Safety Comparison of Minimally Invasive Abdomen-Only Esophagectomy Versus Minimally Invasive Ivor Lewis Esophagectomy

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Introduction:

The current gold standard treatment of resectable esophageal cancer is esophagectomy.[1] However, minimally invasive Ivor Lewis esophagectomy (MIILE) involves violation of the chest cavity and pleural space, which may be contraindicated in patients with significant pre-existing morbidities.[2] The goal of our minimally invasive abdomen-only esophagectomy (MIAE) approach is two-fold: to offer treatment to patients who would not traditionally be candidates for MIILE and to improve overall safety outcomes in treating gastroesophageal pathologies. We hypothesize there will be no significant difference in outcome in appropriately selected patients when comparing MIAE to MIILE.

Methods:

A total of 49 patients were included in this study, with 17 patients undergoing MIAE and 32 patients undergoing MIILE between 2016 - 2019. Data collected involved patient demographics and perioperative outcomes (Table 1). Associations between patient disease attributes and surgery outcomes were investigated using Pearson Chi-Square or Fisher's exact test with continuity correction. The differences between the distribution of continuous variables were investigated using the Kruskal Wallis test .

Results:

There median number of lymph nodes resected ($p < 0.001$) were fewer with shorter operative duration ($p < 0.001$) for MIAE compared to MIILE. MIAE patients also had significantly higher median Charlson Comorbidity Index (CCI) scores (2 vs. 1, $p < 0.05$) and ACS National Surgical Quality Improvement Program (NSQIP) surgical risk values than MIILE patients. There were no differences in median estimated blood loss, length of stay, pulmonary or cardiac complications between groups. There was no significant difference in 90-day survival (Table 2).

Figures

Table 1 Patient demographics

Variables	Abdomen-only MI Esophagectomy	MI Ivor Lewis	
	Patients (n=17)	Patients (n=32)	P value
Age, median [range]	65 [49 – 72]	66.5 [47 -81]	0.51
Gender, n (%)			
Male	12 (70.6)	24 (75)	
Female	5 (19.4)	8 (25)	
BMI, median, [range]	27 [19 – 36]	26.5 [19 – 33]	0.83
ASA Classification, n (%)			
I	0 (0)	0 (0)	
II	9 (52.9)	20 (62.5)	
III	8 (47.1)	12 (37.5)	
Adenocarcinoma, n (%)	8 (47.1)	28 (87.5)	
Gastroesophageal stricture, n (%)	9 (52.9)	4 (12.5)	

Table 2 Surgical and pathological characteristics

Variables	Abdomen-only MI Esophagectomy	MI Ivor Lewis	
	Patients (n=17)	Patients (n=32)	P value
Number of lymph node dissected (median) [range]	13 [19 - 36]	23 [19 - 33]	0.00
Estimated blood loss (mL) (median) [range]	300 [50 – 700)	300 [100 – 900]	0.28
Operative duration (minutes) (median) [range]	245 [180 – 352]	337 [262 – 416]	0.00
Proximal distance of pathology from gastroesophageal junction (cm) (median) [range]	4.6 [3 – 6]	15.5 [10 – 18]	0.00
90-day mortality [n (%)]	1 (5.9)	1 (3.1)	0.64
Length of stay in ICU (days) (median) [range]	3 [1 – 12]	3.5 [1 – 19]	0.15
Length of stay in hospital (days) (median) [range]	18 [8 – 27]	18 [11 – 31]	0.93

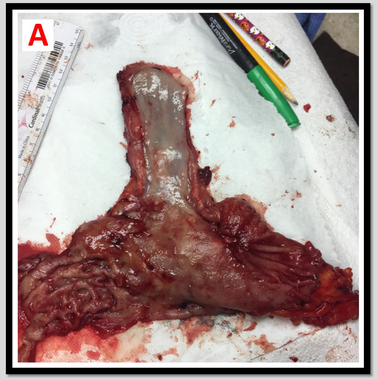




Figure 1. Esophageal and gastric resection specimens from MIAE (A) and MIILE (B).

Discussion:

While Ivor Lewis esophagectomy has positive outcomes for esophageal carcinoma, thoracotomy may present additional risks for significant morbidity. This study suggests MIAE has a median shorter operative duration and a lower median number of lymph nodes dissected. MIAE also shows comparable outcomes and complication rates as compared to MIILE. We hypothesized that an abdomen-only approach offers comparable outcomes to an Ivor Lewis approach for resection of adenocarcinoma or stricture and found that patients who underwent MIAE and were predicted to be at greater risk for complication had similar outcomes post-operatively. The outcomes, though, may suggest that MIAE could be a superior approach for tackling gastroesophageal pathologies, as it features a shorter median operative time, as well as no significant differences in post-operative complications despite the increased risk, in patients contraindicated for MIILE.

Conclusion:

To our knowledge, this is the first study to compare a modified abdomen-only MI esophagectomy with MIILE in patients with distal cancer or stricture. Based on our results, MIAE is a safe, feasible, and possibly superior approach compared to MIILE for the treatment of distal gastroesophageal adenocarcinoma or stricture in patients who are not candidates for MIILE. MIAE has a shorter operative duration and similar post-operative outcomes as MIILE despite the greater calculated pre-operative risk of morbidity.

References:

1. Pennathur A, Gibson MK, Jobe BA, Luketich JD. Oesophageal carcinoma. *Lancet*. 2013 Feb 2;381(9864):400-12. doi: 10.1016/S0140-6736(12)60643-6.
2. Gibbs JF, Rajput A, Chadha KS, Douglas WG, Hill H, Nwogu C, Nava HR, Sabel MS. The changing profile of esophageal cancer presentation and its implication for diagnosis. *J Natl Med Assoc*. 2007 Jun;99(6):620-6.