

Reference

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Transfemoral sockets with vacuum-assisted suspension comparison of hip kinematics, socket position, contact pressure, and preference: Ischial containment versus brimless

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Products

Electronic vacuum-assisted socket system* (eVASS)

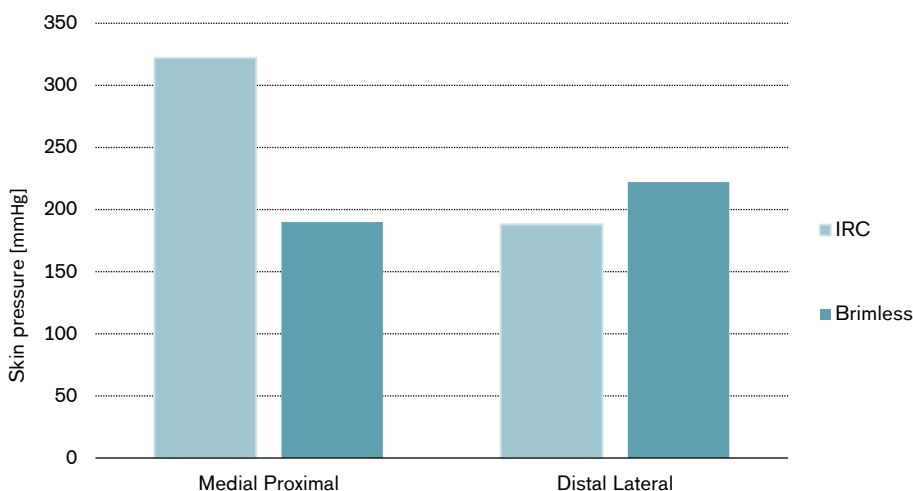
* ePulse, Otto Bock

Major Findings

With brimless compared to ischial ramus containment (IRC) socket design:

- **Improved comfort**
- **Preference of all subjects**
- **Medial proximal average skin pressures decreased by 41%**
- **Vertical movement of the socket showed a tendency to be reduced by 44%**

Peak/Stance Average Pressure on Skin



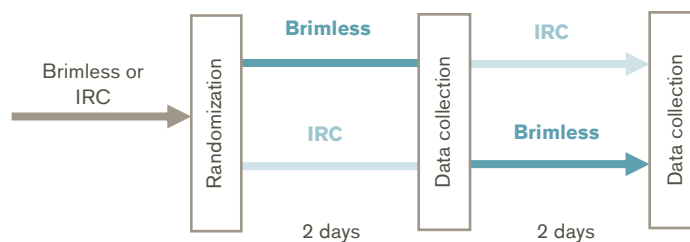
Pressure on skin recorded with sensors during gait for both brimless and ischial ramus containment (IRC) socket design. Sensors were placed on medial proximal and distal lateral position of the residual limb between skin and liner.

Population

Subjects: 9 transfemoral amputees
Previous socket system: 33% brimless, 67% IRC
Amputation causes: 78% trauma, 11% sarcoma, 1% vascular disease
Mean age: 41.2 ± 14.5 yrs
Mean time since amputation: 9.1 ± 10.3 yrs
MFCL: not reported

Study Design

Interventional, randomized crossover design:



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 brimless compared to IRC socket design	Sig.*
Comfort, Limb Health	Questionnaire about comfort	Higher comfort in sitting and standing. Decrease in phantom pain. Increase in hip range of motion. Less urogenital interference. Ease in walking.	n.a.
Level Walking	X-ray to measure hip angle	Trend towards increased femoral abduction in double support. Trend towards increased femoral abduction in stance phase. Trend towards increased femoral adduction in swing phase.	+ + +
Preference, Satisfaction, Quality of Life (QoL)	Questionnaire about preference	All subjects preferred the brimless socket design.	n.a.
Pistoning	X-ray to measure medial wall height, vertical and lateral socket movement	Increased mean lateral shifting (1.6 cm vs 1.2 cm). Decreased mean vertical movement (1.4 cm vs 2.5 cm). Difference in position of the mean medial wall of the socket relative to the distal-most aspect of the ischial tuberosity: 3.3 cm distal for brimless socket 1.1 cm proximal for the IRC socket	- + +
Pressure Measurement	One proximal-medial and one distal lateral sensor to record pressures of 15 gait cycles	The peak/stance average pressure in the medial proximal aspect of the socket decreased by 41% (190 mmHg vs 322 mmHg). The peak/stance average pressure in the distal lateral aspect tended to be increased by 18% (222 mmHg vs 188 mmHg). The single greatest peak pressure value in the	++ - +

Category	Outcomes	Results for brimless compared to IRC socket design	Sig.*
		medial proximal aspect tended to be decreased by 2.6 (819 mmHg vs 841 mmHg).	
		The single greatest peak pressure value in the distal lateral aspect tended to be increased by 38% (751 mmHg vs 543 mmHg).	–

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

Author's Conclusion

“Elimination of the brim may be a clinically viable choice of socket for TFAs because the brimless design was equivalent to the IRC in the area of coronal hip angle, vertical movement, and lateral shifting. Mean peak stance skin pressure was less in the medial proximal aspect of the brimless design. All other peak and mean skin pressures were shown to be equivalent when comparing the brimless design with the IRC. The brimless design was reported to be more comfortable than the IRC design in short-term preference.” (Kahle et al. 2013)

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