C-Leg in limited community ambulators

Ramps

**Major Findings**

With C-Leg compared to NMPKs:

- **Improved walking velocity during ramp ambulation**
  - Walking velocity increased by 28% during ramp ascent
  - Walking velocity increased by 36% during ramp descent

- **Improved ramp descent mobility**
  - Hill assessment index score improved from 5.4 to 7.5 (39% increase)

- **More symmetrical gait pattern during ramp ambulation**
  - Duration of single limb support phase on prosthetic side increased by 17% during ascent and descent

- **Reduced anterior tilt of pelvis during stance phase**

**Clinical Relevance**

Similar to stairs, ramps and hills need to be navigated by amputees to be able to ambulate in the community and participate in daily life. Biomechanical assessment was conducted to determine joint angles and moments. The goal of prosthetic fitting is to try to allow for a natural gait pattern, which includes symmetrical gait characteristics and a loading distributed between the two limbs as even as possible. The ramp mobility is assessed by evaluating the walking speed as well as the dependence on hand rail and the chosen pattern by the Hill Assessment Index (HAI).

**Summary**

The Hill assessment index (HAI) score for hill descent improved in K2 subjects from 5.4 to 7.5 points with C-Leg compared to NMPKs, where 5 points stand for ‘step a little past with assistive device use’ and 8 points stand for ‘step-to-step pattern without assistive device use’ (Hafner et al. 2009).

Additionally to the HAI, time required to descend a hill was investigated. Walking velocity increased with C-Leg Compact by 28% for ramp ascent and by 36% for ramp descent compared to NMPKs, both due to increased stride length and cadence. Furthermore, the duration of single limb support on the prosthetic side in-
creased both during ramp ascent and descent and therefore with C-Leg Compact a more symmetrical gait pattern is achieved compared to NMPKs (Burnfield et al. 2012).

The anterior tilt of the pelvis was reduced in K2 subjects with C-Leg Compact compared to NMPKs as measured by increased hip and thigh extension on the sound side during single limb support phase during ramp ascent and descent (Burnfield et al. 2012).

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