

# Harmony vs other socket systems

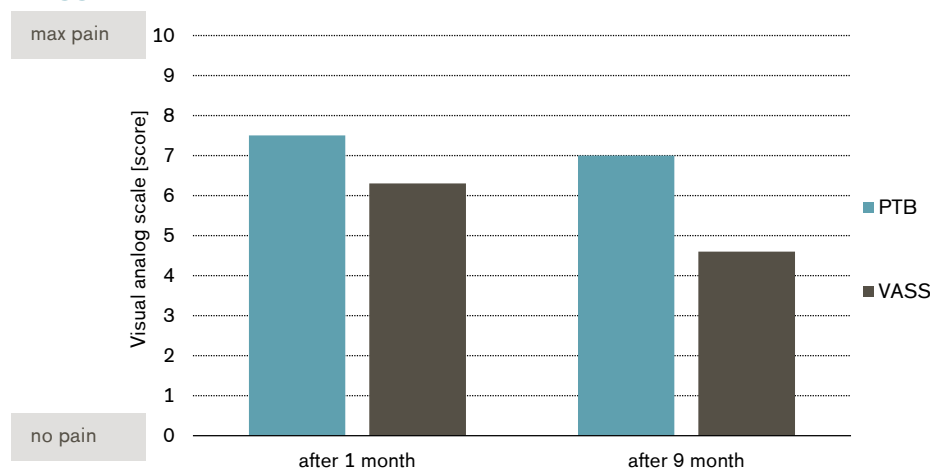
## Pain

### Major Findings

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

- **No change in pain perception even if prostheses use is more intense or residual limb volume is increased**
- **Improves pain control even in the presence of wounds**

### Pain during walking with the prosthesis is decreased with VASS



Pain during walking after one month and after nine months wearing vacuum-assisted socket system (VASS) or a patellar-tendon bearing prosthesis (PTB). Subjects with wound healing failure were enrolled in VASS group, whereas subjects without wound healing failure were enrolled in PTB group. (Brunelli et al., 2009)

### Clinical Relevance

If pain is not influenced by the occurrence of wounds, early prosthesis fitting and rehabilitation start before completed wound healing is possible. Early prosthesis fitting is crucial to obtain great patient autonomy and mobility (Traballesi et al., 2012).

### Summary

There are multiple features of the VASS which have a positive effect on residual limb pain: I) residual limb volume maintenance and reduced pistoning results in minimization of skin irritations and breakdown. II) Mechanical stress, which is the major cause of pain, is reduced through smaller shear stress and through reduced pressure during stance phase. In practice this was confirmed by Brunelli et al. (2009): Subjects on VASS showed improved pain control after 1 month and after 9 month compared to subjects on patellar-tendon bearing (PTB) prosthesis. These results are even more remarkable, considering that only subjects with wound healing failure were included in the VASS group and only subjects without wound healing failure in the PTB group. Traballesi et al. (2012) could not find any difference in pain reported by subjects with wound healing failure between VASS group and the suction suspension system (SSS) group, even though subjects on VASS reported a longer prostheses use per day.

A study investigating the effect of different socket sizes, showed, that the increase in residual limb volume through an over-sized socket size, didn't result in a change in pain perception (Goswami et al., 2003).

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## References of summarized studies

Brunelli, S., Aversa, T., Delusso, S., & Trallesi, M. (2009). Vacuum assisted socket system in trans-tibial amputees: Clinical report. *Orthopädie-Technik Quarterly, English edition, 11*, 2–7.

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.

Trallesi, M., Delusso, A. S., Fusco, A., Iosa, M., Aversa, T., Pellegrini, R., & Brunelli, S. (2012). Residual limb wounds or ulcers heal in transtibial amputees using an active suction socket system. A randomized controlled study. *European journal of physical and rehabilitation medicine, 48*(4), 613–623.

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