# Prospective Comparison of Two Common Methods of Assessing Flexion Gap Laxity during Robotic Total Knee Arthroplasty

Travis R Weiner[1], Peter Keyes Sculco, Vincentius J Suhardi, Alexander Laurent Neuwirth[2], Jeffrey A Geller[3], Nana O Sarpong, Roshan P Shah[1], Herbert John Cooper[2]

[1]Columbia University Medical Center, [2]Columbia University, [3]New York Presbyterian- Columbia University

INTRODUCTION: Robotic total knee arthroplasty (TKA) systems allow surgeons to perform a soft tissue laxity assessment prior to bone resections, which can be used to alter planned bone resections with the goal of achieving balanced gaps. While soft tissue laxity assessment in extension is relatively straightforward, there are several ways to assess in flexion. The purpose of this study was to compare two common methods for assessment of flexion gap laxity when performing robotic TKA.

METHODS: A prospective study of 25 primary robotic TKAs performed by two surgeons experienced in robotic TKA was performed. Maximal medial and lateral compartment flexion laxity was quantified to the nearest 0.5mm by the robotic system using a dynamic, manual, surgeon-applied stress after osteophyte removal. These data were used to plan for the desired balanced flexion gap by choosing the appropriate femoral size, anterior/posterior translation, and external/internal rotation. Flexion laxity was quantified again after bone resections using a ligament tensor instrument. These new data were used to plan for the same desired flexion gap using the same three variables above. Operative time was recorded for each method. Paired t-tests were used to assess for differences between methods.

RESULTS: With the same flexion gap goal, both methods produced identical recommendations for the femoral component sizing (p=1.00) and femoral component anterior-posterior translation (identical mean, range 0-0.5mm; p=1.00) and near-identical recommendations for femoral component rotation (tensor method 0.05 degrees further external, range 0 to 3 degrees; p=0.85). The tensor method took significantly more OR time than the manual method (19.5 seconds vs. 40.3 seconds; p< 0.0001).

DISCUSSION AND CONCLUSION: Tensioning the flexion space with a manual surgeon-applied stress and with a ligament tensor produced near-identical laxity data, suggesting surgeons may comfortably choose either method as a reliable method of assessing maximal soft tissue laxity of the flexion space.