



Original article

Comparison of psoas major muscle thickness measured by sonography during active straight leg raising in subjects with and without uncontrolled lumbopelvic rotation



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ABSTRACT

Background: The psoas major (PM) is important for stabilizing lumbopelvic region during active straight leg raising (ASLR). Uncontrolled lumbopelvic rotation (ULPR) frequently occurs during ASLR in subjects with poor lumbo-pelvic stability and may contribute to asymmetric symptoms including pain in lumbopelvic region.

Objects: This study compared the thickness of contralateral PM (**cPM**) using ultrasound imaging during ASLR in subjects with and without ULPR.

Method: Healthy male subjects (18 without ULPR, 19 with ULPR) were recruited. The thickness of the **cPM** during rest and ASLR without loading and with a 1-kg load was measured by ultrasound imaging. The relative muscle thickness was calculated as the thickness during ASLR/thickness at rest. Two-way mixed-model analysis of variance was used to identify significant differences in the relative thickness of the **cPM** between groups and within a loading status. The level of statistical significance was set at $\alpha = 0.05$.

Results: The resting thickness of the **cPM** in subjects without ULPR did not differ from that of subjects with ULPR. The relative thickness of the **cPM** in subjects without ULPR was significantly greater during ASLR than that in subjects with ULPR both without loading and with a load ($p < 0.01$). No significant change in thickness of the **cPM** was evident in those with ULPR.

Conclusion: The thickness of the **cPM** was significantly greater during ASLR in subjects without ULPR than with ULPR. This result indicates that persons with ULPR have less activation of the **cPM** to stabilize the lumbar spine during ASLR.

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1. Introduction

Recent studies have shown that the psoas major (PM) contributes to stabilization of the lumbar spine (LS) (Santaguida and McGill, 1995; Yoshio et al., 2002; Hu et al., 2011). Hu et al. (2011) stated that during active straight leg-raising (ASLR), various muscles are active, including the iliacus, rectus femoris, and ipsilateral PM (**iPM**); the contralateral PM (**cPM**) is also active. In addition,

most authors agree that PM activity increases with greater hip flexion, while Yoshio et al. (2002) even concluded that the PM mainly works as a stabilizer of the lumbar spine and the femoral head over the first 15° of hip flexion, and does not become an effective hip flexor prior to 45° of flexion (Yoshio et al., 2002; Hu et al., 2011).

Active straight leg raising involves both hip flexion and LS stability because gravity has a large moment and affects muscle contraction (Hu et al., 2010, 2011). The PM in particular is considered a lateral stabilizer of the LS (Santaguida and McGill, 1995). Individuals with lumbopelvic instability have limitations in controlling excessive movement of the LS and pelvis (Roussel et al., 2009). ASLR evaluates the ability to transfer a load between the spine and legs via the pelvis. Therefore, the optimal movement

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