ENHANCING FUNCTION: THE GLIMCHER TEST AT ITS BEST (HYBRIDIZATION OF SERVO AND MYOELECTRIC CONTROL FOR THE TRANSHUMERAL LEVEL LIMB DEFICIENT INDIVIDUAL)

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In the late 1960s, Dr. Melvin Glimcher, was Professor of Orthopedic Surgery and was responsible for amputee rehabilitation at Harvard Medical School. He became aware that the transhumeral level amputee population had low prosthetic success rates. In an effort to improve the success rate, Dr. Glimcher analyzed prosthetic function of transhumeral level amputees. Dr. Glimcher observed that positioning of the mechanical elbow, locking the elbow, and finally opening and closing the terminal device was very inefficient. He concluded that one cause for diminished success rates was the necessity to lock the mechanical elbow prior to operating the terminal device. He implemented a challenge to the prosthetic team to design a control mechanism that allowed for simultaneous control of the elbow and terminal device. Over time, the requirement for a transhumeral level amputee to simultaneous control the elbow and terminal device has become known as the “Glimcher Test”. The most popular method to obtain independent control of elbow and terminal device is the hybrid prosthesis. While there are many combinations possible when designing a hybrid prosthesis, most often they involve the marriage of body-powered control and electronic control. One disadvantage of using body-power control is the force that the harness exerts on the contralateral shoulder and axilla. This force can often lead to axilla tissue irritation, breakdown and in many cases peripheral neuropathy. This paper will examine the use of an electrically-powered prosthesis with independent control of the electric elbow and electric terminal device by using myoelectric and servo control schemes.

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