Effects of 3 Different Elastic Therapeutic Taping Methods on the Subacromial Joint Space

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Abstract

Objective: The purpose of this study was to examine the effects of 3 different elastic therapeutic taping methods on the subacromial joint space in healthy adults.

Methods: Pre-/post-test laboratory study method was used in this study. Forty-eight healthy adults with no prior history of shoulder injury or surgery and no history of dominant shoulder pain in the past 6 months were enrolled in the study. Participants were placed into 3 groups (8 males and 8 females per group) on the basis of a consecutively assigned allocation design. A baseline measurement of the acromiohumeral distance (AHD) was taken by using diagnostic ultrasonography for every participant. On the basis of group assignment, participants were then taped according to the Kinesio Tape (Kinesio Tex Classic Tape) guidelines in one of 3 conditions: (1) taping of the supraspinatus from insertion to origin; (2) taping of the anterior and posterior deltoids from insertion to origin; and (3) a combination of both techniques. After a 5-minute wait period, the AHD was remeasured with the tape intervention in place, with each participant serving as his or her own control.

Results: Data analysis showed a statistically significant increase in AHD when using the taping technique over the anterior and posterior deltoids (Condition 2). The subacromial space increased in both males and females when the supraspinatus was taped from insertion to origin (Condition 1), but not at a statistically significant level. Condition 3, in which both taping techniques were used simultaneously, did not show an increase at a statistically significant level.

Conclusions: The application of the Kinesio Tape from insertion to muscle origin of the supraspinatus or the anterior and posterior deltoid increased the subacromial joint space. (J Manipulative Physiol Ther 2017;40:494-500)

Key Indexing Terms: *Acromion; Humeral Head; Shoulder Impingement Syndrome; Shoulder Joint*

Introduction

Elastic therapeutic taping has been a treatment option used by allied health care professionals since the 1970s, and there has been an increase in interest with regard to its effectiveness.[1,2] The hypothesis of the tape's developer assumes that the thickness and elasticity of the tape are similar to those of the human skin.[3] Many of these assertions remain uncorroborated, either because no published research exists or because of the conflicting or inconclusive findings from previous studies.[2] For instance, Kase et al have suggested that the application of the Kinesio Tape brand elastic therapeutic tape over the supraspinatus, anterior deltoid, and posterior deltoid from the insertion to the origin of the muscle will reduce pain by increasing space at the subacromial joint.[3] Although some studies have suggested that elastic therapeutic taping can be effective in pain reduction in the shoulder,[4] others have found little evidence of such an effect,[5] and still others have reported a stronger effect in the short term than over longer periods.[6]

Shoulder impingement syndrome (SIS) is one of the most frequent causes of reported pain in individuals who engage in overhead activities.[5,7-9] Shoulder impingement syndrome is often associated with narrowing of the subacromial joint space as a result of damage to the subacromial bursa or compression of the supraspinatus tendon.[6,10,11] However, a recent descriptive summary notes that there is no conclusive evidence to help determine if this narrowing is a cause or a consequence of SIS; a diverse range of intrinsic and extrinsic mechanisms can influence the subacromial space.[12] Previous literature reports that the supraspinatus tendon can be compressed during

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overhead movements,[11] and the pathomechanics of the glenohumeral joint can further disrupt normal muscle balance, causing overactivation of the deltoid muscles.[6] Movement of the glenohumeral joint often causes pain and can lead to dysfunction of upper extremity muscles.[13] Pain at the subacromial joint can lead to alterations in activities of daily living or biomechanics during sport activities.[5,6] Research on the topic suggests that SIS symptoms are improved by exercises and modalities that specifically target the supraspinatus and deltoid muscles.[6,8,11]

Research on the effects of elastic therapeutic taping methods in the shoulder region has focused on the clinical objective of pain reduction or improvement on disability indices as a measure of its effectiveness.[5,6,9] This literature, while critical to the development of future lines of inquiry and current clinical practice, does not objectively quantify any possible physiological changes in the shoulder region that occur as the result of the elastic therapeutic taping methods. Furthermore, study of therapeutic effectiveness in patients with SIS should be paired with endeavors to understand the underlying physiological changes brought about by the application of the Kinesio Tape in healthy individuals. Baseline studies are essential to understanding the effect of elastic therapeutic taping techniques on healthy tissue prior to introducing a specific pathology variable.

