

Paper #161

Posterior Cruciate Ligament Resection in Total Knee Arthroplasty: Effect on Flexion-Extension Gaps, Mediolateral Laxity, and Fixed Flexion Deformity

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Summary:

PCL resection creates flexion-extension mismatch, increased mediolateral laxity, and improvements in fixed flexion deformity that need to be accounted for during implant positioning and gap balancing during TKA

Abstract:

Introduction

The objective of this study was to assess the effect of posterior cruciate ligament (PCL) resection on flexion-extension gaps, mediolateral soft tissue laxity, fixed flexion deformity (FFD), and limb alignment during posterior-stabilised total knee arthroplasty (TKA).

Methods

This prospective study included 110 patients with symptomatic knee osteoarthritis undergoing primary robotic-arm assisted posterior-stabilised TKA. All operative procedures were performed by a single surgeon using a standard medial parapatellar approach. Optical motion capture technology with fixed femoral and tibial registration pins was used to assess gaps pre- and post-PCL resection in knee extension and 90 degrees knee flexion. This study included 54 males (49.1%) and 56 females (50.9%) with a mean age of 68.6 years at time of surgery. Mean preoperative hip-knee-ankle deformity was 4.1 3.4 degrees varus.

Results

PCL resection increased the flexion gap more than the extension gap in the medial ($2.4 \pm 1.5\text{mm}$ vs $1.3 \pm 1.0\text{mm}$ respectively, $p < 0.001$) and lateral ($3.3 \pm 1.6\text{mm}$ vs $1.2 \pm 0.9\text{mm}$ respectively, $p < 0.01$) compartments. The gap differences following PCL resection created mediolateral laxity in flexion (gap difference: $1.1 \pm 2.5\text{mm}$, $p < 0.001$) but not in extension (gap difference: $0.1 \pm 2.1\text{mm}$, $p = 0.51$). PCL resection improved overall FFD (6.3 ± 4.4 preoperatively vs 3.1 ± 1.5 postoperatively, $p < 0.001$). There was a strong positive correlation between preoperative FFD and change in FFD following PCL resection (Pearson correlation coefficient = 0.81, $p < 0.001$). PCL resection did not affect limb alignment (change in alignment: 0.2 ± 1.2 degrees valgus, $p = 0.60$).

Conclusion

PCL resection creates flexion-extension mismatch by increasing the flexion gap proportionally more than the extension gap. The increase in the lateral flexion gap is greater than the increase in the medial flexion gap, which

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creates mediolateral laxity in flexion. Improvements in FFD following PCL resection are dependent on the degree of deformity prior to PCL resection.