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The safety and risk factors of revision adenoidectomy in children and adolescents: A nationwide retrospective population-based cohort study

Dai-Lou Lin^{a,b,c}, Chuan-Song Wu^d, Chao-Hsiun Tang^e, Ting-Yu Kuo^b,
Tzong-Yang Tu^{b,c,*}

^a Department of Otolaryngology Head & Neck Surgery, Fu Jen Catholic University Hospital, Taipei, Taiwan

^b Department of Otolaryngology Head & Neck Surgery, Taipei Veterans General Hospital, Taipei, Taiwan

^c Department of Otolaryngology, National Yang-Ming University School of Medicine, Taipei, Taiwan

^d Department of Otolaryngology, Taipei City Hospital, Taipei, Taiwan

^e School of Health Care Administration, Taipei Medical University, Taipei, Taiwan

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ABSTRACT

Objective: To investigate the safety of adenoidectomy and risk factors of re-adenoidectomy, and intend to provide evidence-based information to clinicians for further consideration.

Methods and materials: This study was based on data obtained from Taiwan's National Health Insurance Research Database from the period 2002–2011. We utilized that data from the hospitalization group and collected information regarding those individuals who accepted adenoidectomy with or without tonsillectomy and post-adenoidectomy bleeding. Thereafter, we performed univariate and multi-variate analysis to explore the possible risk factors of re-adenoidectomy.

Results: A total of 5435 individuals who accepted a first adenoidectomy with or without tonsillectomy were collected. After further tracing treatment of these individuals, 107 (1.97%) accepted the revision adenoidectomy until 2011. Post-op bleeding was approximately 0.28%. The revision rate associated with patient age showed the following: 0–4 years (0.61%), 4–12 years (2.06%) and 12–18 years (2.56%). The revision rate associated with surgeon age showed: 28–41 years (1.42%), 41–50 years (2.96%), 50–65 years (2.74%); the surgeons' surgery volume showed low (4.34%), medium (0.71%), and higher (1.02%). There are 4 diseases (otitis media with effusion, sinusitis, chronic pharyngitis, and sleep disorder) that showed a significant relationship with the revision rate when subject to univariate and multivariate analysis. The revision rate incorporating hospital locations, volumes and levels revealed no significant difference with each other.

Conclusions: Adenoidectomy is a generally safe surgical procedure, with low complication and low revision rate. Our study indicated that the revision rate of adenoidectomy might be lower when performed by young visiting staff with medium to higher surgical volume in the medium to higher volume hospital. If patients had diseases such as otitis media with effusion, sinusitis, chronic pharyngitis, and sleep disorder, they would be subject to higher rate of re-adenoidectomy. Surgeons should be aware and sufficiently explain this information to the parents before surgery.

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* Corresponding author at: Department of Otolaryngology Head & Neck Surgery, Taipei Veterans General Hospital, No. 201, Sec. 2, Shipai Rd., Beitou District, Taipei 11217, Taiwan.

E-mail address: tytu@vghtpe.gov.tw (T.-Y. Tu).

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1. Introduction

Adenoid hypertrophy is the unusual growth of the adenoid tonsil, which was first described by the Danish physician

Wilhelm Meyer in Copenhagen in 1868. This challenging condition most commonly affects children or teenagers, causing upper airway obstruction with symptoms of nasal obstruction, mouth open breathing, snoring, sleep disorder, dentofacial growth anomaly (adenoid face), or related diseases of otitis media with middle ear effusion, recurrent upper airway infection, sinusitis and asthma [1–8].

To address this condition, medical treatment can involve adenoidectomy, a common surgical procedure in children and teenagers. The clinical indications of adenoidectomy were declared in 2012 AAO-HNS [9–11]. Overall, 70–100% of those symptoms typically caused by adenoid hypertrophy were improved after adenoidectomy [9].

