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The effect of Kinesio taping on back pain in patients with Lenke Type 1 adolescent idiopathic scoliosis: A randomized controlled trial

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ABSTRACT

Purpose: This study investigated the short-term effects of KT on back pain (BP) in patients with Lenke Type 1 adolescent idiopathic scoliosis (AIS).
Methods: We chosen Lenke Type 1 scoliosis who have had only back pain (the localization of the pain: the only in the apical convex edge). Forty patients suffering from BP with Lenke Type 1 AIS were randomly separated into two groups, Group 1 (20 patients) and Group 2 (20 patients). Group 1 was given KT with tension and home exercises and Group 2 was given KT without tension and home exercises. KT and home exercises was applied to the thoracic area of the patients in both groups for four weeks. Pain intensity was measured using a visual analog scale (VAS) and SRS-22 (subtotal SRS-20) before and after treatment.
Results: Mean age of both groups was 16.1 years. Mean Cobb angle of the thoracic scoliosis was 31.8° (range: 17°–44°) in Group 1 and 32.8° (range: 19°–43°) in Group 2 before the treatment. The decrease in VAS score of Group 1 after taping was higher than that of Group 2. The difference between the pre- and post-treatment VAS scores of both groups was statistically significant ($p < 0.05$). The increase in mean SRS-20 score of Group 1 following taping application was significantly higher than the increase in the control group ($p < 0.05$).
Conclusion: Results demonstrated that KT application with tension effectively leads to back pain relief shortly after application. In addition, KT has a positive impact on quality of life. Thus, KT may be a suitable intervention in treating back pain of patients with AIS.
Level of Evidence: Level 1, Therapeutic study
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Introduction

Despite its lower prevalence in adolescents than adults, back pain is a more common problem in patients with BP scoliosis when compared with the normal population.[1–3] Studies have reported a wide range for prevalence of back pain in adolescent idiopathic scoliosis (AIS), from 23 to 85%.[1–7] When accompanied by AIS, BP has a negative impact on the psychosocial status of the individual.[8]

Several researches have been conducted to study conservative treatment methods for BP of patients with AIS. Conservative treatment of BP with AIS include swimming, home exercises, chiropractics, manual therapy, electrical stimulation, acupuncture, Pilates, yoga, use of medication (acetaminophen, nonsteroidal anti-inflammatory drugs, myorelaxants or opioid analgesics), back school and spinal manipulation.[9–19] However, there is still no treatment algorithm based on evidence. Thus, order of choice for these methods is totally random. Kinesio taping (KT) is a conservative treatment method for controlling pain in the treatment of musculoskeletal conditions which have recently gained popularity. The technique has been first defined by Kenzo Kase. Kinesio tape is a non-invasive technique allowing a longitudinal stretch of 55–60% more than its regular length. Inventors of this technique suggested

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two different concepts with two different amounts of tension in application of the method. With the light (15–25%) tension application of the method from the insertion point to the origin of the muscle, the muscular function is inhibited, whereas with the light-to-moderate (25–50%) tension application of the method from the origin of the muscle to the insertion point activates the muscular function.[20]

In this study, we aimed to evaluate the efficacy of KT as an alternative treatment choice in BP patients with Lenke Type 1 AIS who were given KT plus home exercises and control group KT (without tension) plus home exercises. Besides, we aimed to give variety and bring to innovation to an alternative conservative treatment choice for BP with AIS.

Materials and methods

This prospective, randomized controlled clinical trial with a 4-week follow-up period was performed as a single-center study. Patients who were diagnosed with Lenke Type 1 AIS, who have had only back pain (the localization of the pain: the only in the apical convex edge) for more than 3 months, and those between 10 and 18 years of age and were students were included in the study. We chosen Lenke Type 1 scoliosis with patients because they are seen more often than other types and KT is not successful for low back pain with other Lenke types (e.g. Lenke type 5 or 6). Those who had LBP, a systemic or local regional infection, malignity, neurodermatitis, skin diseases such as eczema or psoriasis, decompensated heart failure; were pregnant; had advanced asthma, epilepsy, intervertebral disc disease, previous surgery (spinal fusion), spinal cord anomalies and tumors, any pathological spinal anomalies, such as spondylolysis, spondylolisthesis and lumbosacral transitional anomalies that could be associated with BP; underwent physiotherapy and medical treatment for scoliosis within last year and/or used brace were excluded. The patients were evaluated for decision of the conservative treatment by two orthopedics surgeons. The patients had only back pain. The patients did not have progressive curve. KT was performed by a certified Kinesio taping practitioner. Home exercises were given by the specialist of physical medicine and rehabilitation.

