Reference

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Targeted Muscle Reinnervation and Advanced Prosthetic Arms

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Products

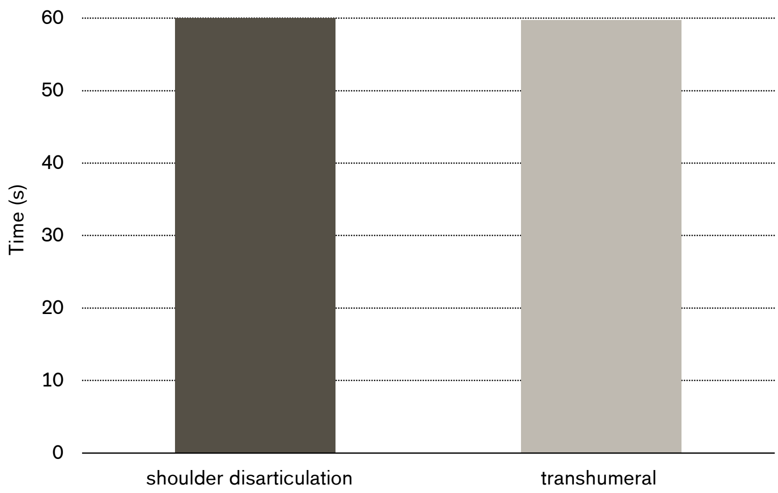
Targeted Muscle Reinnervation and Coapt Pattern Recognition control myoelectric prosthesis

Major Findings

The effect of Targeted Muscle Reinnervation (TMR) and Coapt pattern recognition control on myoelectric prosthetic use:

→ **Similar functional performance of the shoulder disarticulation and the transhumeral side of a bilateral amputee, despite poorer expectation for the higher-level amputation side**

Clothespin Relocation Test



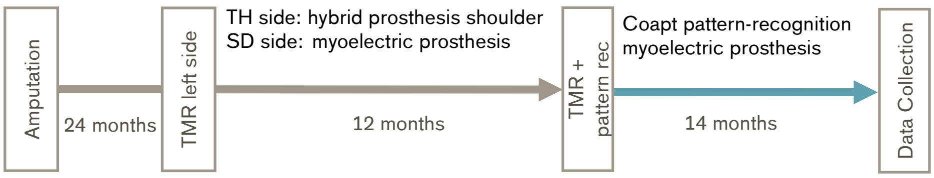
During functional tests such as the clothespin relocation test the patient demonstrated similar performance between his left - shoulder disarticulation (60.6 ± 11.5s) and right - transhumeral sides (59.7 ± 10.6s), despite the difference in amputation level. The results suggest the intuitiveness of control with TMR and pattern recognition control, as higher-level amputation would otherwise be expected to provide poorer performance in functional tasks.

Population

Subjects:	one male bilateral amputee (left shoulder disarticulation and right transhumeral amputation)
Amputation etiology:	trauma
Age at amputation:	43 years
Age at TMR	45 years
Previous prosthesis:	hybrid prosthesis on his transhumeral side, which included a passive (non-moving) elbow and a myoelectric hook; myoelectric prosthesis after TMR surgery on his shoulder disarticulation side
Intervention prosthesis:	bilateral fitting with Coapt pattern-recognition myoelectric prostheses

Study Design

Case report:



A 43 year old male sustained a severe electrical burn injury and required a left side amputation at the shoulder disarticulation level and a right side amputation at the transhumeral level. Two years after the injury, the TMR surgery was first performed on the patient's left side and four months later on his right side. The patient was initially fitted with a hybrid prosthesis on his transhumeral side and with a myoelectric prosthesis on his shoulder disarticulation side. After one year of prosthetic use, the patient was bilaterally fitted with Coapt pattern-recognition myoelectric prostheses as intervention devices.

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 pattern recognition myoelectric prosthetic use after TMR:	Sig.*
Pain	Self-reported	Five months after the TMR surgery, the patient reported complete resolution of his neuroma pain bilaterally. Some occasional phantom limb pain was reported.	n.a.
Manual dexterity	Box and Blocks	Similar performance of the left (11.0 ± 1.5blocks) and right (14.3 ± 0.3blocks) side with pattern recognition prosthesis, despite the difference in amputation level.	n.a.
	Clothespin Relocation Task	Similar performance of the left (60.6 ± 11.5s) and right (59.7 ± 10.6s) side with pattern recognition prosthesis, despite the difference in amputation level.	n.a.
Activities of daily living (ADL)	Self-reported	Many tasks were easier to perform with the pattern recognition controlled myoelectric prosthesis after TMR: eating with a fork, drinking from a water bottle, carrying a laundry basket, yard work, as well as placing, retrieving and replacing items from a refrigerator.	n.a.

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

Author's Conclusion

"Targeted muscle reinnervation combined with existing and emerging prosthetic technology allows for intuitive control of myoelectric prostheses for amputees at multiple levels. For complex amputees, such as the patient presented in the case example, a strategic and orderly approach to care is essential, understanding that each patient will present unique challenges." (Cheesborough et al., 2015)