



Readmission Rates Following Major Head and Neck Surgery with Concurrent Tracheostomy

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Background

The Agency for Healthcare Research and Quality identified tracheostomies as the fifth highest readmission rate at 23.9%, which underscores the need for reducing readmission rates and utilization of healthcare resources without compromising the quality of care.[1] Tracheostomies can be placed to secure an airway either as a standalone procedure or in conjunction with another surgical procedure. Placement of tracheostomy is routine during major head and neck surgery. While the literature has characterized risk factors for readmission and complication rates following tracheostomy for all indications, previous studies have not attempted to understand risk factors in the context of the underlying procedure if the tracheostomy is placed during major head and neck surgery.[2-4]

Objectives

Using the National Surgical Quality Improvement Program (NSQIP), we sought to understand the impact of the most common head and neck procedures on readmission rates and complications following tracheostomy.

Methods and Materials

Data Source and Selection Criteria

This study was deemed exempt by the Cleveland Clinic Institutional Review Board as the NSQIP database is de-identified. The 2005-2017 NSQIP database was queried for CPT code: 31600. Underlying procedures were defined by CPT codes. Patients with missing data, an American Society of Anesthesiology (ASA) score of 5, and age < 18 were excluded as shown in Figure 1.

Statistical Analysis and Definitions of Variables

The NSQIP Data Dictionary defines all pre-operative and post-operative variables. All post-operative variables are documented for 30-days. The readmission variable was only available for cases starting in 2011. Height and weight were used to calculate body mass index (BMI) and groups were classified using Center for Disease Control definitions. Pre-operative characteristics and post-operative complications were analyzed with chi-squared tests except for categories with n < 5, which were compared with the Fisher's exact test.

Multivariable logistic regression models were adjusted for pre-operative variables and used to analyze the association between outcomes of interest and underlying procedures. Length of operation and hospital stay were analyzed using non-parametric tests and reported as the median with the range. Statistical analysis was conducted in R version 4.0.2 and p<0.05 was considered significant.

Figure 1. Diagram of Patient Selection and Exclusion.

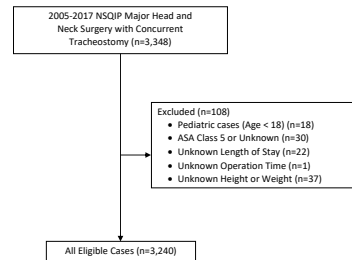


Table 2. Multivariable Logistic Regression Analysis for Head and Neck Surgery Patients with Concurrent Tracheostomy

	Odds Ratio (95% L, 95% U)	p-value
Principle Procedure		
Flaps	Ref	
Excision - Larynx	0.61 (0.40, 0.94)	0.026
Excision - Mandible and Maxilla	1.38 (1.03, 1.85)	0.031
Excision - Tongue and FOM	1.16 (0.92, 1.46)	0.22
Lymphadenectomy	1.04 (0.79, 1.36)	0.79
Other	1.26 (0.99, 1.60)	0.062
Thyroidectomy	0.48 (0.32, 0.72)	< 0.001
Sex		
Male	Ref	
Female	1.12 (0.96, 1.31)	0.16
BMI		
Normal (18.51-24.99)	Ref	
Obese (≥30)	0.87 (0.71, 1.06)	0.16
Overweight (25-29.99)	0.99 (0.83, 1.19)	0.95
Underweight (≤18.5)	1.67 (1.21, 2.32)	0.002
ASA Classification		
2-Mild Disturb	Ref	
1-No Disturb	0.37 (0.10, 1.01)	0.076
3-Severe Disturb	1.43 (1.17, 1.74)	< 0.001
4-Life Threat	2.39 (1.78, 3.20)	< 0.001

Table 3. Post-Operative Complications in Patients Undergoing Tracheostomy Concurrent with Major Head and Neck Surgery

	No Complications n=1,634	Complications n=1,606	p-value
Days from Operation to Discharge [Median, Range]	9.00 [0.00, 62.00]	13.00 [0.00, 167.00]	<0.001
Total Operation Time (Minutes) [Median, Range]	459.00 [0.00, 1310.00]	501.00 [11.00, 1407.00]	0.002
30-Day Return to OR	164 (10.0%)	473 (29.5%)	<0.001
Any Readmission*	77 (5.2%)	181 (13.1%)	<0.001
Death within 30 Days	17 (1.0%)	87 (5.4%)	<0.001
Surgical Complications	N/A	1142 (71.1%)	N/A
Superficial SSI		211 (13.1%)	
Deep Incisional SSI		120 (7.5%)	
Organ Space SSI		94 (5.9%)	
Wound Dehiscence/ Disruption		162 (10.1%)	
Transfusion Intra/Post Op (e.g. due to severe bleeding)		806 (50.2%)	
Medical Complication	N/A	850 (52.9%)	N/A
Pneumonia		347 (21.6%)	
Unplanned Intubations		97 (6.0%)	
Urinary Tract Infection		83 (5.2%)	
DVT/Thrombophlebitis		64 (4.0%)	
Pulmonary Embolism		23 (1.4%)	
On Ventilator >48 Hours		449 (28.0%)	
CVA/Stroke with Neurological Deficit		16 (1.0%)	
Cardiac Arrest Requiring CPR		52 (3.2%)	
Myocardial Infarction		41 (2.6%)	
Sepsis		171 (10.6%)	
Septic Shock		98 (6.1%)	
Progressive Renal Failure		18 (1.1%)	
Acute Renal Failure		32 (2.0%)	

* Reporting began in 2011. N/A = Not Applicable

Table 4. Summary of Adjusted Odds Ratios for Readmission, Return to OR, and Complications in Major Head and Neck Procedures with Tracheostomy

Odds Ratio (95% CI)	Any Readmission*	p-val.	Unplanned Return to OR	p-val.	Any Complication	p-val.
Free Flaps	Ref		Ref		Ref	
Excision - Larynx	1.51 (0.74, 2.90)	0.23	0.72 (0.42, 1.21)	0.23	0.61 (0.40, 0.94)	0.026
Excision - Mandible and Maxilla	0.93 (0.54, 1.55)	0.77	0.83 (0.57, 1.19)	0.31	1.38 (1.03, 1.85)	0.031
Excision - Tongue and FOM	1.05 (0.70, 1.60)	0.81	0.84 (0.63, 1.11)	0.21	1.16 (0.92, 1.46)	0.22
Lymphadenectomy	0.95 (0.57, 1.56)	0.84	0.85 (0.60, 1.18)	0.33	1.04 (0.79, 1.36)	0.79
Thyroidectomy	1.43 (0.70, 2.77)	0.31	0.53 (0.31, 0.88)	0.018	0.48 (0.32, 0.72)	<0.001
Other Procedures	1.36 (0.90, 2.06)	0.14	0.89 (0.67, 1.18)	0.43	1.26 (0.99, 1.60)	0.062

* Reporting began in 2011 (n = 2,859)

Conclusions

While there is a high rate of complications following head and neck surgery that includes creation of a tracheostomy, the rate of readmission is comparatively low and is not associated with the underlying procedure in patients undergoing major head and neck surgery. These findings should reassure head and neck surgeons that properly managed tracheostomies do not constitute a disproportionate risk of readmission.

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