CONTRALATERAL AND IPSILATERAL CANE USAGE BY PATIENTS WITH OSTEOARTHRITIC KNEE

Grace Chan[1], Andrew W. Smith[1], Chris Kirtley[2] and William W.N. Tsang[1]

[1] Department of Rehabilitation Sciences, The Hong Kong Polytechnic University, Hong Kong
[2] Department of Biomedical Engineering, Catholic University of America, Washington, DC
E-mail: channyg@hkstar.com Web: www.rs.polyu.edu.hk

INTRODUCTION

Knee osteoarthritis (OA) is frequently associated with pain and deformity. OA is the most prevalent rheumatic disease in the world (Badley & Tennant, 1993; March & Schwarz, 1994) and the knee is the most often-affected weight bearing joint. A walking cane is prescribed to reduce loading across the affected joint. The cane placement is important in order to minimize joint loading and slow the progression of the osteoarthritis. The efficacy of contralateral cane usage for relief at the hip joint is well established (Neumann, 1988). However, the contralateral use of a cane to unload the knee joint in patients with knee osteoarthritis may not necessarily have the same effect as at the hip. The aim of the study was to compare the knee joint unloading effect of ipsilateral and contralateral cane use of patients with osteoarthritic knee during walking.

METHODS

The gait of fourteen subjects with osteoarthritic knee was studied under three walking conditions. According to the six point Knee Pain Scale (Rejeski et al, 1995), half of the subjects were rated as score 3, having "discomforting pain" during most of their daily activities, while half fell into the "very severe" group (points 11-13) for the Lequesne Algofunctional Index (Lequesne et al, 1987). The Vicon Clinical Manager calculated the degree of knee deformity. Eight of the subjects were having knee varus (2°-10°) and the remaining six were with knee valgus (1°-10°).

The walking conditions were: (a) walking unaided, (b) walking with a cane held on the ipsilateral (same) side, and (c) walking with a cane held on the contralateral (opposite) side to the affected knee. The kinematics and ground reaction force data of each walking condition were measured by a VICON 370 motion analysis system and multiple AMTI force platforms respectively. These data were combined with the anthropometric measures to calculate the knee joint moments by the process of inverse dynamics. Values were then obtained for the sagittal and coronal plane knee moments, coronal plane hip moment, and temporal-spatial variables. The hip abduction moment was used as an internal control variable. Differences between the three walking conditions were identified using the repeated measures ANOVA.

RESULTS AND DISCUSSION

The reliability results showed acceptable (ICC: 0.416) to excellent reliability (ICC: 0.904) for the frontal plane knee moment, sagittal plane knee moment and frontal plane hip moment during ipsilateral and contralateral cane usage. Good reliability (ICC: 0.76) was also obtained in sagittal plane moment for unaided walking. Poor reliability was found in frontal plane knee moment (ICC: 0.046) and hip moment (ICC: 0.230) during unaided walking.

The data for mean peak knee and hip moments for both knee deformity conditions are summarized in Table 1. Contralateral cane use gave rise to the lowest knee valgus and knee flexion moments of force in both

knee deformity (varus/valgus) conditions. Figure 1 is an example of the mean knee valgus moment for the subgroup of subjects with knee varus deformity.

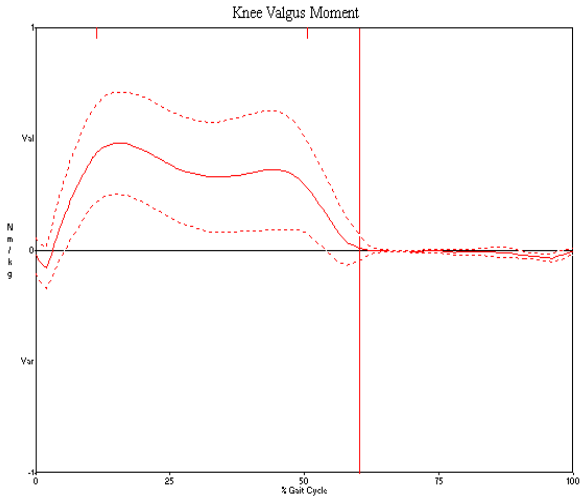

Figure 1: Frontal plane knee moment from subjects (n=8) with knee varus deformity. Mean (solid) ± s.d. (dotted) knee moment of force (Nm/kg)

Significant differences were found between with cane and without cane data in speed and cadence. Significant differences were also illustrated in the values of knee valgus (abduction) moment, hip abduction moment between ipsilateral and contralateral cane use. A significant difference was also obtained in knee flexion moment between contralateral cane use and unaided walking. Non-significant differences were obtained in stride length, hip abduction moment (contralateral versus unaided), knee valgus moment (contralateral versus unaided) and knee flexion moment (ipsilateral versus contralateral, ipsilateral versus unaided).

SUMMARY

From the results of this study, it can be seen that a cane may play a beneficial role in persons with knee osteoarthritis by placing it on the contralateral side of the affected extremity.

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Table 1: Mean Peak Knee And Hip Moments For The Knee Varus And Valgus Conditions

Walking Conditions		Mean Moment of Force (± s.d.)	
		Varus Knee (Nm/kg)	Valgus Knee (Nm/kg)
Ipsilateral cane:	Frontal plane knee	0.67 (± 0.25)	0.92 (± 0.64)
	Sagittal plane knee	0.4 (± 0.23)	0.41 (± 0.27)
	Frontal plane hip	1.08 (± 0.26)	1.46 (± 0.72)
Contralateral cane:	Frontal plane knee	0.54 (± 1.09)	0.46 (± 0.18)
	Sagittal plane knee	0.34 (± 0.22)	0.28 (± 0.15)
	Frontal plane hip	0.88 (± 0.15)	0.91 (± 0.22)
Unaided:	Frontal plane knee	0.55 (± 0.15)	1.99 (± 3.44)
	Sagittal plane knee	0.45 (± 0.14)	0.32 (± 0.23)
	Frontal plane hip	0.90 (± 0.19)	1.06 (± 0.41)