ruptures (Balduini et al. 1987; Karlsson et al. 1989). The ankle instability is defined as chronic after 6 months and can be defined as either mechanical instability or functional instability. Mechanical instability is a true ligamentous instability and can be measured using stress radiographs. The correlation between mechanical and functional instability is not constant and not all correlating factors are known. Functional instability is a complex syndrome, with underlying mechanical and neuromuscular factors (Karlsson et al. 1992). Some athletes with functional instability have peroneal muscle weakness and/or proprioceptive deficits (Freeman 1965a,b; Tropp 1985).

2. How Does Ankle Tape Work?

Ankle tape is commonly used among athletes directly after injury, during the rehabilitation phase after injury, and prophylactically to prevent a healthy or previously weakened ankle joint from further injury. However, the mechanism behind the function of ankle tape is not fully understood. Ankle tape is considered effective for 3 possible reasons: (a) reduction of mechanical ankle instability; (b) limitation of extremes of ankle motion; and (c) shortening of the reaction time of the peroneal muscles by affecting the proprioceptive function of the ligaments and joint capsule around the ankle joint and the lower-leg muscles.

2.1 Mechanical Instability

Ankle joint instability is measured by stress radiographs (Karlsson et al. 1991). Static mechanical instability, both in the sagittal plane (anterior talar translation) and the frontal plane (talar tilt) has in several studies been shown to be decreased by the use of ankle tape (Karlsson 1989; Vaes et al. 1984, 1985). Instability in the frontal plane (talar tilt) is better controlled by ankle tape than is sagittal instability. A significant reduction of talar tilt has been shown after ankle taping (Larsen 1984; Vaes et al. 1984, 1985). The support of ankle tape is, however, generally insufficient to eliminate the talar tilt completely. The best protection (decreased mechanical instability) is found in ankles with the highest degree of mechanical instability. Karlsson and Andréasson (1992), however, found the reduction of mechanical ankle instability insignificant with ankle tape, both anterior talar translation and talar tilt, using standardised stress radiographs.

2.2 Limitation of Ankle Motion

Although ankle tape does not normalise mechanical ankle instability, it significantly affects ankle motion. Taping effectively limits the extreme ranges of ankle motion, i.e. partially increases the mechanical stability of the unstable ankle. Ankle tape restricts initial ankle motion and provides significant residual restriction of ankle motion after exercise (Fumich et al. 1981; McCluskey et al. 1976).

Although tape loosens after exercise, the partial increase in mechanical stability by limiting the extremes of ankle motion is probably a significant factor behind the function of ankle tape.

2.3 Functional Instability

A further explanation for the effectiveness of ankle taping is shortening of the reaction time of the peroneus brevis and longus muscles by affecting the proprioceptive function of the ankle ligaments and joint capsule.

The proprioceptive reflex system consists of mechanoreceptors in the ankle ligaments and the joint capsule, connected by afferent nerves to the central nervous system. In the central nervous system, the afferent nerves are connected to the peroneal muscles by the efferent system. After stimu-