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Redefining the learning curve for robotic Ivor Lewis esophagectomy

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Background: Minimally invasive esophagectomy (MIE) has demonstrated superior outcomes compared to open approaches. The myriad of techniques has precluded the recommendation of a standard approach. The robotic approach has increased steadily and we have previously published our series defining the learning curve for this approach. The purpose of this study is to redefine the learning curve for robotic-assisted esophagogastrectomy with respect to operative time, conversion rates, and patient safety.

Methods: We have prospectively followed all patients undergoing robotic-assisted esophagogastrectomy and compared operations performed at our institutions by a single surgeon in successive cohorts. Our measures of proficiency included: operative times, conversion rates, and complications. Statistical analyses were undertaken utilizing Spearman regression analysis and Mann-Whitney U test. Significance was accepted with 95% confidence.

Results: We identified 203 patients (166 (81.8%) male: 37 (18.2%) female) with a median age of 67.2 (30-90) years who underwent robotic-assisted esophagogastrectomy for malignant esophageal disease. One-hundred sixty six were adenocarcinoma, 26 were squamous cell carcinoma and 11 were other. R0 resections was performed in 202 (99.5%) of patients. The median lymph node harvest was 18 (6-63) and neoadjuvant chemoradiation was administered to 157 (77.4 %) patients. A significant reduction in operative times ($p<0.005$) following completion of 20 procedures was identified (514 ± 106 min vs. 415 ± 91 min compared to subsequent 80 cases and further reduced with the subsequent 100 cases 397 ± 71.9 min) $p<0.001$. Complications decreased after the initial learning curve of 29 cases, $p=0.04$. However there was an increase in complications after 90 cases in which there was an increase in the Charleson morbidity index, $p<0.01$ indicating higher risk patients which tapered after case 115.

Conclusions: For surgeons proficient in performing minimally-invasive esophagogastrectomies, the learning curve for a robotic-assisted procedure appears to begin near proficiency after 20 cases however as more complex cases are undertaken there appears to be an additional learning curve which is surpassed after 115 cases.

Recent Publications

1. Kothari N, Mellon E, Frakes J, Hoffe S, Shridhar R, Pimiento J, Tram N, Saeed N, Meredith K L and Almhanna K (2016) Outcomes in patients with brain metastasis from esophageal cancer. Journal of Gastrointestinal Oncology doi: 10.21037/jgo.2016.03.12.

2. Saeed N, Chuong M, Hoffe S, Shridhar R, Almhanna K and Meredith K L (2017) CT-Based Assessment of Visceral Adiposity and Outcomes for Esophageal Adenocarcinoma. Journal of Gastrointestinal Oncology 8(5).

Biography

Meredith is a Professor of Surgery at Florida State University College of Medicine and serves as Medical Director of Gastrointestinal Oncology at the Sarasota Memorial Institute for Cancer Care. He is a Surgical Oncologist with a focus on foregut malignancies. His clinical interests include minimally invasive approaches to resection of gastrointestinal malignancies including robotics. He has lectured and taught surgeons across the world about his robotic approaches and has pioneered robotic approaches to esophageal and pancreatic resections. He has published extensively and given over 200 presentations at the local, regional, national and international meetings.

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