Impact of Robotic Approach on Post-Anastomotic Leaks After Esophagectomy for Esophageal Cancer

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Objective

Esophageal cancer is the eighth most common cancer worldwide and is the sixth most common cause of cancer death. Esophagectomies is the standard of cancer for esophageal cancer but is associated with increased morbidity and mortality. Overall complication rate of esophagectomies is 59%. Incidence of anastomotic leaks after esophagectomies have been reported as high as 35%.

Anastomotic leaks are associated with increased median length of hospital stay, increased anastomotic stricture, and worse quality of life.

The purpose of this study was to investigate the impact of surgical approach of esophagectomies on leak rates and the subsequent management of leaks. In addition, we sought to perform a more recent analysis of patient and procedure variables associated with increased risk for anastomotic leaks after esophagectomies.

Methods

This is a retrospective review of ACS-NSQIP Procedure Targeted Esophagectomy Database analyzing esophagectomies performed for esophageal cancer between 1/1/2016 to 12/31/2019. Patients were divided into two cohorts:

- **No anastomotic leak**
- **Anastomotic leak**

Patient characteristics, cancer characteristics, intra-operative details, post-operative complications, and post-operative outcomes were reviewed.

Patients with anastomotic leaks were further analyzed to determine how the leak was managed. Leaks were either managed:

- **Without Intervention**: conservative medical management
- **With Intervention:** endoscopic treatment, non-operative drainage, or operative repair

Results

A total of 2,696 patients were included: 2,322 (86%) patients did not develop anastomotic leaks and 374 (14%) of patients did develop anastomotic leaks after esophagectomy.

Patient Demographics: The study population comprised of 83% males with a median age of 65 years old. Patients who developed leaks were found to have higher median BMI (27.2 vs 26.8, P = 0.045) with co-morbidities of diabetes (25% vs 18%, P = 0.002) and hypertension (57% vs 46%, P < 0.001).

Cancer Characteristics: The majority of patients had a histologic diagnosis of esophageal adenocarcinoma (87%). There were no significant differences in pre-operative radiation therapy, pre-operative chemotherapy, or TMN staging.

Intra-operative Characteristics:

	NO ANASTOMOTIC LEAK n = 2322	HAD ANASTOMOTIC LEAK n = 374	P VALUE
Surgical Approach			0.123
Robotic	10%	13%	
Laparoscopic/Thoracoscopic	32%	33%	
Open	58%	54%	
Operative Time (minutes)	340	386	<0.001
Positive Margins	10%	14%	0.038

Post-operative Complications: Patients who developed anastomotic leaks had higher rates of post-operative complications. These include: bleeding, surgical site infection, wound disruption, pulmonary complications, cardiac complications, acute renal failure, venous thromboembolism, and sepsis.

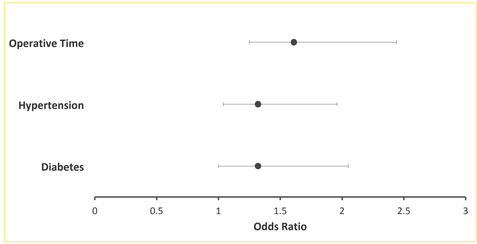
Post-operative Hospital Outcomes: Patients who developed anastomotic leaks experienced longer hospital stay (16 days vs 9 days, P < 0.001), higher 30-day readmission (29% vs 11%, P < 0.001), and higher 30-day reoperation (57% vs 10%, P < 0.001). Mortality within 30 days of operation was notably higher in patients with anastomotic leaks (7% vs 2%, P < 0.001). TMN staging.

Management of Anastomotic Leaks:

	ROBOTIC n = 43	LAPAROSCOPIC n = 107	OPEN n = 178	P VALUE
				0.004
Treated **without** intervention (n = 98)	47%	21%	25%	
Treated with intervention (n = 276)	54%	79%	75%	

Independent Risk Factors for Anastomotic Leak:

Multivariable Analysis



ODD RATIO (95% CI)

1.61 (1.25-2.08)

1.32 (1.04-1.68)

1.32 (1.00-1.73)

Conclusion

The results from this study demonstrate that a robotic approach may not be associated with reducing the rate of leak but may mitigate the severity of the leak and subsequent need for operative intervention. This study also supported findings from previous studies and redemonstrated hypertension, diabetes, and prolonged operative time as independent risk factors for anastomotic leak. Results from this study stress the importance of focusing on modifiable patient and operative-related factors to reduce risk of developing anastomotic leaks and may help with patient counseling.