

Reference

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Functional Comparison of Upper Extremity Amputees Using Myoelectric and Conventional Prosthesis

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Products

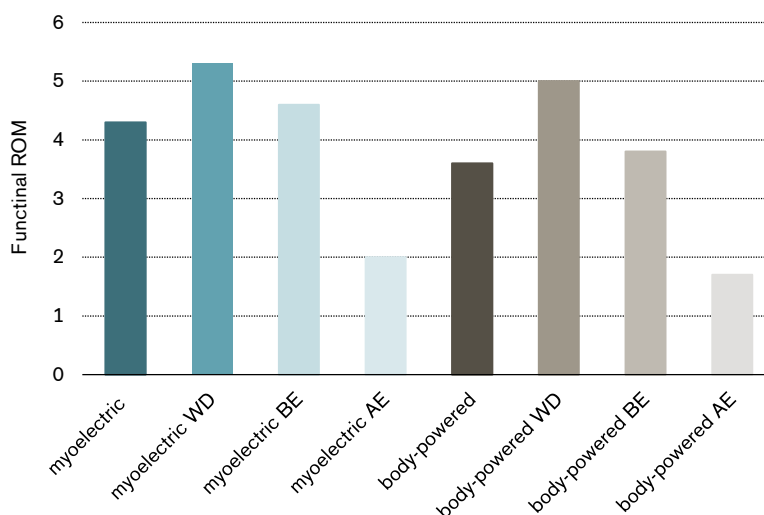
Myoelectric (Ottobock 6V) vs body-powered prosthesis

Major Findings

With myoelectric compared to body-powered prosthesis:

- **Myoelectric prosthesis provides to the user higher range of motion.**
- **Task execution was faster with body-powered prosthesis, but with more compensatory movements.**
- **60% of amputees preferred myoelectric prosthesis.**

Functional Range of Motion (RoM) for patients tested with myoelectric and body-powered prosthesis



The myoelectric amputees scored higher on average in test of functional range of motion (RoM) than body-powered amputees (4.3 compared to 3.6, dark blue and grey bars). A score of 4 means that the amputee could open his terminal device (hook or myoelectric hand) in 4 of the 5 positions tested (above shoulder level, at the mouth, behind the neck, far in front of the body, behind the back). Amputees fitted with body-powered prosthesis were unable to open the hook behind the back and the neck, because the cable became slack in these positions. (WD – wrist disarticulation, BE – below elbow, AE – above elbow)

Population

Subjects:	34 upper limb amputees
Products:	16 body-powered prostheses; 20 myoelectric prostheses (Ottobock 6V)
Amputation causes:	60% traumatic causes, 40% congenital malformation
Mean age:	body-powered group: 40 ± 17 years myoelectric group: 27 ± 14 years
Mean time since amputation:	body-powered group: 12.2 ± 12.9 years myoelectric group: 1.4 ± 1.5 years

Study Design

Observational study

Amputees were tested on standardised series of tasks using their myoelectric hand, conventional prosthesis and their normal hand. Questionnaires were also administered.

Results

Body Function		Activity			Participation	Others	
Mechanics	Pain	Grip patterns / force	Manual dexterity	Activities of daily living (ADL)	Satisfaction and Quality of life (QoL)	Training	Technical aspect

Category	Outcomes	Results for myoelectric vs body-powered prosthesis	Sig.*
Manual dexterity	Functional Range of Motion (RoM):	The myoelectric amputees scored higher on average in test of functional range of motion (RoM) than body-powered amputees (4.3 compared to 3.6).	++
	<ul style="list-style-type: none"> above shoulder level, at the mouth, behind the neck, far in front of the body, behind the back 	Amputees fitted with body-powered prosthesis were unable to open the hook behind the back and the neck, because the cable became slack in these positions.	+
	Tasks:	Amputees performing tasks with myoelectric prosthesis took about twice as long as those with a conventional prosthesis, and nearly 5 times as long as when performing tasks with their normal arm.	-
Activities of daily living	<ul style="list-style-type: none"> Pick up small objects Simulated feeding Stacking checkers Picking up pegs Picking up and rotating heavy objects Strength of cylindrical grasp Box and Block test Endurance 	Although amputees were able to accomplish the task faster with the body-powered than with myoelectric prosthesis, they had to use extreme body movements such as rotating their trunk to rotate heavy objects, because of harnessing.	+
	Questionnaire	The average scores on the ADL questionnaire were not different for myoelectric and conventional prosthesis users.	0
		Body-powered prosthesis was worn for a longer period of time (14h per day on average) than myoelectric prosthesis (9.6h per day on average).	--
		60% preferred to use myoelectric prosthesis compared to body-powered, which they had been fitted previously.	+

* no difference (0), positive trend (+), negative trend (-), significant (++/--), not applicable (n.a.)

Author's Conclusion

"Amputees who had been fitted only with a conventional prosthesis and used their prosthesis regularly, tended to wear the prosthesis more hours per day (14 hours) than amputees fitted with a myoelectric hand (9.6 hours), some of whom continued to use a conventional prosthesis for some jobs. However, the amputees with myoelectric prostheses had a greater functional range of motion (RoM) than those with a conventional prosthesis and many regular wearers of myoelectric prosthesis had long since rejected a conventional prosthesis. Amputees took about 2.5 times as

long to complete the tasks tested with a conventional prosthesis and about five times as long with myoelectric prosthesis than with their normal hand. Despite the slower function, more than 60% of below-elbow amputees accepted the myoelectric prosthesis, which they had all been fitted with previously. Others preferred to continue using a conventional prosthesis to which they become accustomed (13%) or no prosthesis (26%). The combination of function, RoM, and cosmetic appearance of myoelectric prosthesis is preferred by most below-elbow amputees, despite its slower performance at present time.” (Stain et al. 1983)

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