Harmony vs other socket systems

Limb Volume Fluctuation

Major Findings

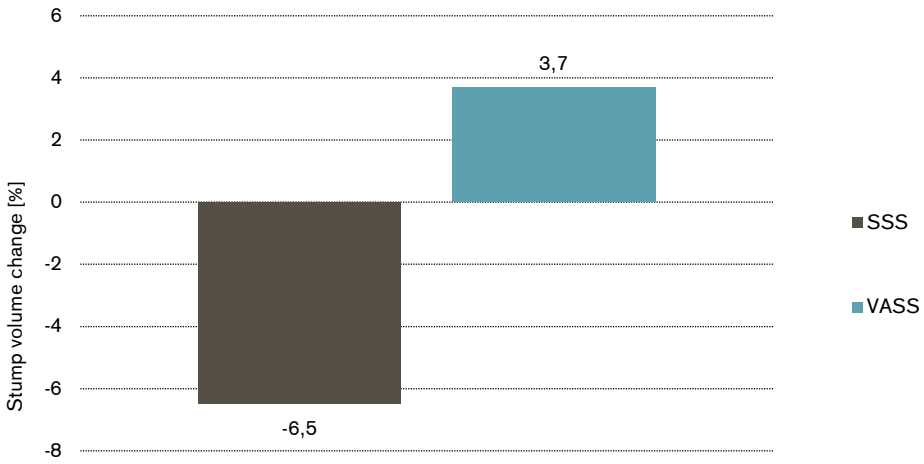
With vacuum assisted socket system (VASS) compared to other socket systems:

→ **Prevents volume loss of the residual limb during activity**
Residual limb volume increased 3.7% with VASS
Residual limb volume decreased 6.5% with suction socket system (SSS)

→ **Limb volume change is more positive than with pin suspension system (PSS) during activity**

→ **Net gain of limb volume is achieved with under-sized, neutral and over-sized socket design after activtiy**

Increased stump volume with VASS after walking



Volume of residual limb before and after 30 minutes of walk was measured for vacuum-assisted socket system (VASS) and suspension socket system (SSS). (Board et al., 2001)

Clinical Relevance

One of the most important benefits of the VASS is that limb volume is maintained throughout the day. With other suspension systems, the residual limb loses volume as fluid gets pushed out of the limb during stance phase. As a result, the socket fit is less consistent and users need to remove prosthesis multiple times/day while attempting to manage volume changes with additional sock layers.

Summary

VASS shifts the fluid balance in the residual limb to one of maintenance or a slight gain by driving less fluid out of the limb during stance phase and drawing more fluid in during swing phase. An increase in the residual limb volume by 3.7% after 30 min of walking was observed with VASS, whereas the residual limb volume decreased by 6.5% with the suction socket system (Board et al., 2001). A case report demonstrated that 2 out of 3 subjects showed an increase in limb fluid volume during activity by 1.2%, respectively 0.4%. Moreover, 3 out of 3 subjects showed a more positive limb volume change during activity compared to pin suspension system (PSS) (Sanders et al., 2011).

A study investigating the effect of different socket sizes measured a change of the fluid balance of the residual limb towards a net gain for all socket sizes during walking. The improved fluid balance is independent of socket size. Nevertheless a tight

socket is crucial to make the VASS work as well as for safety rea-sons. (Goswami et al., 2003).

Beil et al. (2002) proposed that drawing more fluid in based on the 27% increase of negative pressure in swing phase is probably most responsible for volume maintenance. The drop in pressure is hypothesized by Street (2006) to be the result of the anchored liner. Thus tissues elongate, tissue pressure drops and therefore fluid is drawn into the limb.

References of summarized studies

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