All patients were evaluated according to Lenke et al[21] classification, with standing anteroposterior, lateral, traction and bending radiographs. Type 1 deviation (structural, main thoracic curvature, non-structural proximal and thoracolumbar/lumbar curvature) was present in all cases. Type and size of deviation, lumbar and sagittal plane parameters, kyphosis, lordosis, SVA, PI, SS, and PT were measured and recorded. But, we did not evaluate the thoracic rib hump of patients.

Our hospital has an experts group for spine surgery. We planned this study for 6 months. We hoped that more patients will come in our clinic. But forty-six patients with Lenke Type 1 AIS accepting our study came for KT treatment. Six patients did not adjust to treatment. These patients were removed from this study. Forty patients who met the inclusion criteria were randomly with computer program divided into two groups. Group 1 (20 patients) was given KT and home exercises application and Group 2 (20 patients) control group KT and home exercises. Patients' data regarding their age, sex, height, weight and profession were collected and their preference for KT color was noted. After they were trained about the KT application, the patients were asked not to remove the tape unless a reaction developed. The skin was cleaned with alcohol. Patients with bristle were asked to cut them 1 h prior to application. Attention was paid to ensure the tapes had rounded edges. The patients were called for follow-up with intervals of one week and standard Kinesio® Tex Gold Classic tape (5 cm width) was applied for four times. In the Group 1 (KT with tension), the tape was applied over the area of spinalis thoracis muscle (between T3 and L1) (origin point: spinous processes of T11 to L3, insertion point: spinous processes of T3 to T8) with 25–50% of tension for the convex side (from the origin of the muscle to the insertion point) for and 15–25% of tension for the concave side (from the insertion of the muscle to the origin point) (Fig. 1). In the Group 2 (KT without tension), a paper off tension application of taping was done longitudinally over the thoracic area (between T3 and L1) for the convex side (from the origin of the muscle to the insertion point) for the concave side (from the insertion of the muscle to the origin point) (Fig. 2). That is, we applied similar to areas in Group 2 according to the KT with tension group. Application area (between T3 and L1) was contained both painful region origin and insertion points of the each muscle.

Home exercises consisted of stretching and strengthening exercises. Stretching exercise for the concave side and strengthening exercise for the convex was performed all patients. Three sets of stretching exercise for the concave side, with each set involving a 20-s hold and 20-s rest with four reps were performed three times a week for four weeks. Three sets of strengthening exercise for the convex side, included 20 reps with a 20-s hold, was performed three times a week for four weeks. Benefits of regular exercise were told to the patients and they were encouraged to do their first session with a supervisor. Patients were told to avoid repetitive and compelling thoracic and lumbar movements.

Patients were given visual analog scale (VAS) forms and were asked to fill them in before and after treatment for evaluation of pain.[22] Subtotal SRS-20 section of the SRS-22 questionnaire were filled for assessing their quality of life. Patients' perception of their deformity has become a measurable quantity through the use of health-related quality of life. The most commonly used tool currently is the Scoliosis Research Society-22 (SRS-22) questionnaire for the assessment of spinal deformity, whose Turkish version has been validated.[23] Pain, self-image, functional activity, and mental health were the components of the SRS-22 questionnaire (subtotal SRS-20).

Mean, standard deviation, median, minimum and maximum values were used in descriptive statistics of the data. Distribution of the variables was analyzed with the Kolmogorov–Smirnov test. Mann–Whitney U test was utilized in analyzing quantitative data. Analysis of repetitive measurements was done with the Wilcoxon test. The chi-square test was employed in analysis of qualitative data, or Fischer's test where chi-square test conditions were not met. Level of statistical significance was set at $p < 0.05$. Statistical analyses were performed using the SPSS 22.0 software.

Results

Mean age was 16.1 (range: 14–18) years in Group 1 and 16.1 (range: 13–18) years in Group 2 ($p > 0.05$). Nineteen female (95%) and one male (5%) patient were in Group 1 and 18 female (90%) and two male (10%) patients in Group 2 ($p > 0.05$).

Mean body mass index (BMI) in Group 1 was 28.4 ± 5.2 kg/m^2 and in Group 2, 26.8 ± 5.2 kg/m^2, respectively. There were no significant differences between the 2 groups in terms of BMI ($p > 0.05$).

Group 1 had 12 patients (60%) with Lenke Type 1A, six (30%) with Type 1B, and two (10%) with Type 1C curvature. Group 2 had nine patients (45%) with Type 1A, nine (45%) with Type 1B, and two (10%) with Type 1C curvature. No statistically significant difference was observed between two groups in terms of lumbar modifier ($p > 0.05$).

As shown in Table 1, there was no statistically significant difference between two groups in terms of other demographic

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