Generally, adenoidectomy has appeared to be a safe and necessary operation for those symptomatic children or teenagers. However, many medical professionals remain concerned about the risk of operational side effects (most frequently post-operative bleeding), the recurrence of adenoid and the need for revision surgery.

The National Health Insurance Research Database (NHIRD) in Taiwan is an extraordinary, multi-faceted population-based database. Information in this database includes data from all levels of medical institutions, incorporating medical records from 99.6% of Taiwanese citizens. We aimed to utilize the database to investigate the safety and the possible risk factors of revision rate of adenoidectomy.

2. Material and methods

The study was reviewed and approved by the Institutional Review Board (IRB) of Taipei Veterans General Hospital (IRB number: 2015-10-002CC). There was no need to obtain informed consent because we analyzed de-identified secondary data from the government database.

2.1. Data resources

Our research involved use of a 12-year database (1999–2011) from the Taiwan NHIRD, involving the population-based data of approximately 23 million people including the adults and children. Every admission and outpatient visit record was included in this database.

2.2. Study population and protocol

We identified those children and teenagers (0–18 years old) who underwent their first adenoidectomy with or without tonsillectomy from 2002 to 2006. Then, we traced information about these people until 2011; thereafter, each patient would be followed up for at least 5 years. In this period, we identified those patients who underwent a 2nd adenoidectomy or more. Thereafter, we collected the patient’s information for further analysis.

We used the operation codes (282 — tonsillectomy without adenoidectomy; 283 — tonsillectomy with adenoidectomy; 286 — adenoidectomy without tonsillectomy; 287 — control of hemorrhage after tonsillectomy and adenoidectomy) to identify the patients. Following review of the patients, we could then

Table 1
Possible risk factor for otorhinolaryngologic disease.

Ear	Otitis media effusion (OME)	Throat	Acute pharyngolaryngitis
	Acute otitis media (AOM)		Cleft palate
	Chronic middle ear disease		Chronic tonsillitis or adenitis
			Chronic pharyngolaryngitis
Nose	Allergic rhinitis	Others	Asthma
	Sinusitis		Sleep apnea
	Other nasal diseases		Speech disorder

analyze the post-op bleeding rate. We also collected the basic information of these patients, such as patient characteristics and surgical factors.

Because some otorhinolaryngologic conditions and other diseases such as asthma or sleep apnea were possible risk factors, we used the codes of these diseases and classified them into several groups for further analysis (Table 1).

2.3. Outcome measures

We compared the following factors in the revision adenoidectomy group and non-revision group: (a) patient factors including gender, age, and comorbidities, and (b) surgical factors including surgeon gender, surgeon age, surgeon operation volume, hospital level, hospital location, hospital operation volume and surgical procedure.

The ages of the surgeons were separated as follows: 28–41 years, 41–50 years, and 50–64 years. The hospital level in Taiwan was divided into three categories: (1) medical center, (2) regional hospital, and (3) district hospital according to their facilities and faculties. Hospital locations were noted as being in the northern, central, southern, and eastern parts of Taiwan. Hospital volume and surgeon volume were defined as the number of operations for adenoidectomy with or without tonsillectomy performed by each surgeon and at each hospital every year. The volume of hospitals and surgeons were categorized into 3 parts (low, medium, high) after which we performed analysis associated with the difference between the groups.

2.4. Statistical analysis

Chi-square analysis was used to compare the patient and surgical factors between the revision adenoidectomy and non-revision groups in the study cohort from 2002 to 2006. The univariate and multivariate logistic regression analysis were applied to estimate significance, odds ratios (ORs) and 95% confidence intervals between groups. All analyses used the STATA version 12.0 (STATA Corp., College Station, TX, USA), and a two-sided probability value of <0.05 was considered significant.

3. Results

In this study, we found that 5435 patients underwent their first adenoidectomy with or without tonsillectomy from 2002 to 2006 in the NHIRD at an average age of 7.27 ± 3.02 . Then,

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