Lower Rates of Unplanned Conversion to Open in Robotic Approach to Esophagectomy for Cancer

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Objective

Minimally invasive esophagectomy (MIE) approaches have gained popularity worldwide; however, unplanned conversion to an open approach is not uncommon. This study sought to investigate the role of robotic-assisted approaches in conversion to open esophagectomy, and to evaluate the outcomes following conversion. We hypothesized that patients requiring conversion experience poorer short-term outcomes, and that a robotic approach would be protective against conversion.

Methods

Patients undergoing esophagectomy between January 1, 2016 and December 31, 2019 at hospitals participating in the American College of Surgeons National Quality Improvement Program (ACS-NSQIP) Procedure Targeted Esophagectomy module were included in the initial population of eligible patients for this study. Patients were separated into two groups for direct comparison: MIE versus Conversion. Furthermore, a stepwise, multivariable logistic regression model was used to investigate factors associated with increased odds of conversion to open esophagectomy.

Short-term outcomes measured within 30 days of surgery included the need for invasive postoperative intervention, reoperation, length of stay (LOS), morbidity, anastomotic leak, readmission, and all-cause mortality.

Results

Study Population (N = 1,347)	
Female Sex	227 (17%)
Age	65 (59-71)
BMI	27 (24-31)
Adenocarcinoma ESCC	1,172 (87%) 146 (11%)
Planned Robotic MIE	236 (24%)
Conversion to Open	140 (10%)

Factor associated with Conversion	Univariate OR (95% CI)	Multivariable OR (95% CI)
Robotic Approach	0.55 (0.31-0.95)	0.95 (0.41-2.16)
Squamous Cell Ca	2.01 (1.25-3.24)	2.66 (1.02-6.98)

	MIE N = 1,207	Conversion N = 140	P Value
Diabetes	206 (17%)	35 (25%)	**0.02**
Dyspnea	99 (8%)	19 (14%)	**0.03**
Hypertension	563 (47%)	82 (59%)	**0.01**
ASA II ASA III ASA IV	214 (17%) 916 (76%) 74 (6%)	11 (8%) 115 (82%) 14 (10%)	**0.01**
Squamous Cell Ca	121 (10%)	25 (18%)	**< 0.01**
Robotic Approach Lap/Thoracoscopic	220 (25%) 669 (75%)	16 (15%) 89 (85%)	**0.03**
30-day Morbidity	394 (33%)	76 (54%)	**< 0.01**
Leak	169 (14%)	27 (19%)	**0.01**
Reoperation	171 (14%)	30 (21%)	**0.02**
30-day Mortality	24 (2%)	7 (5%)	**0.02**

Conclusion

Although patients who underwent RAMIE were less likely to require conversion to open esophagectomy, the specific causes for this finding are unknown. Patients undergoing planned MIE who require conversion suffer worse outcomes compared to those who achieve MIE without conversion, thus the factors outlined in this study may aid in patient selection and surgical approach choice for esophagectomy. Future prospective studies should focus on the factors influencing lower conversion rates in RAMIE, as it may be an underappreciated benefit of this newest operative approach. Further clarity on this issue may also encourage surgeons to expand their robotic practice and overcome the learning curve necessary to achieve desired outcomes from RAMIE.