Application of a 3D freehand ultrasound system for the measurement of lumbar multifidus volume: protocol of a reliability study.

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Introduction 3D freehand ultrasonography (3DfUS) can be used to measure muscle and tendon morphological and structural properties, including volume, length and echo-intensity. Its reliability has been already demonstrated for lower limb muscles1. 3DfUS might be an interesting tool for the evaluation of other muscles, such as the lumbar multifidus of which structural dysfunction might play a role in chronic low back pain (CLBP). Instead of using 2D ultrasound measures such as cross-sectional area and thickness, volume measurements might be a better reflection of muscle size. However, the reliability of measuring the lumbar multifidus muscle volume by 3DfUS remains unknown in individuals with CLBP.

Aim To determine inter- and intra-rater reliability of acquisition and processing of lumbar multifidus muscle volume measurements by 3DfUS in patients with CLBP.

Methods Lumbar multifidus muscles will be visualized bilaterally from L2 to S1 using a 3DfUS system, consisting of a conventional 2D US system and a motion-tracking system. The US images will be manually segmented and interpolated for the calculation of muscle volume by Stradwin software. Thirty patients with CLBP will be evaluated at rest in a prone position. Data acquisition will be performed three times by two examiners in two separate sessions. Intraclass correlation coefficients with 95% confidence interval and the standard error of measurement will be calculated within and between examiners.

Results Data collection is going on and an analysis of the results will be presented.

Conclusion Inter- and intra-rater acquisition and processing reliability of lumbar multifidus muscle volume measured by 3DfUS will be determined in patients with CLBP.

Keywords Muscle volume, ultrasound, low back muscles, reliability