

Case Study

Effect of the Individual Strengthening Exercises for Posterior Pelvic Tilt Muscles on Back Pain, Pelvic Angle, and Lumbar ROM of a LBP Patient with Excessive Lordosis: A Case Study

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Abstract. [Purpose] The purpose of this study was to document the effect of individual strengthening exercises for posterior pelvic tilt muscles on back pain, pelvic tilt angle, and lumbar ROM of a low back pain (LBP) patient with excessive lordosis. [Subjects] The subject was a 28 year-old male with excessive lordosis who complained of severe LBP at the L3 level. [Methods] He performed individual strengthening exercises for the posterior pelvic tilt muscles (rectus abdominis, gluteus maximus, hamstring). [Results] Pelvic tilt angles on the right and left sides recovered to his normal ranges. Limited lumbar ROM increased, and low back pain decreased. [Conclusion] We suggest that an approach of individual resistance exercises is necessary for the effective and fast strengthening of the pelvic posterior tilt muscles in case of LBP with excessive lordosis.

Key words: LBP, Lordosis, Posterior pelvic tilt

(This article was submitted May 2, 2013, and was accepted Aug. 19, 2013)

INTRODUCTION

Some researchers have examined the relationship between back pain and changes in the angle of the lumbar spine^{1, 2)}. Increased lordosis has been advocated as the major cause of postural pain, radiculopathy, and facet pain^{2, 3)}. The possible negative consequences of excessive lordosis include increased compression of the apophyseal joint and increased anterior shear force at the lumbosacral junction, which may progress to spondylolisthesis^{1, 4)}. Pelvic anterior and posterior movements are produced by the couple force of various muscles⁴⁾. Generally, anterior pelvic tilt is associated with excessive lumbar lordosis angle⁴⁾. For this reason, clinicians recommend various posterior pelvic tilt exercises be performed in the lying, sitting, or standing positions for LBP with excessive lordosis^{4, 5)}. However, we can't apply powerful resistance for strengthening the muscles of pelvic tilt movement. The traditional approach in LBP of applying simplistic single-dimensional analyses has failed to provide effective treatment for LBP patients^{6, 7)}, and a patient-centered approach should be used to treat LBP^{6, 7)}. The purpose of this study was to document the effect of individual

strengthening exercises for the posterior pelvic tilt muscles on back pain, pelvic tilt angle, and lumbar ROM of a LBP patient with excessive lordosis.

SUBJECTS AND METHODS

The subject was a 28 year-old male with excessive lordosis, who complained of severe LBP pain at the L3 level. Ethical approval for this study was obtained from Yonsei University Faculty of Health Science Human Ethics Committee, and the subject provided his written informed consent to participation in this study prior to its commencement. He complained of continuous LBP for 1 year, and an examination revealed that his pelvis was tilted anteriorly. He had not received any specific treatment for this condition which included mechanical LBP without radiating pain. When he performed backward extension in the standing position with his knees fully extended, he experienced pain and stiffness in the lower back. The visual analogue scale (VAS) score of this back pain was 7. The pelvic inclination was measured with a palpation meter (PALM; Performance Attainment Associates, St. Paul, MN, USA) by one examiner. PALM was used to measure the distance and inclination between two bony landmarks of the body. PALM consists of an inclinometer and two caliper arms. The intra-test and inter-test reliabilities of the PALM are 0.8 or higher⁸⁾. The patient removed his shoes and spread his feet during the measurements which were made with the patient standing upright with the anterior aspect of the thighs against a sta-

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bilizing table. The sagittal plane rotation of the innominate was measured with the caliper tips of the PALM in contact with the ipsilateral anterior superior iliac spine (ASIS) and posterior superior iliac spine (PSIS). At the initial assessment, the anterior pelvic tilt angles were 19° and 20° on the right and left sides (normal range, 11 ± 4°), respectively. A Dual Inclinator (ACUMAR, Lafayette Instrument Co., Lafayette, USA) was used to measure the trunk flexion and extension angles. The intra-test and inter-test reliabilities of the Dual Inclinator are 0.8 or higher. The lumbar flexion angle of the initial measurement was 58°, and the extension angle was 32°. The patient performed individual strengthening exercises for the posterior pelvic tilt muscles (rectus abdominis, gluteus maximus, hamstring). The exercise for the rectus abdominis was the crunch exercise. The patient lay supine with his knees bent and feet flat on the floor, crossed his arms, and placed his hands on his chest. The exercise for the gluteus maximus was the buttock exercise: To strengthen this muscle, the patient lay prone with his hips and legs off the end of a table or bench. Tightening the buttock on one side, he extended the leg up toward the ceiling while maintaining a neutral spine. The exercise for gluteus maximus was a hamstring curl exercise using a resistance band in the prone position. He performed these three individual strengthening exercises for two weeks, performing three sets of 20 repetitions per day.

RESULTS

The patient's anterior pelvic tilt angle decreased: the post-intervention angles were 14° and 14° on the right and left sides, compared to the initial angles of 19° and 20° on the right and left sides. The lumbar ROM increased: the post-intervention flexion angle was 69° and the extension angle was 43°, compared to the initial flexion angle of 58° and extension angle of 32°. In backward trunk extension, the VAS score of back pain decreased from an initial score 7 to 4.

DISCUSSION

Pelvic anterior and posterior tilt movements are produced by couple force of various muscles⁴. However, we

cannot apply strong resistance during pelvic anterior and posterior tilt motions in the lying, standing, or sitting positions. So, we tried prescribing individual resistance exercises for strengthening of the posterior pelvic tilt muscles of a LBP patient with excessive lordosis. After intervention, the pelvic tilt angles of the right and left sides recovered to within his normal ranges. Limited lumbar ROM increased, and low back pain decreased. These results show the short-term effect of two weeks of training. I suggest that individual resistance exercises are a necessary approach for the effective and fast strengthening of the pelvic posterior tilt muscles in case of LBP with excessive lordosis.

ACKNOWLEDGEMENTS

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. 2012R1A1B4001058).

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