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## Reference

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# Impact of Michelangelo prosthetic hand: Findings from a crossover longitudinal study

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## Products

### Michelangelo hand vs Tridigit hands

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## Major Findings

With Michelangelo compared to conventional myoelectric prosthesis:

→ **A higher functionality can be achieved**

Score of Box and Block Test increased by 20.8%

Score of SHAP increased by 11.4%

Time needed to perform Minnesota Manual Dexterity Test decreased by 14.8%

→ **ADL execution is easier**

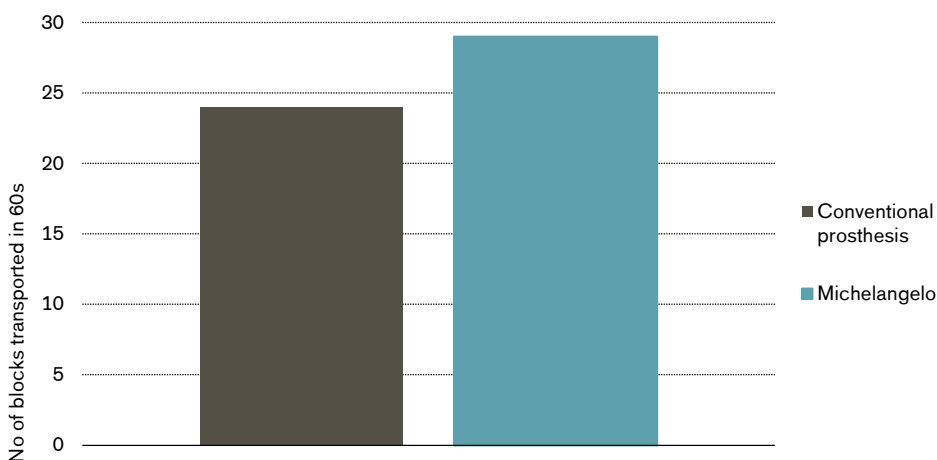
Reported by 84% of patients

→ **Michelangelo hand is more actively used at home**

Lateral grip preferred over opposition grip

→ **Gesture and posture is more natural**

### Significant improvement in Box and Block Test



Box and Blocks is a manual dexterity test where number of blocks transported from one box to another in 60s is assessed. The users were able to transport 5 blocks more on average with Michelangelo hand. Four out of six participants (67%) had a sore above minimal clinically relevant detectable change (more than 6.5 blocks were transported with Michelangelo hand in 60s than with conventional myoelectric prosthesis).

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## Population

Subjects:	6 transradial amputees
Previous prosthesis:	tridigital myoelectric prosthesis
Amputation causes:	trauma
Mean age:	47 yrs (range: 35-65 yrs)
Mean time since amputation:	15 yrs (range: 4.5-48 yrs)

## Study Design

Interventional pre- to post-test design:



The subjects were provided with 5 days of occupational therapy after they have been fitted with Michelangelo.

## 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 Michelangelo vs Tridigit hands	Sig.*
Grip patterns / force	Activity monitoring data	After 3 months the median number of opening and closing cycles was 32,330. 83% of patients preferred the lateral grip (73% of cycles). After 6 months the median number of opening and closing cycles was 54,012 in total over six months. The lateral grip was preferred for 77% of cycles.	n.a.
Manual dexterity	Southampton Hand Assessment Procedure (SHAP)	The score for the SHAP was 11.4% higher with Michelangelo than with the conventional prosthesis. A higher score can be interpreted as a higher functionality.	+
	Box and Block Test (BBT)	<b>The number of blocks that was carried over a partition was increased by 20.8% suggesting higher hand functionality.</b> 67% of the patients increased the score over the minimal clinically relevant detectable change.	++
	Manual Dexterity Test (MMDT)	<b>The time for the test was decreased by 14.8% which also can be interpreted as a higher functionality.</b>	++
	Disabilities of the Arm, Shoulder, and Hand (DASH)	All patients showed high hand functionality (min DASH row score 26, range 0-100, lower score = higher functionality). No difference was observed between two hands.	0
Activities of daily living (ADL)	Orthotics and Prosthetics User Survey – Upper Extremity Functional Status (OPUS-UEFS)	84% of the patients reported an easier execution of ADLs.	+
Satisfaction and Quality of life (QoL)	Hospital Anxiety Depression Scale (HADS)	Despite the fact that questionnaires created to assess satisfaction and quality of life did not show statistical significant difference, interview transcripts emphasised that Michelangelo en-	0
	EuroQoL (Health-Related Quality of Life)		0

Category	Outcomes	Results for Michelangelo vs Tridigit hands	Sig.*
	Amputee Body Image Scale (ABIS)	hances functionality and brings more natural gesture and posture.	0
	Trinity Amputation and Prosthesis Experience Scales (TAPES) – Upper Limb Version		0
	Multidimensional Scale Perceived Social Support (MSPSS)		0
	Coping Inventory for Stressful Situations (CISS)		0
	Eysenck Personality Questionnaire Revisited – Short Form (SPQR-SF)		0

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

### Author's Conclusion

“Amputation- and prosthetic-related factors, along with psychological factors (e.g., patient coping strategies, attitude, expectations) and social factors (i.e., support of family and friends, reactions of others), need to be screened in the prosthesis fitting process. The present study shows that the M is effective in improving the functional ability and in easing the social interaction of previous active users of a myoelectric prosthesis.” (Luchetti et al. 2015)

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