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).


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<th>P13</th>
<th>Mean</th>
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<td>Pre-Echelon (kPa)</td>
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<td>221</td>
<td>192</td>
<td>185</td>
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<td>274</td>
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<tr>
<td>Echelon (kPa)</td>
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<td>162</td>
<td>156</td>
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</table>

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