One of the few studies that pair quantifiable physiological measurements with pain indices and questionnaires was conducted by Kaya et al.[14] Kaya et al incorporated use of elastic therapeutic taping methods into 1 study condition for patients presenting with SIS to determine its impact on pain levels as well as supraspinatus tendon thickness. Although that study found significant improvement in subjective pain levels in all participants, the results did not include any physiological changes as the result of any of the conditions.[14] The findings suggested that tendon thickness is not affected by elastic therapeutic taping and that other physiological effects may result from the use of the elastic therapeutic taping methods.

Therefore, this study aimed to evaluate the underlying physiological effects of the elastic therapeutic taping methods on the subacromial joint space in healthy individuals by using musculoskeletal diagnostic ultrasonography. This imaging technique is noninvasive and provides real-time images that can quantitatively measure acromiohumeral distance (AHD) while demonstrating excellent measurement reliability in previous studies.[15-18] A pretest/post-test study method was used to examine 3 taping techniques to determine whether AHD increases as a result of the intervention.

Methods

Participants

Forty-eight individuals were recruited to participate in this study. A convenience sample was obtained through word-of-mouth and e-mail recruitment. An equal number of males and females (24 each) were included in the study, ranging in age from 18 to 50 years (mean age 31.95 ± 9.9 years). Participants were considered eligible if they reported no history of dominant shoulder pain in the 6 months prior to the study. More specifically, inclusion criteria were being recreationally active and reporting no shoulder pain or range of motion (ROM) limitations in the past 6 months. To screen for the inclusion criteria, each participant completed a Physical Activity Readiness Questionnaire (PAR-Q) and a Health History Questionnaire. Individuals were excluded from the study if they indicated any of the following on the questionnaires: any prior history of shoulder injury or surgery on the dominant shoulder; any neurologic impairment (ie, Parkinson disease; nerve entrapment; multiple sclerosis; amyotrophic lateral sclerosis; paresthesia); any prior history of general medical conditions involving joints, muscles, bones, or connective tissue (ie, osteoarthritis; rheumatoid arthritis; fibromyalgia; Lyme disease); and reported allergy to adhesive or Kinesio Tex Classic Tape. On the basis of their responses to the questionnaires, all the volunteers were found to be eligible to participate.

The North Dakota State University Institutional Review Board approved the methodology and recruitment of participants. All participants signed an informed consent form and had the opportunity to ask questions about the study prior to consenting to participate. All 48 participants completed the entire study, and there was no attrition.

Study Design and Protocol

This within-subjects study adopted a pretest/post-test research design with elastic therapeutic taping being the intervention of interest. A baseline measurement of the AHD in every participant was obtained by using diagnostic ultrasonography. The diagnostic ultrasonography to obtain baseline and post-test measurements was performed by a clinician with 5.5 years of training and experience in musculoskeletal diagnostic ultrasonography. Baseline raw data measurements of the subacromial joint were collected on the dominant shoulder by using Terason t3200 diagnostic ultrasonography (United Medical Instruments Inc, San Jose, California). Participants were asked to relax the dominant shoulder with the arm hanging to the side of the body and to sit in the upright position.[19] The glenohumeral joint was in the neutral position, with the arm resting at the side of the body and the elbow in extension. This position was chosen because of the high intrarater reliability of diagnostic ultrasonography performed on healthy subjects.[17]

To measure the AHD, Terason t3200 diagnostic ultrasonography with a 15L4 linear transducer (4 MHz to 15 MHz) (Teratech Corporation, Burlington, Massachusetts) was set to the preset shoulder parameters. Aquasonic ultrasound gel (Parker Laboratories, Inc., Fairfield, New Jersey) was applied to the 15L4 linear transducer (4 MHz to 15 MHz) for image acquisition. Scanning was performed on the side of the subject,