

Title: **Hybrid Approach to Bilateral UE Prosthetic Rehabilitation**

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Learning Outcomes: At the conclusion of this presentation the attendees will:

1. Develop a better understanding of prosthetic options available to the bilateral upper limb patient.
2. Understand the advantages of combining body powered and electric powered systems.
3. Observe several case studies where hybrid prosthetic designs have produced higher levels of functional performance for the individual.

Abstract:

Patients with "high" level bilateral upper extremity deficiencies require maximum functional rehabilitation to increase independence and self-care skills. Traditional prosthetic rehabilitation for these individuals utilizes various control mechanisms including body power, electric, and hybrid systems.

Rehabilitation teams rarely gain experience with multiple cases using varied control methods. In most cases systems are recommended and fit based on the limited past experiences and training of the rehabilitation team members and the local prosthetist.

Body powered control provides the user with fine motor skills and excellent proprioceptive feedback through Extended Physiological Proprioception (EPP). Traditional body powered hooks provide the user a superior line of sight and grasping patterns that allow for easy manipulation of small objects. Limitations to body powered bilateral systems include limited grip strength (for voluntary opening devices), limited ability to easily reposition components, contralateral controls interference, and minimal requirements of strength and excursion.

Electric powered systems provide the user with excellent control (i.e. using proportional control systems). Current electric powered terminal devices provide the user with superior grip strength and varied grasping patterns that easily handle larger and heavier objects. The user can achieve operation and reposition of components with little effort.

Hybrid designs traditionally combine body powered and electric control within a single prosthesis. This combination can provide the user with the best functional components from each system to improve overall functional outcome.

This presentation will look at bilateral prosthetic wearers using combinations of body powered systems on one limb and electric powered on the contralateral side. Theory of prosthetic fitting, controls design, and operation will be discussed. Multiple case studies will be utilized as examples for all levels including transradial, transhumeral, shoulder, and combined levels of bilateral upper limb absence.

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