

Myoelectric vs body-powered prostheses

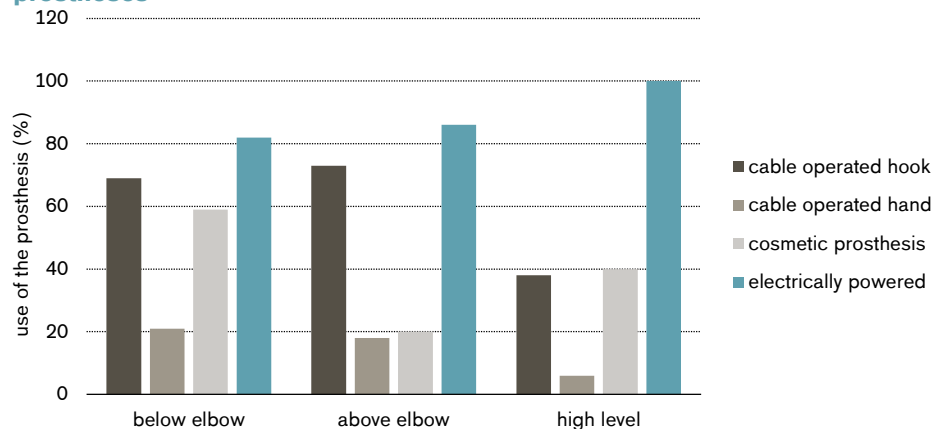
Do amputees need both of them?

Major Findings

Myoelectric compared to body-powered prosthesis:

- **The most preferred prostheses are myoelectric prosthesis.**
- **The majority of amputees used more than one prosthesis for their functional needs and should be fitted with more than one type of prosthesis.**
- **The rejection rate is similar with myoelectric (mean 23%) and body-powered (mean 26%) prostheses.**
- **Myoelectric prosthesis offers to a user higher range of motion (RoM).**
- **Myoelectric prosthesis could reduce phantom limb pain.**
- **Body-powered prostheses are more robust and durable.**
- **Less training is needed to learn how to use body-powered prosthesis.**

Acceptance of body-powered and electrically powered prostheses



Amputees reported that myoelectric prosthesis is the most preferred type of prosthesis, followed by the cable operated hook, cosmetic and cable operated hand. Acceptance rate for myoelectric prosthesis was 82% for below elbow, 86% for above elbow and 100% for high level amputations. Acceptance rate for cable operated hook was 69% for below elbow, 73% for above elbow and 38% for high level amputations (Millstein et al., 1986).

Clinical Relevance

The prosthetic options to fit upper limb loss are passive (cosmetic) and active prosthesis (body-powered or myoelectric). The role of the prosthetic hand is not limited just to the restoration of the physical and functional movements, but it also plays a role in body gesture and posture, social life and communication. Oftentimes more than one prosthesis is needed to fulfil patients' needs.

Summary

A body-powered prosthesis usually employs a harness and cables and a variety of terminal devices (hooks, hands) that can be attached. The advantages of body-powered prosthesis include (Stain, et al., 1983; Millstein et al., 1986; Craig, et al., 2011):

- Low cost
- More robust
- More durable
- Less intensive training needed to learn how to control it
- Used for jobs that require heavy lifting objects, where materials handled are dirty, greasy or sharp

- Used in hot, humid weather conditions
- Users report perceived sensory feedback
- Preferred for home use (e.g. washing)
- Preferred for heavier and more vigorous sports activities

Myoelectric technology uses electromyographic (EMG) signal from the voluntary activity in the stump muscles to operate the terminal device. The advantages of myoelectric prosthesis include (*Stain, et al., 1983; Millstein et al., 1986; Craig, et al., 2011;*)

- Increased comfort
- Control of the prosthesis is more natural
- They give a greater range of motion to the user
- User needs less compensatory motion to execute ADLs
- Bring more cosmetic acceptance
- Used for office related jobs, supervisory work or in contact with general public
- Preferred for home use (e.g. eating)
- Preferred for car driving
- Preferred for light sports activities
- Extensive use could reduce phantom limb pain

References

Carey et al., *Journal of Rehabilitation Research & Development* 2015; 52(3):247-262. Differences in myoelectric and body-powered upper-limb prostheses: Systematic literature review

Stain et al., *Archives of Physical Medicine and Rehabilitation*; Vol 64, 1983 Functional Comparison of Upper Extremity Amputees Using Myoelectric and Conventional Prosthesis

Millstein et al., *Prosthetics and Orthotics International*; Vol 10, 27-34, 1986. Prosthetic use in adult upper limb amputees: a comparison of the body powered and electrically powered prostheses

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