Case Study

Effect of thoracic movement-mediated training on back pain and trunk range of motion in a patient with lower back pain

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Abstract. [Purpose] We explored the effect of thoracic movement-mediated training (TMMT) on back pain and trunk range of motion (ROM) in a lower back pain (LBP) patient with lumbar flexion rotation syndrome. [Subject] A 55-year-old male LBP patient with lumbar flexion rotation syndrome. [Methods] The subject underwent TMMT, consisting of two thoracic stretching exercises and three thoracic muscle-strengthening exercises, supervised by a physical therapist. [Results] After training, trunk ROM increased and the visual analog scale (VAS) score of back pain decreased. [Conclusion] Therapists should consider substituting thoracic spine movements for lumbar spine movements to prevent excessive lumbar movement and pain in LBP patients with lumbar flexion rotation syndrome.

Key words: Low back pain, Lumbar flexion rotation syndrome, Trunk ROMs

INTRODUCTION

The traditional approach toward treatment of low back pain (LBP) fails many LBP patients1). The movement-impairment system based on kinesiopathology is an evidence-based method that defines the cause and provides solutions to LBP. LBP is categorized into five syndromes: lumbar-flexion, lumbar-extension, lumbar-rotation, lumbar-flexion-rotation, and lumbar-extension-rotation. Recently, a patient-centered approach to LBP treatment has been recommended1–3). Classification systems seek to categorize LBP patients into homogenous subtypes for which appropriate treatment strategies have been developed4). The lumbar-flexion-rotation and lumbar-extension-rotation syndromes are the most prevalent forms of LBP4). Here, we developed a patient-centered approach, thoracic movement-mediated training (TMMT), for an LBP patient with lumbar flexion rotation syndrome. We investigated the effect of such training on back pain and trunk range of motion (ROM).

SUBJECT AND METHODS

We treated a 55-year-old male LBP patient with lumbar flexion rotation syndrome. The purpose and methods of the study were explained and written informed consent obtained in line with the ethical principles of the Declaration of Helsinki.

The patient complained of continuous LBP lasting the previous 10 months. He had not received any specific treatment. During forward trunk flexion, the visual analog scale (VAS) score for back pain was 7. Standard clinical examinations allowing diagnosis of lumbar flexion rotation syndrome have been described (Sahrmann, 2002). The primary tests are provocative in nature, and are designed to assess movements or stresses in flexion and rotation. Secondary tests performed upon positive findings are confirmatory, designed to correct or inhibit flexion and rotation; reduced movements or symptoms are considered a positive result. A dual inclinometer (ACUMAR, Lafayette Instrument Co., Lafayette, USA) was used to measure trunk ROM. Initially, the lumbar flexion angle was 50°, the extension angle 32°, the right rotation angle 50°, and the left rotation angle 52°.

The patient underwent TMMT, consisting of two thoracic stretching exercises and three thoracic muscle-strengthening exercises, supervised by a physical therapist. The waist T12–L5 levels were protected by a compression bandage and a pelvic belt was worn during all exercises to protect against thoracic movement induced by limitation of lumbar movement. In the first thoracic movement-mediated stretching exercise, the patient arched his back like a cat, then supported himself on his knees and elbows, with neck flexion, and then on his hands and knees, with limitation of lumbar movement. The back was hunched on inspiration and arched on full expiration. In the second, a roller was used to hinge the upper back backwards in the supine position with limitation of lumbar movement. The thoracic region was stretched or tightened, with care not to overextend the neck. In the first thoracic movement-mediated strengthening exercise, while sitting in a chair and lumbar movement was limited, both arms were clasped behind the head with each hand carrying...
a 3-kg sandbag, followed by gentle backwards arching and raising of the head. The second involved the same arm position and weights, but instead the head and the upper thoracic region were lifted while supine, with the knees and hips held at 90° and lumbar movement was limited. In the third, the feet and lower legs were secured under a sturdy object, and the patient then lay on his side with the hips, torso, and shoulders in line, and contracted his abdominal muscles to lift his torso off the ground. He paused at the top of this motion, and returned to the starting position, all with limited lumbar movement.

The patient performed TMMT for 1 month, doing 10 sets of 10 repetitions per day.

RESULTS

After training, trunk ROM increased. Specifically, flexion angle increased from 50° to 62°, the extension angle from 32° to 46°, right rotation from 50° to 58°, and left rotation from 56° to 52°. Upon forward trunk flexion, the VAS score of back pain decreased from 7 before the one-month period of training to 4 afterwards.

DISCUSSION

I developed a patient-centered approach, TMMT, to treat an LBP patient with lumbar flexion rotation syndrome. After training under conditions of lumbar movement limitation administered by a physical therapist, trunk ROM increased and back pain decreased. Lumbar flexion and extension ROM is large, while lateral lumbar flexion is limited, and very little rotation is possible at any level of these vertebrae. LBP patients with flexion rotation syndrome tend to exhibit lumbar spine rotation during trunk movement. These symptoms usually increase upon repeated axial rotation, and decrease when such rotation is restricted and corrected.

In contrast, movements in the thoracic region are combinations of flexion and extension, most evident in the lower thoracic area. Lateral flexion increases upon progression down the thoracic vertebrae. Rotation exhibits the opposite pattern, being maximal at the upper levels. As chronic LBP patients require correction of abnormal spine movement patterns, we sought to induce movement in the thoracic spine to reduce pain associated with lumbar movement. Trunk movement patterns can be altered by changing trunk muscle activities or lengths. Therefore, therapists should seek to apply substitute thoracic spine movements when lumbar spine movement is limited in LBP patients with lumbar flexion rotation syndrome.

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