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Abstract

The socket of a prosthesis is an important part that serves as the interface between the residual limb and the prosthesis. The soft tissue around a residual limb that is not well suited to load bearing and where an improper load is distributed may cause pain and skin damage. Correct shaping of the socket for appropriate load distribution is a critical process in the design of lower limb prosthesis sockets. In this study, a nonlinear finite element model was created and analyzed to evaluate the pressure distribution between a residual limb and the prosthesis socket of a transfemoral amputee. Three-dimensional models of the residual limb and socket were created using magnetic resonance imaging data; the models were composed of 21 layers, each separated by 10 mm. Two types of socket MCCT socket and UCLA socket are used in this study for quantitative evaluation. The interface pressure distribution in the residual limb was observed in the same condition when the experiment of loading 50% and 100% of body weight and the pressure at eight locations on the surface between socket and residual limb was measured. The value of pressure between experiment and simulation got a high coefficient of correlation (>0.9). This analysis allows prosthetist and engineers to simulate the fit and comfort

of transfemoral prostheses in order to evaluate the fit of socket shape.

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Index Terms

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Keywords

Transfemoral prosthesis ,finite element analysis, UCLA socket, MCCT socket