

原 著

立位での異なる足関節底屈位における ヒラメ筋外部アキレス腱伸張率の算出

Outer Achilles tendon strain for soleus muscle at different ankle joint angles

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Abstract

The purpose of this study was to measure the human soleus-Achilles tendon length and its strain directly at different ankle joint angles and to examine validity of the soleus-Achilles tendon length measurements for the potential application of dynamic human movements. In the upright position at three different ankle joint angles (90°, 110°, 120°), the soleus-Achilles tendon length was measured by three different methods: 1) the entire soleus-Achilles tendon was scanned by ultrasound and the length can be measured as the curvature line (actual value), 2) the length can be measured as the straight line by using ultrasound (straight model), 3) the distance between calcaneal tuber and Achilles tendon junction identified by ultrasonography was measured with a tape (outer curve model). The soleus-Achilles tendon strain from 90° to 110° were $7.2 \pm 6.1\%$, $7.8 \pm 5.0\%$, $9.0 \pm 6.2\%$ respectively. These values were over the "yield region" in stress-strain relationship in tendon. In addition, at the 120° ankle joint angle, the soleus-Achilles tendon length of a straight model was much shorter than the other two models ($p < 0.05$). These results confirmed that the strain of soleus-Achilles tendon at the 110° plantar flexion ankle joint angle was already over 7% and that at 120° was dramatically increased together with the greater curvature of the soleus-Achilles tendon.

キーワード ヒラメ筋, ストレイン, 超音波, 腱弾性

Soleus muscle, tendon strain, ultrasound, tendon elasticity

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