

Harmony vs other socket systems

Comfort and Limb Health

Major Findings

With vacuum assisted socket system (VASS) compared to other socket systems:

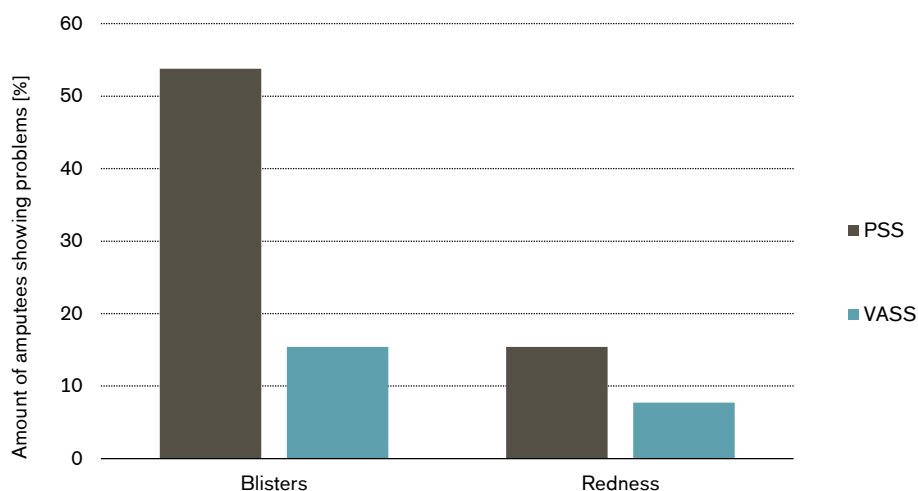
→ **Trend towards increased limb health**

38% less blisters

8% less redness of the skin

→ **Improvements in comfort**

Decreased comfort restricting factors with VASS



Problems experienced in users of vacuum-assisted socket system (VASS) and pin suspension system (PSS) (n=13) after wearing each system at least 30 days. (Ferraro, 2011)

Clinical Relevance

Comfort is the basis for a successful prosthesis use. As a result of comfort, prosthesis use per day may increase which further leads to improved confidence of amputees and quality of life.

Summary

Ferraro (2011) showed an increase in comfort with VASS compared to pin suspension system (PSS) based on a trend towards improved limb health such as less blisters and less redness of the skin. Furthermore, it is known, based on experience in praxis, that VASS reduces or eliminates minor skin problems such as folliculitis and recurring cysts (Street, 2006).

A study investigating the effect of different socket sizes with VASS, demonstrated that even the volume gain by using over-sized socket does not cause discomfort or reddening of the skin (Goswami et al., 2003). Only Klute et al., (2011) reported contrary results; residual limb health decreased with VASS compared to pin suspension system (PSS). These results can probably be explained by an inappropriate socket fit due to changes in residual limb volume that were not accommodated by necessary socket modifications in the first months of using VASS.

In a study investigating the effect of different socket types in combination with electronic VASS on transfemoral amputees, subjects reported higher comfort with brimless socket design instead of the ischial ramus containment (IRC) socket design (Kahle et al., 2014).

References of summarized studies

Goswami, J., Lynn, R., Street, G., & Harlander, M. (2003). Walking in a vacuum-assisted socket shifts the stump fluid balance. *Prosthetics and Orthotics International*, 27(2), 107–113.

Kahle, J. T., & Highsmith, M. J. (2013). Transfemoral sockets with vacuum-assisted suspension comparison of hip kinematics, socket position, contact pressure, and preference: Ischial containment versus brimless. *Journal of Rehabilitation Research and Development*, 50(9), 1241–1252. doi:10.1682/JRRD.2013.01.0003

Klute, G. K., Berge, J. S., Biggs, W., Pongnumkul, S., Popovic, Z., & Curless, B. (2011). Vacuum-Assisted Socket Suspension Compared With Pin Suspension for Lower Extremity Amputees: Effect on Fit, Activity, and Limb Volume. *Archives of physical medicine and rehabilitation*, 92(10), 1570–1575. doi:10.1016/j.apmr.2011.05.019

Ferraro, C. (2011). Outcomes Study of Transtibial Amputees Using Elevated Vacuum Suspension in Comparison With Pin Suspension. *JPO Journal of Prosthetics and Orthotics*, 23(2), 78–81. doi:10.1097/JPO.0b013e3182173b83

Street, G. M. (2007). Vacuum Suspension and its Effects on the Limb. *Orthopädie-Technik*, 04.

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