Learning Objectives

MedBridge
Understanding the Transtibial and Transfemoral Limb/Socket Interface
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Course Objectives:

Upon completion of this course, learners will be able to:

- Relate the regions of weight bearing on the residual limb to the shape and design of the transtibial socket
- Describe the difference between induced and reactionary forces that occur between the residual limb and prosthetic socket
- Name the location of the center of pressure, location of ground reaction force vector, and what force moment occurs about the knee during each phase of transtibial amputation gait
- Relate the position of the tibia and femur within the prosthetic socket to each phase of gait
- Describe the concentric and eccentric muscle patterns that occur about the knee to control tibial progression during transtibial gait and the hip to control knee stability throughout transfemoral gait

Chapter 1: Socket Shape and Transtibial Residual Limb Weight Bearing Regions

Socket design is directly related to the regions of weight bearing ability on the residual limb. This chapter will emphasize relation between the socket and residual limb in both the static and dynamic environment.

Chapter 2: Terminology and Gait Biomechanics of the Transtibial Prosthesis

Biomechanics of transtibial gait is the foundation for successful early ambulation training with a transtibial prosthesis. Emphasis will be placed on the terminology most applicable to apply a framework of understanding of the forces placed on the residual limb during ambulation.

Chapter 3: How the Ground Reaction Force affects the Transtibial Residual Limb during Gait

This chapter now builds on the previous knowledge of weight bearing regions of the limb and the biomechanical forces that act upon it during each phase of gait. Each phase of gait will be discussed in the context of the tibial position within the socket and how this affects the ability to ambulate efficiently.

Chapter 4: Socket Shape and Transfemoral Residual Limb Weight Bearing Regions

Transfemoral socket design continues to evolve as various theories are introduced and incorporated into the field of study. General weight tolerant areas of the residual limb will be discussed and related to several common socket design approaches. This chapter emphasizes the dynamic nature of the femur position in both the coronal and sagittal planes during static standing and dynamic ambulation.

Chapter 5: Terminology and Gait Biomechanics of the Transfemoral Prosthesis

Biomechanics of transfemoral gait provides an understanding of how to train the patient to maintain knee stability during both level ground walking and when encountering environmental barriers. A review of terminology will provide a reference for a study of the importance of knee control in the context of each phase of gait.

Chapter 6: How the Ground Reaction Force Affects Knee Stability and the Transfemoral Residual Limb During Gait

Each phase of gait will be discussed in the context of the trochanter-knee-ankle (TKA) line, and the ground reaction force vector effect on the joint moments that affect knee stability.