شبكة المعلومات الجامعية

بسم الله الرحمن الرحيم

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

شبكة المعلومات الجامعية

جامعة عين شمس

التوثيق الالكتروني والميكروفيلم

قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
علي هذه الأفلام قد أعدت دون أية تغيرات

يجب أن

تحفظ هذه الأفلام بعيدا عن الغبار

في درجة حرارة من ١٥-٢٥ مئوية ورطوبة نسبية من ٢٠-٤٠%

To be Kept away from Dust in Dry Cool place of 15-25- c and relative humidity 20-40%

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بالرسالة صفحات لم ترد بالاصل

TRANSTIBIAL AMPUTEE GAIT ANALYSIS: A COMPARISON OF TWO TYPES OF PROSTHETIC FEET

By

Nagla M. Alaa El-Din Mahmoud
B. Sc. of Systems & Biomedical Engineering
High Institute of Engineering
El- Shorouk Academy

A Thesis
Submitted to the Faculty of Engineering at Cairo University
In Partial Fulfillment of the Requirements for the Degree of
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I wish to dedicate this study to my father's soul,

Dr. Mohammed Alaa El-Din Shalaby

who has had considerable influence

over me by providing encouragement, support

and believing in my abilities to succeed.

ABSTRACT

Amputation is one of the most severe problems facing humanity all around the world. Prosthesis is simply the solution for such a problem. The broadened range of prosthetic feet available made it more difficult to choose which foot is most suitable for each amputee. This study was performed as a case study on one unilateral transtibial traumatic amputee. The purpose was to determine whether a Single Axis (SA) prosthetic foot enhanced gait as opposed to a SACH prosthetic foot when walking on uneven grounds. Three-dimensional gait analysis system was used to study gait kinematics and kinetics using the two prosthetic feet on three different walkways: wood, sand and pebble. The kinematic variables stride length, cadence, speed, stride time, prosthetic stance and normal stances as well as joint relative angles were considered in the analysis. The kinetic variables vertical ground reaction force and ankle moment (plantar flexion) were considered in the analysis. The results confirmed the asymmetry of amputee gait. With both prosthetic feet, the amputee walked with a lower speed, cadence and stride length on both types of uneven ground than on the flat ground. The SA foot was found to significantly increase speed and cadence, and to affect hip and knee flexion angles. However, there was no clear conclusion that one foot performed better on all walkways. The results confirmed that both the vertical ground reaction force and ankle moment (plantar flexion) were significantly greater at the normal limb rather than the prosthetic limb. The results also confirmed that the SA prosthetic foot increased the ankle moment (plantar flexion). The results will provide quantitative insight to facilitate proper prosthetic foot selection, and help the amputees go on with their life style, walk easier with less effort, while increasing their comfort and control.

The foot pressure distribution of the sound (normal) limb was also measured and analyzed to determine to which extent the sound limb was affected by the amputation, as well as to study the foot pressure distribution of the sound limb when the amputee wore both the SACH and SA prosthetic feet. The results showed decreased pressure on the 1^{st}, 2^{nd} and 3^{rd} metatarsals of the normal limb when the amputee wore the SA foot.