Does Computer Navigation or Robotics Improve Survivorship Following Primary Total Knee Arthroplasty? An Analysis from the American Joint Replacement Registry

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INTRODUCTION:

Computer-assisted navigation (nTKA) and/or the use of robotics (rTKA) at the time of the primary total knee arthroplasty (TKA) have been suggested to improve implant position, minimize alignment outliers and improve patient outcomes compared to conventional instrumentation (cTKA). The purpose of this study was to use the linked Medicare dataset from the American Joint Replacement Registry (AJRR) to compare the mid-term survivorship of nTKA and rTKA to that of cTKA.

METHODS:

All primary TKA procedures between January 2017 and December 2022 among patients greater than 65 years of age were included in the analysis. The data were stratified into patients that underwent nTKA (n=20,777), rTKA (n=22,022) and cTKA (n=131,992) at the time of their index procedure. There were 3,343 cTKAs and 1,165 rTKAs with 5 years follow-up. Revision rates and reasons for revision were determined at 5-years postoperatively (Cox proportional hazards model). The survival models were adjusted for age and sex.

RESULTS:

The survival model found computer navigation use to not be significant, with the numbers available, in TKA all-cause revision (HR(CI) = 0.94 (0.82,1.08), p=0.37) or mechanical loosening (HR(CI) = 0.97(0.62,1.51), p=0.88), but was significant for other mechanical complications (HR(CI) = 0.46(0.27,0.76), p=0.002). Robotic use was not found to be significant, with the numbers available, in TKA all-cause revision (HR(CI) = 0.96(0.84,1.10), p=0.56), mechanical loosening (HR(CI) = 1.27(0.82,1.97), p=0.28) or other mechanical complication (HR(CI) = 0.91(0.60,1.38), p=0.66).

DISCUSSION AND CONCLUSION:

Computer-assisted navigation and/or the use of robotics at the time of primary total knee arthroplasty did not demonstrate a decrease in the need for surgical intervention at mid-term follow-up among Medicare beneficiaries in the American Joint Replacement Registry. While this study was unable to assess all clinical outcomes following total knee arthroplasty with advanced technology, survivorship was not improved with these advanced technologies at 5 years of follow-up.