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‘Active’ Dynamic Taping for medial longitudinal arch support, applied in the shortened position increases navicular height, reduces foot length and decreases the magnitude of navicular drop between non weight bearing and weight bearing more than ‘non-active’ taping: a preliminary investigation

Background: Several studies have demonstrated increases in navicular drop and velocity of navicular drop in conditions such as medial tibial stress syndrome (MTSS). Anti-pronation taping with a rigid athletic tape has been shown to increase arch height and reduce activity in Tibialis Anterior and Tibialis Posterior during walking. Load has also been reported as the driving factor in tendinopathies.

In contrast to other elastic tapes and approaches i.e. kinesiology taping, Dynamic Taping offers an alternative treatment option and uses a highly elastic (over 200%), four way stretching tape with strong recoil properties. Dynamic Tape can be laminated together (PowerBand ™) to increase the strength of the elastic recoil when required. Dynamic Tape proposes to exert a mechanical effect on the kinetic chain by creating a ‘bungee’ effect. This is in contrast to the primary neurophysiological mechanisms proposed with kinesiology taping (i.e. lifting the skin to create space, take pressure off pain sensitive structures, enhance circulation and promote facilitation or inhibition via the input into the skin).

This ‘bungee’ effect is achieved by placing the Dynamic Tape on with the joint/s and/or muscle/s in a shortened position and with some tension on the tape such that as the body part lengthens, the tape is stretched providing a resistance and deceleration of motion while at the same time storing the energy required to stretch the tape as elastic potential energy. As shortening commences once again, this energy is converted back into kinetic energy to assist motion. It is possible to tape in this way and still permit full range of motion due to the high degree of elasticity, four way stretch and strong recoil.

It is proposed that if applied correctly, the lengthening of the tape can provide a deceleration force and in effect reduce the necessary eccentric demand on the musculotendinous unit and that the recoil can then assist the work of muscle during the transition into the concentric phase. Alternatively, it is suggested that movement patterns may be affected by using the elastic energy of the Dynamic Tape to resist motion in one direction or to pull the body part in another.

Purpose: To evaluate the effect of Dynamic Taping on foot length and navicular height in weight bearing and non weight bearing and to compare the effect of Dynamic Taping with the joints in the ‘shortened’ position as recommended with the same application applied in a more neutral or slightly lengthened position.

Methods: Six asymptomatic subjects were recruited. Measurements were taken of foot length (FL) and navicular height (NH) in weight bearing (WB) and non weight bearing (NWB). Both feet of each subject were measured in the untaped (NT) condition. Feet were then randomly assigned to be actively taped (AT) i.e. applied in the shortened position consisting of plantar flexion, forefoot adduction, inversion and great toe flexion or passively taped (PT) i.e. applied in neutral/lengthened position consisting of dorsi-flexion, great toe neutral or slight extension.

A two-layer Dynamic Tape PowerBand was used in all cases. The same area of skin was covered in the AT and PT to account for the effect that skin contact may have on neuromotor control.

Both measuring investigator and subject were blinded however in retrospect subjects reported that the stronger force imparted by the AT was very obvious however they were given no indication of what to expect or whether such force was desirable.

Results: When compared to the untaped condition (NT), AT produced a mean increase in NH of 6.5mm (range 2mm - 10mm) in NWB and 8.16mm (range 6mm - 10mm) in WB and mean change in FL of - 5.16mm (range -1mm to -11mm) in NWB and -7.6mm in WB (range -1mm to -11mm).

PT produced a mean increase in NH of 3.3mm (range -1 to 10mm) in NWB and 4.3mm (range 0mm - 8mm) in WB and mean change in FL of 0.5mm (range -6 to +3) in NWB and 1.0mm (range in -3 to 5mm) in WB when compared to the NT condition.

The mean change in navicular height between NWB and WB was also evaluated for each condition: NT = 7.3mm, AT = 5.3mm and PT = 6.1mm

Conclusions: Active Dynamic Taping resulted in significantly greater increase in navicular height and reduction in foot length in both weight bearing and non weight bearing with a trend towards a reduction in overall navicular drop when compared to the passive taping and untaped condition. This would support the hypothesis that when applied in a shortened position, the strongly elastic properties of Dynamic Tape can exert a mechanical effect on the foot position.

Passive taping also resulted in considerable change in navicular height compared with the untaped condition. This was greatest in the weight bearing condition. Some neurophysiological mechanism may be responsible however as the passive tape was still placed under additional tension when a neutral foot position was adopted and under increasing tension as body weight was applied a mechanical mechanism cannot be excluded. This is supported by the trend showing that those with larger navicular drops and lower navicular heights in weight bearing when untaped showed the greatest increase in navicular height and reduction in navicular drop in the passive taping condition.

Further neurophysiological mechanisms are not discounted and are in fact anticipated in the AT or PT conditions. Rigid ankle taping has been shown to produce a greater muscle response and shorter reaction time in the peroneus longus muscle in unstable ankles whereas kinesiotaping did not. The authors suggest that this is due to more aggressive pulling on the skin and consequently greater input into the system. It can be hypothesized that the strongly elastic Dynamic Tape PowerBand would pull more aggressively on the skin when applied in the short position so similar changes in muscle activity may also be expected.