In Vivo Investigation of Patellar Tendon Properties Using Sonography in Transtibial Amputees

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The purpose of this study was to investigate the mechanical and morphological properties of the patellar tendon, specifically elongation, stiffness, strain, length and cross-sectional area, in vivo in unilateral trans-tibial amputees. Investigation of these properties were analyzed and related to the subject’s socket design, socket-skin interface, suspension system, and duration of prosthesis use. These mechanical properties were measured in vivo under two conditions: with the quadriceps relaxed, and with isometric quadriceps contraction. It was hypothesized that the amputated side patellar tendon of unilateral trans-tibial amputees would be longer, thicker, and stiffer than the patellar tendon of their non-amputated limb. This study was designed to serve as an investigational study of the effects of socket design, suspension system, and duration of prosthesis use on the patellar tendon of the amputated limb, as compared to the patellar tendon of the sound limb. The results were intended to allow clinicians to formulate a better understanding of the effects of these factors over time, and to integrate this understanding into clinical recommendation. The potential risk of the study was minimal, and the results will assist in better comprehension of socket designs, socket-skin interfaces, and suspension types and their effects over time, and in formulating prescription recommendations and guidelines.