Interrater reliability of ultrasound elastography to examine the stiffness and elasticity of muscles and fascia of the lower extremity in healthy adults

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Background: Ultrasound elastography is one of the first real-time imaging techniques to quantify mechanical tissue properties. With the help of ultrasound elastography, the palpation of the therapist can be further developed diagnostically and different muscular and fascial tissue stiffness can be shown objective and visual. [1]

Methods: 20 healthy subjects (9 women, 11 men, mean ± SD age = 27 ± 3 years, height = 178.4 ± 8.4 cm, weight 70 ± 10.5 kg, BMI = 21.9 ± 2.2) were recruited and included in the study by an inexperienced (~10 practice hours) and an experienced (>3 years) examiner. After measurement of the statics and mobility the region of interest was divided in seven muscle areas (ischial tuberosity, m. biceps femoris, m. gastrocnemius, m. soleus, m. rectus femoris proximal, central and distal). Two independent examiners performed the measurement of both legs with strain ultrasound elastography (Ultrasonix Tablet).

Results: ICC values range from unilateral sufficient: 0.2-0.4 (ischial tuberosity, m. biceps femoris, m. rectus femoris distal) to good: 0.7 (m. gastrocnemius, m. rectus femoris proximal and central) and excellent agreement: 0.8 (m. soleus). The visual evaluation of the pictures from both examiners confirmed the results, whereas there were only partial matches in the stiffness results of mobility and static measurements.

Conclusion: Strain ultrasound elastography is a useful diagnostic tool to study the tissue stiffness of muscles and fascia of the lower extremity in healthy adults. Especially the muscles m. soleus, m. gastrocnemius, m. rectus femoris proximal and central are particularly suitable for examination. The muscles ischial tuberosity and m. biceps femoris are more difficult to study reliably. The study has shown that even an inexperienced examiner can achieve adequate interrater reliability after a short time of practice.

References: