



Does Obesity Affect Outcomes After Total Laryngectomy?

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Abstract

Objective: The purpose of this study is to identify the impact that obesity has on outcomes and postoperative complications following total laryngectomy.

Methods: The 2005-2017 American College of Surgeons National Surgical Quality Improvement (ACS-NSQIP) database was used with Current Procedural Terminology (CPT) codes to identify cases of total laryngectomy (CPT 31360, 31365) or pharyngolaryngectomy (CPT 31390, 31395). Body mass index (BMI) was calculated using provided height and weight and patients were stratified into an obesity cohort with a BMI greater than or equal to 30. Cases were excluded from analysis if they were missing height or weight data, performed by a non-otolaryngology surgical specialty, or underwent a concurrent free flap reconstructive procedure. Univariate cross-tabulation and multivariate logistic regression analysis were used to compare baseline characteristics and outcome differences between the two groups.

Results: 1,403 cases met inclusion criteria, 197 (14.0%) were obese and 1,206 (86%) were not obese. There were no significant differences in age, gender, or race between the groups. Mean age in the obese group was 62.3 +/- 11.9 in the obese group and 63.3 +/- 10.6 in the non-obese group (p=0.245). Obese patients were more likely to have comorbid diabetes mellitus (32.5% v. 11.8%, p<0.001), and be taking hypertension medication (65.5% v. 45.4%, p<0.001). Non-obese patients were significantly more likely to be anemic (54.1% vs 30.2%, p<0.001), be smokers (63.0% v. 52.8%, p<0.001), and have undergone a >10% decrease in body weight in the six months prior to surgery (15.5% v. 6.6%, p=0.001). There was no significant difference between the two groups for congestive heart failure, dyspnea, chronic obstructive pulmonary disease, chronic steroid use, bleeding disorder, or dependent functional status. Mortality (1.7% v. 1.5%) and unplanned reoperation (2.6% v. 2.5%) did not differ between the groups. The mean operative time for obese patients was less than non-obese patients but not significant (369.7 v. 391.7 minutes, p=0.088. There was no difference in the length of hospital stay (12.1 v. 12.5 days). There were no differences in complications except for need for blood transfusion which was less frequent in the obese group (9.6% v. 17%, p=0.008). There were no significant differences in surgical site infections, wound disruption, pneumonia, ventilator dependence, urinary tract infection, thromboembolic events, and sepsis. After multivariate regression analysis accounting for demographics, diabetes, smoking status, hypertension medication, and anemia, there was no difference in blood transfusions between the two groups (OR 0.715, [0.074-6.905], p=0.772).

Conclusion: Obesity affects a minority (14%) of patients undergoing total laryngectomy. This study suggests that total laryngectomy is safe in obese patients, who have similar complications and length of stay compared to their non-obese counterparts. Obese patients have higher preoperative hematocrit and therefore were less likely to receive blood transfusions. After controlling for pre-operative anemia and other confounding factors, the risk of transfusion was the same.

Introduction

- Obesity is a highly prevalent comorbidity in the United States with an age-adjusted prevalence of 42.4% in adults from 2017-2018.¹
- While obesity has been shown to be associated with increased rates of complications in complex general surgery and orthopedics procedures, studies of obese patients undergoing head and neck microvascular free flap reconstruction found that obesity did not predict any medical or surgical complication.^{2,3}
- Total laryngectomy is a complex surgical procedure for which preoperative planning is essential, and elucidation of risk factors that may affect the postoperative course can help with controlling costs and resource allocation.
- The objective of this study was to investigate the impact that comorbid obesity may have on outcomes and postoperative complications following total laryngectomy.

Methods and Materials

Database and Patient Selection:

- The American College of Surgeons' National Surgical Quality Improvement Program (NSQIP) database provides de-identified patient case information from over 700 institutions in the United States. The database was queried from 2005-2017.
- Current Procedural Terminology (CPT) codes were used to identify patients undergoing a total laryngectomy or pharyngolaryngectomy performed by otolaryngologists. Body mass index (BMI) was calculated using height and weight variables, and this was used to stratify patients into obese (BMI greater than or equal to 30) and non-obese cohorts. Patients who underwent concurrent free tissue transfer were excluded.

Statistical Analysis

- Baseline characteristics were compared and a multivariate regression model was used to identify outcomes that obesity predicted.
- SPSS 24 (IBM, Armonk, New York) was used for univariate analysis and multivariable regression model construction.

Results

- A total of 1,403 cases met inclusion criteria; 197 (14.0%) were obese and 1,206 (86%) were not obese.
- Univariate analysis of baseline comorbidities is shown in **Table 1**.
- Complication rates for each cohort are displayed in **Table 2**.
- Multivariate analysis predicting outcomes and postoperative complications is shown in **Table 3**.

Table 1 – Baseline Patient Comorbidities

	Non Obese (%)	Obese (%)	p-value
Comorbidity			
Anemia	54.1	30.2	<0.001
Diabetes	11.8	32.5	<0.001
Smoker	52.8	36.0	<0.001
Dyspnea	24.0	20.8	0.366
COPD	24.1	32.0	0.244
Congestive heart failure	1.7	2.0	0.770
Hypertension	45.4	65.5	<0.001
Disseminated cancer	11.0	11.7	0.807
Wound infection	2.8	2.5	1.000
Chronic steroids	5.7	6.1	0.869
Weight loss	15.5	6.6	0.001
Bleeding disorder	2.9	3.6	0.650
Transfusion	0.7	0.5	1.000
Sepsis	4.2	3.6	0.847
Functional status, dependent	7.4	5.6	0.455

Table 2 – Outcomes and Complication Rates

	Non Obese (%)	Obese (%)	p-value
Outcomes			
Mortality	1.7	1.5	1.000
Unplanned reoperation	2.6	2.5	1.000
LOS (mean, days)	12.1	12.5	0.580
Operative time (mean, minutes)	391.7	369.7	0.088
Complications			
Superficial SSI	6.2	7.6	0.435
Deep SSI	4.2	4.6	0.849
Organ/space SSI	3.0	3.0	1.000
Wound disruption	3.8	6.1	0.173
Pneumonia	4.9	3.0	0.359
Ventilator >48hr	1.7	2.5	0.397
Urinary tract infection	1.0	1.0	1.000
Myocardial infarction	0.8	0.0	0.374
Transfusion	17.0	9.6	0.008
Deep venous thrombosis	1.7	2.0	0.770
Sepsis	4.1	4.6	0.705
Septic shock	0.3	0.0	1.000
Any surgical	28.9	27.4	0.734
Any medical	12.1	12.7	0.814
Any complication	34.6	35.5	0.809

Table 3 – Logistic Regression of Factors Associated with Obesity

	OR	95% CI	p-value
Age			
<40	ref		
41-60	0.525	0.205-1.343	0.178
61-80	0.272	0.106-0.696	0.007
>80	0.241	0.077-0.761	0.015
Gender			
Male	Ref		
Female	1.377	0.940-2.019	0.100
Race			
White	Ref		
Black	0.604	0.361-1.011	0.055
Other	0.283	0.065-1.229	0.092
Unknown	1.142	0.720-1.811	0.573
Comorbidities			
Diabetes	3.080	2.123-4.470	<0.001
Smoker	0.511	0.363-0.719	<0.001
Hypertension	2.305	1.624-3.273	<0.001
Recent weight loss	0.479	0.261-0.879	0.018
Anemia	0.330	0.229-0.475	<0.001
Complications			
Transfusion	0.715	0.074-6.905	0.772

Conclusions

- In this study population, only a minority (14%) of patients undergoing total laryngectomy were obese.
- Obesity was not associated with an increased rate of any medical or surgical complication. This suggests that total laryngectomy is safe in these patients.
- Obese patients were less likely to receive a blood transfusion, which may be explained by higher preoperative hematocrit.

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