

KNEE ADDUCTION MOMENTS DURING GAIT PREDICT DECREASED KNEE FUNCTION OVER FOUR YEARS

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INTRODUCTION:

Arthroscopic partial meniscectomy (APM) patients have been shown to have an increased rate of development of radiological OA after surgery [1]. Increased severity of radiological osteoarthritis (OA) of the knee has been correlated with decreased knee function [2]. External knee adduction moments in the stance phase of gait are predictive of radiographic OA progression over 6 years [3], and increased adduction moments during gait have also been recently identified in APM patients when compared to controls [4]. Further, APM patients experience decreased knee function 18 to 48 months after surgery [5]. Therefore, this study aimed to investigate whether post-surgery adduction moments of APM patients during gait were predictive of self reported knee function of in APM patients 4 years post-surgery.

METHODS:

Seventeen APM patients underwent three-dimensional gait analysis with a 50Hz Vicon motion analysis system, incorporating 2 AMTI force platforms, within 4-12 weeks of surgery, walking at a self-selected pace. 3D joint moments were calculated according to established procedures [6]. Patients completed the Knee Osteoarthritis Outcome Scale (KOOS) questionnaire [7] at baseline, and again 4 years post-APM-surgery. Fourteen controls, matched for age and body mass index, also underwent the same testing protocol. All participants had no sign of radiographic OA at baseline testing scored from 30° semi-flexed weight bearing posterior-anterior view knee X-rays [8].

Peak knee adduction moments were identified during the stance phase of gait. The peak knee adduction moment was normalised to body weight. The relationship between peak knee adduction moments at baseline and the change in KOOS scores at 4-year follow-up was quantified using Pearson product moment correlation (1-tailed). Significance was set at $p < 0.05$. Knee adduction was reported as negative and change in KOOS was calculated so that positive values indicate a degeneration a negative correlation will indicate an association between higher peak moments and greater degeneration.

RESULTS AND DISCUSSION:

It was shown that increased baseline peak adduction moments during gait were predictive of worsening KOOS scores over 4 years for both the APM patients ($r = 0.497$, $p = 0.021$) and controls ($r = 0.634$, $p = 0.007$). Both APM patients and healthy controls exhibiting increased peak knee adduction moments during gait experienced decreased knee function and increased knee pain, as indicated by a lower KOOS score, over a period of 4 years.

CONCLUSIONS:

This is the first study to report that peak knee adduction moments during gait are associated with a decline in self-reported knee function at 4-year follow-up, in not only APM patients but also controls who were healthy, and of similar age and BMI at baseline testing. Given the relationships that have already been shown to exist between fast disease progression in knee OA patients and large adduction moments during gait [3], and the increased propensity of APM patients to experience poor functional outcomes after surgery [5], these results suggest adduction moments during gait are a sensitive instrument for predicting those at risk of developing poor knee function over time. Of particular note is the finding that decreased function in controls was also predicted by baseline adduction moments.

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