Effect of a prosthetic foot with a hydraulic ankle unit on the contralateral foot peak plantar pressures in individuals with unilateral amputation

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Summary

Plantar pressure under the sound foot was measured for thirteen unilateral amputees, using prosthetic feet with and without hydraulic ankle units. There was a significant reduction in plantar pressure when using the hydraulic ankle.

Method

Components: Echelon, previous non-hydraulic ankle-foot

Measurements: Contralateral foot plantar pressure

Subjects: Thirteen unilateral K3 amputees (12 male, 1 female; 8 trans-tibial, 5 trans-femoral)

Data collection protocol: Participants walked over an Amcube pressure platform with their contralateral foot, back and forth along a 6m walkway, with their originally prescribed prosthetic foot. Each walked for a total of five minutes in order to record a sufficient number of steps. They were then fitted with an Echelon hydraulic ankle and acclimatised to the device for a period of four weeks. Subsequently, they returned to the clinic and repeated the plantar pressure measurement test, this time using the hydraulic ankle.

Analysis: Paired t-tests comparing peak pressures with and without the hydraulic ankle units.

Results

All 13 patients showed a decrease in contralateral foot peak plantar pressures when using the prosthetic foot with the hydraulic ankle unit. The mean reduction was 48kPa (p=0.002). The two largest reductions were both trans-femoral patients (165kPa and 129kPa reductions, respectively).

	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	Mean
Pre-Echelon (kPa)	132	221	192	185	331	200	105	131	162	176	186	274	150	188
Echelon (kPa)	92	134	162	156	166	199	90	84	138	149	158	145	143	140
Difference	-40	-87	-30	-29	-165	-1	-15	-47	-24	-27	-28	-129	-7	**-48**

Conclusion

The authors conclude that maintaining the contralateral limb should be viewed as an issue of great priority. The inclusion of a hydraulic ankle on the prosthetic side can directly play a statistically significant part in the health and longevity of the sound limb. With respect to the two large reductions for the trans-femoral patients, the authors state that because these reductions were observed at the forefoot and metatarsal heads, it is likely that Echelon reduced the necessity to hip-hike, due to its greater toe clearance.

Products with Related Technology:

Linx, Elan, Echelon, EchelonVT, EchelonVAC