



An Analysis of Patient Characteristics and 30-day Postoperative Adverse Events in Adult Otologic Surgery

Aparna Govindan, BA; Kristen Echanique, BS; Meghan M. Crippen, MS
Soly Baredes, MD, FACS; Evelyne Kalyoussef, MD, FACS; Yu Lan Mary Ying, MD
Department of Otolaryngology – Head & Neck Surgery, Rutgers New Jersey Medical School, Newark, NJ

Abstract

Objectives: To analyze the influence of preoperative patient characteristics on 30-day postoperative sequelae in adults undergoing otologic procedures, and identify significant predictors of surgical outcomes.

Study Design: Retrospective cohort analysis of cases from the American College of Surgeons National Surgical Quality Improvement Program participant user files.

Methods: CPT codes for tympanoplasty, tympanomastoidectomy, myringoplasty, stapedectomy, and external hardware implantations (defined as bone-anchored hearing aid or cochlear implantations) were used to identify patients who underwent otologic surgery between 2005-2013. Patient demographics, comorbidities, and surgical outcomes categorized as readmission, complication and reoperation were studied using univariate and multivariate analysis.

Results: 4,879 cases met our inclusion criteria. Complications occurred in 2.1%, readmissions in 0.9%, and reoperations in 0.3% of cases. Univariate analysis revealed increased rates of complications associated with diabetes mellitus (3.6% vs. 1.9%; P= .028), and increased rates of readmission in obese patients (1.9% vs. 1.0%; P= .035). Multivariate regression analysis revealed that of the preoperative variables studied, independent predictors of complications include male gender ([OR]=1.690 P<0.041), smoking ([OR] = 2.505 P<0.001), wound infection ([OR] = 3.658 P=0.50), and American Society of Anesthesiology (ASA) class 3 or 4 ([OR] = 1.927 P=0.022). Significant predictors of readmission include bleeding disorders ([OR] = 4.875 P=0.03) and functional status ([OR] = 6.751 P=0.009).

Conclusions: Rates of adverse events are low following otologic surgery, however comorbidities including bleeding disorders and functional status significantly increase the odds of readmission, while smoking, preoperative wound infection, and ASA class increase the odds of complication.

Introduction

- Otologic conditions are a cause of major morbidity in the United States (U.S.).
- Results of the 2012 National Health Interview Survey suggest that the age-adjusted prevalence of hearing impairment in U.S. adults is 15.2%,¹ and results of the National Health and Nutrition Examination Surveys suggest that the overall prevalence of tinnitus in U.S. adults is 25.3%.²
- Although many of these patients do not require surgical treatment, there is still a significant number of patients who receive otologic surgery.
- A recent study by Roxbury et al. analyzed the American College of Surgeons National Surgical Quality Improvement Program-Pediatric (ACS-NSQIP-P) data to determine the frequency of pediatric otologic surgeries and the incidence of associated post-operative adverse events.³
- Similarly, other studies have used national administrative or quality improvement databases to investigate postoperative adverse events in surgery for specific otologic conditions in adults.^{4,5}
- No studies analyzing the safety of adult otologic surgeries at the population level have been reported.

Methods and Materials

Patient Database

- The 2005-2013 National Surgical Quality Improvement Program (NSQIP) participant user files were used to identify patients who underwent otologic surgery between 2005-2013 using the Current Procedural Terminology Codes for tympanoplasty, tympanomastoidectomy, myringoplasty, stapedectomy, and external hardware implantations (defined as bone-anchored hearing aid or cochlear implantations).
- Demographics, comorbidities, and surgical outcomes (readmission, complication, reoperation) were investigated.

Statistical Methods

- Cross-tabulation, Pearson's chi-square, 2-sided Fisher's exact test, and independent 2-tailed t-test were performed as appropriate.
- Binary logistic regression analysis was conducted to adjust for confounding variables including age, sex, race, and significant co-morbidities found on univariate analysis.
- A probability value of less than 0.05 was considered statistically significant.
- SPSS 22 (IBM, Armonk, New York) was used for all statistical computations.

Results

Table I. Common Procedures and Rates of Complications & Readmissions

	N	Complications		Readmissions	
		%	P	%	P
Myringoplasty	249	0.4	0.063	0.5	0.515
Tympanoplasty	2864	1.6	0.013	0.5	<0.001
Tympanomastoidectomy	1652	2.9	0.003	2.6	<0.001
External Hardware	24	16.7	0.001	0.0	1.000
Stapedectomy	57	0.0	0.632	0.0	1.000
Overall	4846	2.1	-	1.2	-

Table II. Preoperative Variables and Rates of Complications & Readmissions

	Complications		Readmissions	
	%	P	%	P
Male Gender	2.5	0.029	1.2	0.601
Obese	2.5	0.125	1.9	0.028
Diabetes	3.6	0.019	1.0	1.000
Smoking	3.8	<0.001	2.1	0.023
COPD	5.7	0.033	0.0	1.000
On Dialysis	16.7	0.024	0.0	1.000
CNS Tumor	50.0	0.037	50.0	0.010
Wound Infection	12.9	0.004	7.7	0.040
Weight Loss	60.0	<0.001	25.0	0.049
Bleeding Disorder	2.0	1.000	8.3	0.010
Systemic Sepsis	18.8	0.004	7.7	0.150
Impaired Functional Status	7.0	0.056	8.1	0.010
ASA Class 3&4	3.7	<0.001	1.7	0.215

Insignificant variables include Age, Race, Procedure Type, Alcohol Use, Dyspnea, Previous Cardiac Surgery, Hypertension, Corticosteroid Use, Prior Operation, and Emergent Operation

Table III. Multivariate Regression: Significant Preoperative Variables & Complications

	OR	95% CI	P
Male Gender	1.690	1.022 – 2.793	0.041
Smoking	2.505	1.496 – 4.195	<0.001
Wound Infection	3.658	1.012 – 13.404	0.040
ASA Class 3&4	1.927	1.101 – 3.371	0.022

OR = Odds Ratio, CI = Confidence Interval

Table IV. Multivariate Regression: Significant Preoperative Variables & Readmission

	OR	95% CI	P
Impaired Functional Status	6.751	1.617 – 28.188	0.009
Bleeding Disorder	4.875	1.166 – 20.385	0.030

OR = Odds Ratio, CI = Confidence Interval

Discussion & Conclusion

- Otologic surgeries are relatively safe procedures with low rates of postoperative complications and readmissions in the first 30 days
- Highest complication risk exists for procedures involving external hardware such as cochlear implants, with regression showing an insignificant difference after accounting for patient factors
- The patient characteristics that independently predict postoperative complications include male gender, smoking, wound infection, and high-risk ASA class
- Several classic risk factors including obesity, diabetes, alcohol use, HTN, and COPD do not confer significant risk in otologic surgery
- Bleeding disorders and poor functional status independently predict readmission. Therefore, these risk factors may be identified and managed conservatively with close follow up to minimize readmission rates
- This analysis can be supplemented by further investigation of otologic specific complications not specified by the NSQIP database

Contact

Yu-Lan Mary Ying, MD
Assistant Professor
Department of Otolaryngology- Head and Neck Surgery
Rutgers New Jersey Medical School
yy348@njms.rutgers.edu

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