THE PENNSYLVANIA STATE UNIVERSITY
SCHREYER HONORS COLLEGE

DEPARTMENT OF BIOENGINEERING

PRELIMINARY INVESTIGATION OF THE EFFECTS OF ARCH HEIGHT ON SUBTALAR JOINT MECHANICS DURING WALKING

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ABSTRACT

The purpose of this honors thesis was to modify a method for locating the subtalar joint axis from measured foot motions. Once the axis is located with this subtalar axis locator (SAL II), then moments about this axis can be determined through a series of walking trials by utilizing a 6 camera motion analysis system and force plates. The location of and moments about the subtalar joint axis provide key insight into the mechanics of this crucial ankle joint. This study specifically sought to determine if arch height correlates with peak internal subtalar joint moments during walking. Further understanding of how arch height affects these subtalar joint mechanics could contribute to the improved treatment methods of such gait disorders as adult acquired flatfoot disorder.

Preliminary testing of a limited subject population indicated a possible correlation between low arches and large internal supination subtalar joint axis moments during early stance. The reliability of the Arch Height Measurement System was also determined, providing the Penn State Biomechanics Laboratory with a reliable way of measuring arch height. This thesis establishes the protocol for determining subtalar joint axis location and moments with the SAL II device, a protocol that can be used to definitively determine correlations between arch height and subtalar joint mechanics in a variety of future studies.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

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