Case Report

Effect of scapular elevation taping on scapular depression syndrome: A case report

Jung-Hoon Lee\textsuperscript{a,c} and Won-Gyu Yoo\textsuperscript{b,\ast}

\textsuperscript{a}Department of Physical Therapy, Inje University Pusan Paik Hospital, Inje University, Gimhae, Republic of Korea
\textsuperscript{b}Department of Physical Therapy, College of Biomedical Science and Engineering, Inje University, Gimhae, Republic of Korea
\textsuperscript{c}Department of Physical Therapy, The Graduate School, Inje University, Gimhae, Republic of Korea

Abstract. Objective: This report describes the application of scapular elevation taping (SET) using kinesio tape to elevate the scapula and treat upper trapezius (UT) muscle tenderness in a patient with scapular depression syndrome.

Methods: The patient was a 22-year-old man who had scapular depression and severe tenderness of the right UT. We performed SET for 2 months, 4 days a week, for an average of 9 h each day, to provide scapular elevation.

Results: At the last assessment, the right superior angle of the scapula and the lateral border of the acromion were slightly elevated compared with the spinous process of the second thoracic vertebra. A chest X-ray showed that the right coracoid process was higher compared to the initial level and that the level of the first ribs was similar on both sides. The pressure-pain threshold in the UT increased from 1 to 8 kg and the tenderness at 3 kg, assessed on a numeric rating scale, decreased from 6 to 0. No tenderness occurred when carrying a bag with the right hand or slinging a bag over the right shoulder.

Conclusion: Continuous application of SET may be used as a supplementary method for scapular elevation and reduction in patients with UT tenderness.

Keywords: Kinesio tape, pressure pain threshold, scapular depression syndrome, scapular elevation taping, upper trapezius muscle

1. Introduction

Scapular depression syndrome is characterized by scapular depression that leads to neck and shoulder pain [1]. The scapula is considered to be depressed when the superior angle of the scapula (SAS) is situated below the spinous process of the second thoracic vertebra (SP2) [1,2]. Scapular depression syndrome is associated with lengthening or weakening [1] and a lower pressure pain threshold (PPT) in the upper trapezius (UT) muscle [3]. However, few studies have examined scapular depression syndrome, and few reports have described favorable therapeutic methods of scapular repositioning in patients with scapular depression syndrome.

Kinesio taping is a relatively new treatment technique, which is increasingly becoming an adjunct treatment with other therapeutic methods used for various musculoskeletal and neuromuscular problems [4]. Several recent reports have described that Kinesio taping may stimulate cutaneous mechanoreceptors [5], relieve pain [4,6,7], assist postural alignment [8], and increase muscular bioelectric activity [9,10]. However, the effect of Kinesio taping on scapular malalignment has not been sufficiently studied. Therefore, we describe the application of scapular elevation taping (SET) to elevate the scapula and to treat UT tenderness in a patient with scapular depression syndrome.
2. Case report

The patient was a 22-year-old man who had no specific surgical or medical history of the shoulder. For 2 months, he had experienced severe tenderness in the right UT when carrying a bag in the right hand, slinging a bag over the right shoulder (the patient habitually carried or slung a heavy bag [weight, >10 kg] on his right shoulder for an average of 5 h a day), or elevating the right upper extremity to hold a strap in a bus or subway. He did not undergo any treatment; the severe tenderness in the right UT was relieved when the scapula was passively elevated for achieving normal alignment.

Skin surface landmarks are useful reference points for determining the location of selected bony areas on the scapula and thoracic spine [11]. To assess the position of such relevant landmarks, the examiner marked 3 anatomic references (SAS, the lateral border of the acromion [A], and SP2) with a black pen while the patient was in an upright standing position with his arms to the sides. In an ideal scapular position, SAS and A are on the same level or above SP2. Because the patient’s right SAS and A were lower than SP2, his scapula was found to be depressed compared with the ideal scapular alignment [3] (Fig. 1). In addition, chest X-ray showed that the coracoid process and first rib were lower on the right side than on the left side; thoracic scoliosis was also observed (Fig. 2).

The PPT was measured with an algometer (Pain Test-Model FPK; Wagner Instruments, Greenwich, CT) in the middle of the UT between SP2 and A while the patient was sitting on a stool; the PPT was 1 kg before treatment. The PPT is a useful clinical tool [12] because it is believed to be related to different etiologies, including excessive strain and soft tissue tenderness [13]. The tenderness at 3 kg using an algometer [14], assessed on a numeric rating scale from 0 to 10 (i.e., 0 representing no pain and 10 representing the worst imaginable pain), was 6.

We performed SET for 2 months, 4 days a week, for an average of 9 h each day, to provide scapular elevation. SET was performed by a Kinesio taping expert; the Kinesio tape (KT-X-050; Kinesio Tex, Tokyo, Japan) was stretched to 55–60% of the original length [15]. For SET application, an I-type strip with approximately 75% of the available tension, according to the guideline for stretching reported by Kase [15], was applied. The strip was applied (in this order) while the scapular elevation was passively maintained by an assistant: (1) from the inferior scapular angle towards A (Fig. 3a), (2) from the midpoint of the medial scapular border toward the UT (Fig. 3b), and (3) from the inferior scapular angle towards the cervical spine (Fig. 3c) (Fig. 3; arrow, direction of tape application). To prevent an adverse reaction to the tape, the Kinesio tape was removed immediately if the patient developed itchiness. In addition, carrying a bag by hand or slinging a bag over the shoulder, which contributed to the depressed position of the scapula in the present patient, should be avoided as much as possible [1]. No other physical therapy or home exercise was used to treat the scapular depression or the tenderness of the right UT.

