
Reference

Goswami J, Lynn R, Street G, Harlander M.

Health, Physical Education, Recreation and Sport Science, St. Cloud University, Minnesota, USA

Walking in a vacuum-assisted socket shifts the stump fluid balance

Prosthetics and Orthotics International 2003; 27(2):107-113.

Products**Vacuum-assisted socket system* (VASS)**

*TEC, later acquired by Otto Bock and sold as Harmony

Major Findings

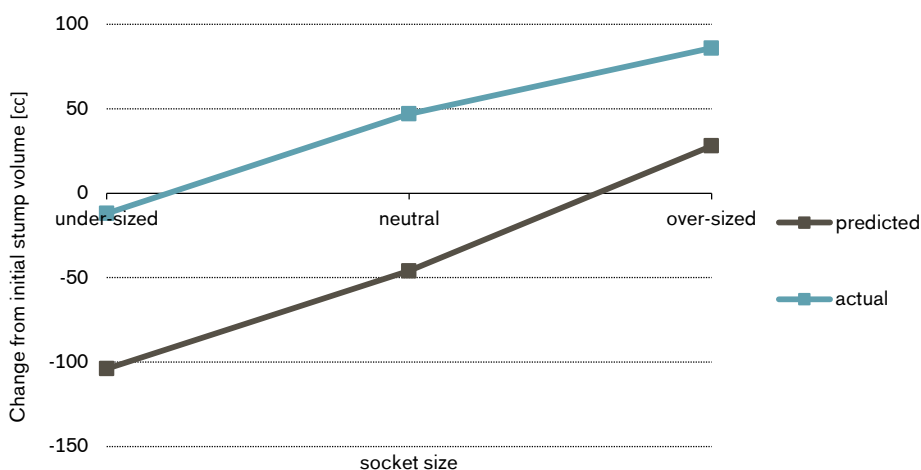
With VASS:

→ **Fluid balance of the residual limb is changed towards a net gain for all socket sizes and therefore a better fit of the socket is achieved**

For under-sized socket, limb volume increased by 92 cc

For neutral socket, limb volume increased by 93 cc

For over-sized socket, limb volume increased by 58 cc

Stump Volume Change

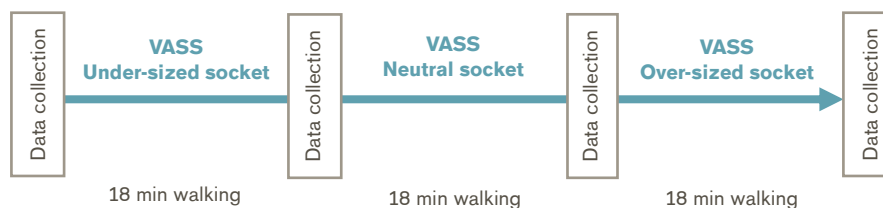
Average changes in volume from the initial stump volume after 18 minutes walking in the under-sized, neutral and over-sized sockets. The predicted changes are based on the volume available to the stump in the respective sockets.

Population

Subjects:	7 transtibial amputees
Previous socket system:	not reported
Amputation causes:	Trauma or congenital
Mean age:	45 yrs (27 – 66 yrs)
Mean time since amputation:	≥ 3 yrs
MFCL:	not reported

Study Design

Interventional, A-B-C study design:



The study was designed to determine the effect of socket size on the stump volume fluctuation when walking. Therefore volume differences of -8% for under-sized, 0 for neutral and 8% for over-sized socket sizes from the liner volumes were investigated.

Results

Body Function				Activity			Participation	Others	
Wound Healing	Limb Volume Fluctuation	Pain	Comfort, Limb Health	Level Walking	Balance	Activity, Mobility, ADLs	Preference, Satisfaction, QoL	Pistoning	Pressure Measurement

Category	Outcomes	Results for VASS	Sig.*
Limb Volume Fluctuation	Alginate casting method: marked limb was casted in an alginate-water mixture. The impression of the stump thus formed, was filled with water. The volume of water determined the limb volume.	<p>Post-walk stump volumes were increased relative to the volumes available in the sockets for all socket sizes:</p> <p>For undersized socket size stump volume increased by 92 cc</p> <p>For neutral socket size stump volume increased by 93 cc</p> <p>For oversized socket size stump volume increased by 58 cc</p> <p>Therefore, the fluid balance of the stump was changed towards a net gain for all socket sizes.</p>	<p>++</p> <p>++</p> <p>++</p>
Pain	Questioned about pain after walk with over-sized socket	No pain resulted from the volume gain following the walk in the over-sized socket.	n.a.
Comfort, Limb Health	Questioned about discomfort after walk with over-sized socket	No discomfort or reddening of the skin resulted from volume gain following the walk in over-sized socket.	n.a.

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

Author's Conclusion

"A custom-fit, VASS minimizes or prevents the acute volume loss normally observed after donning the recommended 4-6% under-sized socket. This shift in fluid balance ensures that a good fit is maintained during the day in ambulatory trans-tibial amputees." (Goswami et al. 2003)

© 2014, Otto Bock HealthCare Products GmbH ("Otto Bock"), All Rights Reserved. This article contains copyrighted material. Wherever possible we give full recognition to the authors. We believe this constitutes a 'fair use' of any such copyrighted material according to Title 17 U.S.C. Section 107 of US Copyright Law. If you wish to use copyrighted material from this site for purposes of your own that go beyond 'fair use', you must obtain permission from the copyright owner. All trademarks, copyrights, or other intellectual property used or referenced herein are the property of their respective owners. The information presented here is in summary form only and intended to provide broad knowledge of products offered. You should consult your physician before purchasing any product(s). Otto Bock disclaims any liability related from medical decisions made based on this article summary.