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## Reference

Bertels T, Schmalz T, Ludwig E

Otto Bock HealthCare GmbH, Goettingen

# Biomechanical influences of shoulder disarticulation prosthesis during standing and level walking

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## Products

### MovoShoulder Swing with DynamicArm and System Electric Hand vs no prosthesis

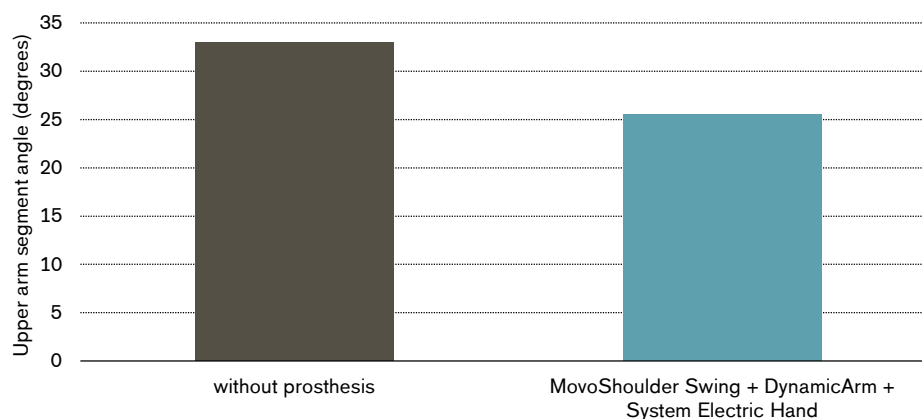
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## Major Findings

MovoShoulder Swing with DynamicArm and System Electric Hand:

- **Compensatory movements during walking in shoulder, elbow and knee are reduced when using a free swinging shoulder joint**
- **Swinging of the sound arm in shoulder joint is 23% reduced**
- **Swinging of the sound arm in elbow joint is 13% reduced**
- **Unphysiological loading of the knee joint on amputated side is 12% decreased**

### Mean range of contralateral shoulder motion during walking with or without prosthesis



The prosthesis (MovoShoulder Swing, DynamicArm and System Electric Hand) reduced the pronounced unphysiological swing of the sound arm (segment angle of sound side decreased from 33° without the prosthesis to 25.5° with prosthesis).

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## Population

Subjects: 8 patients with unilateral shoulder disarticulation and 6 able-bodied subjects  
Amputation causes: 6 traumas, 1 cancer and 1 sepsis  
Mean age: 44 ± 13 years  
Mean time since amputation: 14 ± 9 years

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## Study Design

Observational (non-interventional) study:

Aim of this study was to observe the impact of functional arm prosthesis on body posture and gait of shoulder disarticulation patients and compare it with able-bodied individuals.

## 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 MovoShoulder Swing with DynamicArm and System Electric Hand vs no prosthesis	Sig.*
Mechanics	Gait analyses (kinematic)	Walking speed between amputees and able bodied participants was similar.	0
		<b>Intensive swinging of the sound arm in shoulder and elbow joint is drastically reduced with MovoShoulder Swing and DynamicArm.</b>	<b>++</b>
		<b>Shoulder backward rotation is reduced with the use of prosthesis.</b>	<b>++</b>
		<b>Unphysiological loading of the knee joint decreases with free swing in the shoulder joint enabled by the prosthesis.</b>	<b>++</b>

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

## Author's Conclusion

"From the biomechanical point of view, unilateral shoulder disarticulation patients benefit greatly from modern prosthetic systems as described in this paper. This study shows that the patient's body posture is significantly improved by using a prosthesis. Compensatory movements, such as abnormal swinging of the contralateral arm, are reduced. In addition, unphysiological loading of the knee joint decreases if the prosthetic shoulder joint freely swings in the sagittal plane." (Bertels et al. 2012)

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