After applying SET for 1 week, the PPT increased from 1 to 3 kg and the tenderness at 3 kg, assessed on
a numeric rating scale, decreased from 6 to 3. After applying SET for 1 month, the PPT increased to 6 kg and the tenderness at 3 kg, assessed on a numeric rating scale, decreased to 0. At the last assessment, following SET for 2 months, the PPT increased to 8 kg and the right SAS and A was slightly elevated compared with SP2. On chest X-ray, the right coracoid process was higher compared to the initial level and the level of the first rib was similar on both sides (Fig. 4). However, a precise match of the location of both scapulae was difficult because of the observed thoracic scoliosis. Tenderness did not occur when the patient elevated his right upper limb, carried a bag in his right hand, or slung a bag over his right shoulder.

3. Discussion

The influence of scapular depression syndrome on neck and shoulder regions was first described by Sahrmann [1]. Symptoms and diagnoses associated with scapular depression syndrome include acromioclavicular joint pain, rotator cuff tear, humeral subluxation, neck pain with or without radiating pain into the arm, thoracic outlet syndrome, pain of the trapezius and levator scapulae muscles, and glenohumeral joint impingement [1]. During glenohumeral joint flexion/abduction, scapular depression leads to insufficient elevation, and the amount of shoulder girdle elevation must increase to compensate for the depressed starting position [1]. In addition, prolonged time in the depressed scapular position may lead to chronic increased tension, pain, and decreased PPT in the UT [3] and scapula elevator muscles [1]. Although the relationship between alignment and pain is still unclear, alignment is known to be one of numerous factors contributing to the development of mechanical pain [16]. Data on previously reported cases of healthy young people with scapular depression have shown that their PPT values for the UT muscle were lower than those for healthy young people with an ideal scapular position [3].

The most important treatment for scapular depression syndrome is providing passive support to the scapula for achieving neutral alignment of the scapula [1]. A previous study showed that elevating the scapula passively during upper extremity activities in subjects with depressed shoulders was an effective method for reducing trapezius symptoms and neck pain [17].

In this case, based on previous reports that scapular elevation is beneficial for decreasing symptoms of scapular depression syndrome [1,3], two scapular elevation procedures were performed. First, the scapulae were manually elevated after the assistant placed a hand in each of the patient’s axillae [18]. Second, the application of Kinesio tape with severe tension (approximately 75% of the available tension) [15] may help maintain the elevated scapular position when the tape is applied to the scapula in the elevated position. Unlike conventional tape, Kinesio tape has an elasticity of 55–60% of the original length [15]. According to the guideline for stretching reported by Kase [15], the tension required for mechanical correction is 50–75% of the available tension. The tension created by applying SET involving severe tension may cause resistance
to scapular depression. In addition, because applying Kinesio tape may affect tactile stimulation [19], the perception of increased tension in the scapular depression position after SET application causes scapular elevation for normalizing the perceived skin tension [15]. In a report of hemiplegic patients, Kinesio taping increased the stability of the thoracic spine and scapula and provided feedback regarding the preferred postural alignment to the muscle [8]. Additionally, Kinesio tape application enabled mechanical correction such as changes in the pelvic inclination and sacral horizontal angle [21]. In this case, SET application around the scapula for 2 months elevated the scapula and reduced UT tenderness. Hence, the continuous application of SET may be a supplementary method for scapular elevation.

Additionally, the application of Kinesio tape to the skin may stimulate cutaneous mechanoreceptors [5]. According to the counterirritant theory, increased mechanoreceptive afferent input inhibits the transmission of nociceptive signals through the release of enkephalin, which results in hyperpolarization of interneurons and inhibition of substance P release (i.e., the neurotransmitter involved in the integration of pain) [22]. Recent studies have reported that Kinesio taping relieves chronic and acute low back pain [6, 7] and the pain associated with shoulder impingement syndrome [4]. Thus, the continuous application of SET results in a reduction in UT tenderness. The limitations of the current study were that (1) the inactivity of the UT and the tightness/overactivity of the scapular depressor muscles such as the lower trapezius, pectoralis major, and latissimus dorsi muscles were not assessed; (2) shoulder pain scales other than the PPT were not used; and (3) therapy that did not involve taping was not studied for comparison with the effects of SET application. Shoulder depression due to stretching of elevated muscles and hypertrophy of the dominant shoulder in skilled tennis players was first described by Priest and Nagel, and depression of the shoulder may simulate apparent scoliosis [23]. However, as seen in the current case, the mechanisms underlying the correlation between scapular depression and thoracic scoliosis are unclear in non-athletes, and additional research is required in this area.

In conclusion, this case shows that SET using Kinesio tape resulted in scapular elevation and reduced UT tenderness in a patient with scapular depression syndrome. Future pathophysiologic studies on scapular depression syndrome are necessary for preventing scapular depression and for obtaining satisfactory therapeutic effects.

Acknowledgments

This research was supported by Basic Science Research Program through the National Research Foundation of Korea (NRF) funded by the Ministry of Education, Science and Technology (No. 2011-0005580).

References


