

Abstract Number: 18049

Influence of tibial component position on altered kinematics following total ankle arthroplasty during simulated gait

Guilherme Honda Saito¹, Daniel Sturnick¹, Jonathan Deland¹, Scott Ellis¹, Constantine Demetracopoulos¹

1. Hospital for Special Surgery, New York City, USA.

ABSTRACT

Introduction: Correct positioning of total ankle arthroplasty (TAA) implants has been associated with superior clinical outcomes. However, the correlation between implant position and ankle motion is unclear. The objective of this study was to assess the effect of tibial component position on ankle kinematics during simulated gait.

Methods: The stance phase of gait was simulated pre and post-TAA with 8 mid-tibia cadaveric specimens using a six-degrees-of-freedom robotic platform. Ankle kinematics were measured based on reflective markers. A fixed-bearing total ankle system (Salto Talaris, Integra LifeSciences) was used. Using reconstructed CT data, the 3D tibial component position relative to a standard ankle joint reference was characterized (Fig 1A). The effect of the tibial component position on absolute differences in ankle kinematics (pre/post TAA) was assessed using linear regression with a level of significance set to $p=0.05$.

Results: Differences in ankle joint kinematics were only identified in the transverse plane, where internal talar rotation was significantly increased following TAA compared with the native condition (Fig 1B). The medial position of TAA tibial components was positively associated with increased internal talar rotation (Fig 1C; $\beta=1.861$ degrees/mm, $R^2=0.72$, $p=0.008$).

Conclusion: This study suggests that a medial-lateral position of the tibial implant affects ankle kinematics. During operative procedures, the tibial component is usually positioned to preserve the bone stock of the medial and lateral malleolus. However, little attention is given to the position of the implant in relation to the center of the tibial axis. This finding could have clinical implications for techniques.

Keywords: Arthroplasty, replacement, ankle; Simulated gait; Component position; Ankle kinematics; Ankle arthritis.

