Robotic Assistance Does Not Improve Outcomes in Posterior Cervical Fusion Surgery

Aaron Singh, Travis Mark Kotzur[1], Lindsey Noelle Peng, Ezekial Joseph Koslosky, Ali Seifi, Christopher D Chaput[2]
[1]University of Texas Health San Antonio, [2]UT Health San Antonio

INTRODUCTION:
Degenerative disc disease is common, and spinal fusion may be indicated in instances of advanced disease. Fusion surgery typically involves the use of pedicle screws for fixation; however, screw placement can be technically challenging, and screw misplacement and associated complications are common. The aim of this study is to assess the impact of robotic assistance in the setting of posterior cervical fusion surgery.
METHODS: This was a retrospective cohort study utilizing the National Readmissions Database, years 2016-2019. Patients undergoing posterior cervical fusion surgery, both conventional and robotic assisted, were identified via ICD-10 codes. Multivariate regression was performed to compare postoperative outcomes, including complications. Negative binomial regression was performed to assess 30-day readmissions and reoperation, and discharge disposition. Quasi-Poisson regression was performed to assess total charges and length of stay. Patient demographics and comorbidities, measured via the Elixhauser comorbidity index, were both controlled for in our regression analysis.
RESULTS: A total of 139,094 patients undergoing posterior cervical fusion, including 3,808 (2.74%) who underwent a procedure with robotic assistance, were included in our analysis. We found no difference in complications or hospital related outcomes between cohorts; however, robotic-assisted procedures were associated with increased total charges (Odds Ratio (OR) 1.142; $p<0.001$).
DISCUSSION AND CONCLUSION:
Robotic assistance does not improve outcomes following posterior cervical fusion surgery. While we found no difference in complications or hospital-related outcomes; however, robotic assistance was associated with significantly greater total charges. Possible long term benefits of robotic surgery were not assessed; however, this study calls into question some of the purported short-term benefits of robotic surgery in the cervical spine including shorter hospital stays and improved patient safety.

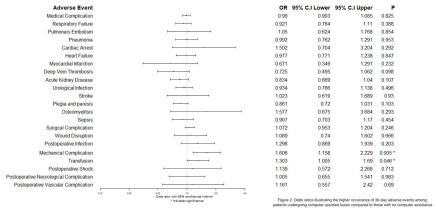

Figure 2: Odds ratios illustrating the higher occurrence of 30-day adverse events among patients undergoing computer assisted fusion compared to those with no computer assistance

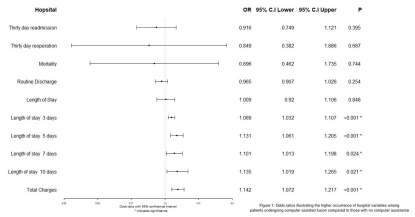

Figure 1: Odds ratios illustrating the higher occurrence of hospital variables among patients undergoing computer assisted fusion compared to those with no computer assistance