Predictors of Morbidity, Readmission, and Reoperation after Laparoscopic Heller Myotomy

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Introduction

- Morbidity, readmissions, and reoperations are uncommon after laparoscopic Heller myotomy (LHM).
- The impact of readmission/reoperation on morbidity for patients after LHM is unknown.
- **Aim**: Identify predictors of readmission, reoperation and morbidity after laparoscopic Heller myotomy.

Methods

- Retrospective review of patients undergoing LHM were identified from the National Surgical Quality Improvement Program (NSQIP) database over 8 years, ending in 2019.
- Demographics, past medical history, ASA class, pre-operative labs, procedural details, morbidity, and mortality were recorded. Patients were then stratified by presence of AKI and compared
- Multivariable logistic regression (MLR) analysis was performed to determine independent predictors of both readmission/reoperation and morbidity.

Table 1: Baseline characteristics for patients undergoing LHM

Characteristic	Value
Age, median (IQ)	54 (41-66)
Male, n (%)	1872 (49.5)
COPD, n (%)	155 (4.1)
Weight Loss, n (%)	430 (11.4)
Smoker, n (%)	550 (14.6)
Steroid Use, n (%)	119 (3.2)
ASA	
3, n (%)	1493 (39.5)
4, n (%)	62 (1.6)
BMI, median (IQ)	26.8 (22.9-31.3)
Hematocrit, median (IQ)	40.9 (37.9-43.6)
Albumin, median (IQ)	4.1 (3.8-4.4)
Morbidity, n (%)	99 (2.6)
Pneumonia, n (%)	151 (0.8)
Reintubation, n (%)	16 (0.4)
Pulmonary Embolism, n (%)	5 (0.1)
Vent >48 hours, n (%)	7 (0.2)
Acute Kidney Injury, n (%)	2 (0.1)
Urinary Tract Infection, n (%)	22 (0.6)
Stroke, n (%)	2 (0.1)
Cardiac Arrest, n (%)	4 (0.1)
Myocardial Infarction, n (%)	7 (0.2)
Bleeding, n (%)	15 (0.4)
Deep Vein Thrombosis, n (%)	7 (0.2)
Sepsis, n (%)	15 (0.4)
Septic Shock, n (%)	10 (0.3)
Return OR, n (%)	68 (1.8)
Readmission, n (%)	135 (3.6)
Death, n (%)	6 (0.2)

Table 2: Comparison of patients with and without Readmission/Reoperation

	Without	Readmit/Reop	p
Total, n	3613	167	
Age, median (IQ)	54 (41-66)	56 (44-69)	0.059
Male, n (%)	1793 (49.6)	79 (47.3)	0.558
COPD, n (%)	141 (3.9)	14 (8.4)	0.004
Weight Loss, n (%)	402 (11.1)	28 (16.8)	0.025
Smoker, n (%)	515 (14.3)	35 (21)	0.016
Steroid Use, n (%)	108 (3)	11 (6.6)	0.009
ASA			<0.0001
3, n (%)	1404 (38.9)	89 (53.3)	
4, n (%)	57 (1.6)	4 (3)	
BMI, median (IQ)	26.8 (23-31.3)	26.6 (22.5-31.8)	0.961
Hematocrit, median (IQ)	40.9 (38-43.6)	39.4 (36-43.3)	0.005
Albumin, median (IQ)	4.1 (3.8-4.2)	3.9 (3.5-4.3)	0.005
Morbidity, n (%)	52 (1.4)	47 (28.1)	<0.0001
Pneumonia, n (%)	11 (0.3)	19 (11.4)	<0.0001
Reintubation, n (%)	10 (0.3)	6 (3.6)	<0.0001
Pulmonary Embolism, n (%)	11 (0.03)	4 (2.4)	<0.0001
Vent >48 hours, n (%)	2 (0.1)	5 (3)	<0.0001
Acute Kidney Injury, n (%)	1 (0.03)	1 (0.6)	0.086
Urinary Tract Infection, n (%)	13 (0.4)	9 (5.4)	<0.0001
Stroke, n (%)	0	2 (1.2)	0.002
Cardiac Arrest, n (%)	4 (0.1)	0	1
Myocardial Infarction, n (%)	6 (0.2)	1 (0.6)	0.271
Bleeding, n (%)	9 (0.3)	6 (3.6)	<0.0001
Deep Vein Thrombosis, n (%)	3 (0.1)	4 (2.4)	0.001
Sepsis	1 (0.03)	13 (7.8)	<0.0001
Septic Shock	1 (0.03)	9 (5.4)	<0.0001
LOS, median (IQ)	1 (1-2)	3 (1-6)	<0.0001
OR Time, median (IQ)	129 (98-167)	133 (100-196)	0.050
Death, n (%)	4 (0.1)	2 (1.2)	0.026

Table 3: Multivariable logistic regression

	Odds Ratio	95% Confidence Interval	p
Predictors of Readmission and Reoperation			
Hematocrit	0.951	0.917-0.988	0.009
Operative Time	1.010	1.002-1.016	0.0004
ASA Class	1.659	1.233-2.232	0.001
Predictors of Morbidity			
Age	1.032	1.017-1.046	<0.0001
Operative Time	1.007	1.005-1.009	<0.0001
COPD	2.679	1.423-5.044	0.0023

Conclusion

- Patients requiring readmission/reoperation after LHM suffer prolonged hospital LOS, significant morbidity and mortality
- Those with pre-existing conditions, weight loss, and steroid use should all be carefully observed given their increased incidence of readmission/reoperation.
- Increasing age, higher ASA, lower hematocrit, COPD, and longer OR times were all independently associated with readmission/reoperation and increased morbidity following LHM
- Thus, limiting operative time emerges as the only potentially modifiable risk factor for reducing both readmission/reoperation and morbidity post-LHM.