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Coordination Variability after Hip Replacement Surgery: A Case Report

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Patients with unilateral hip replacement surgery have an increased risk for additional joint replacement surgeries in the contralateral limb. Reduced coordination variability (Cvar) is associated with orthopedic disorders. Differences in joint Cvar after hip replacement surgery may provide information regarding the progression to a healthier state. The purpose of this study was to examine differences in surgical and contralateral limb knee and hip Cvar before and after surgery. A male participant completed gait analyses prior to total hip arthroplasty, three weeks following surgery (post-op) and ten months after surgery. He walked at a preferred speed while three-dimensional kinematic and kinetic data were recorded. A modified vector coding technique was used to determine the bilateral Cvar throughout stance for thigh-leg and pelvis-thigh flexion/extension and internal/external rotation coordination. Cvar was averaged for the stance phase of gait at each visit. Effect Size (ES) was calculated to determine clinically significant differences in variability both between the surgical and contralateral limbs and for each visit (Tables 1 and 2). In the surgical limb, variability was similar at all visits for pelvis-thigh and thigh-shank flexion/extension and internal/external rotation ($ES < 0.5$). Differences in (Cvar) between the surgical and contralateral limbs diminished with time. While Cvar in the surgical limb did not change, Cvar in the contralateral limb decreased over time. This may indicate a decline in health and an increased risk for orthopedic disorders in the contralateral limb after hip replacement surgery.

Table 1: Thigh-Shank Flexion/Extension Coordination Variability

Visit	Mean Phase Angle (°)		ES
	Contralateral limb	Surgical limb	
Pre-op	8.8	3.8	0.9
Post-op	3.8	4.6	0.3
10-month	3.8	4.7	0.2

Table 2: Contralateral Limb Thigh-Shank Flexion/Extension Variability

Visit	Mean Phase Angle (°)	ES
Pre-op	8.8	0.8
Post-op	3.8	
Pre-op	8.8	0.6
10-month	3.8	