
Reference

Highsmith MJ, Kahle JT, Carey SL, Lura DJ, Dubey RV, Csavina KR, Quillen WS.
University of South Florida, School of Physical Therapy & Rehabilitation Sciences,
Tampa, FL, USA.

Kinetic asymmetry in transfemoral amputees while performing sit to stand and stand to sit movements

Gait Posture 2011; 34(1):86-91.

Products

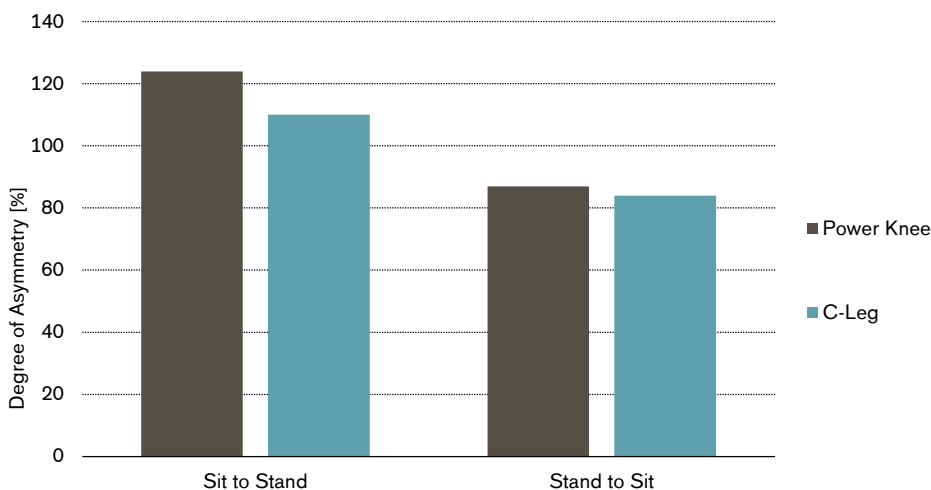
C-Leg vs Power Knee

Major Findings

With MPCKs:

→ **Independent of MPK, amputees still prefer to load mainly the healthy side during sit to stand and stand to sit task which leads to a high degree of asymmetry.**

Degree of Asymmetry for Knee Moment



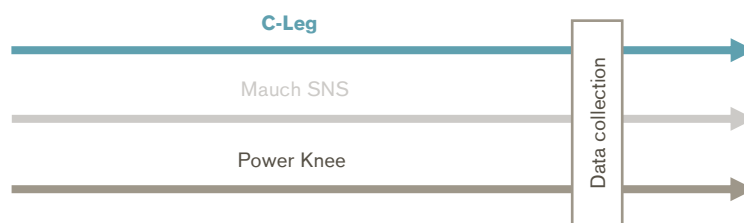
Degree of asymmetry for the knee moment was determined by the difference of the ground reaction force between sound side and prosthetic side.

Population

Subjects:	21 unilateral, transfemoral amputees
Previous prosthesis:	C-Leg or Power Knee
Amputation causes:	52% trauma, 14% sarcoma, 14% vascular, 10% vascular and diabetes, 5% diabetes, 5% congenital
Mean age:	45.7 yrs (\pm 14.9 yrs)
Mean time since amputation:	14.6 yrs (\pm 13.7 yrs)
MFCL:	10% K2, 76% K3, 14% K4

Study Design

Cross-sectional study design:



Subjects were included when no prosthetic adjustment was conducted up to 90 days before data collection.

Results

Activities								Participation	Environment
Level walking	Stairs	Ramps, Hills	Uneven ground, Obstacles	Cognitive demand	Metabolic energy consumption	Safety	Activity, Mobility, ADLs	Preference, Satisfaction, QoL	Health economics

Category	Outcomes	Results for C-Leg compared to Power Knee	Sig.*
Activity, Mobility, Activities of daily living (ADLs)	Motion Analysis Sit to stand	No difference in time to complete task.	0
		No difference in degree of asymmetry in ground reaction force (GRF).	0
		No difference in hip moment asymmetry, hip moment on sound side as well as side hip moments.	0
	Motion Analysis Stand to sit	No difference in knee moment asymmetry and knee moment on sound side.	0
		No difference in time to complete task.	0
		No difference in degree of asymmetry in ground reaction force (GRF).	0
		No difference in hip moment asymmetry, hip moment on sound side as well as side hip moments.	0
		No difference in knee moment asymmetry and knee moment on sound side and prosthetic side.	0

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

Author's Conclusion

“Transfemoral amputees are able to sit and stand at rates comparable to healthy control subjects and sitting down takes more time than it does to stand up. Transfemoral amputees do not load their prosthesis extensively for standing up or sitting down making this transitional movement a one-legged task which probably increases risk of injury or accelerated degeneration to the sound limb. On average the power knee did not assist this group in standing up. In fact, its control strategy seems better suited to facilitate enhanced symmetry in sitting down. The power

knee has the potential, by way of an extension assist feature, to facilitate enhanced symmetry for rising to stand. All three knees studied have the potential, by way of flexion damping stance control to assist with sitting down. These features were not optimally utilized possibly due to issues such as a lack of training or practice, distrust or improper settings despite the fact that all participants were accommodated to their respective prosthesis. Although the differences between knee groups were generally not statistically significant, differences may be clinically meaningful on an individual basis. Additional research is warranted to assist in determining what circumstances (e.g., user attributes, training techniques, etc.) maximally improve transfer performance in transfemoral amputees. The flexion damping feature of prosthetic knees is of high relevance regarding safety, and therefore this stand to sit movement could benefit from further study.” (Highsmith et al. 2011)

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