

ORIGINAL RESEARCH

Tonsillectomy and the Risk of Post-Tonsillectomy Hemorrhage: A Retrospective Cross-Sectional Study

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Abstract

Intorduction. Aim of article was to retrospectively reviewed occurrence of post-tonsillectomy hemorrhage (PTH) in a population with a wide age range and assessing the association between patients' age, time of PTH, and the need for surgery to control bleeding.

Methods. A retrospective cross-sectional study of 240 patients who underwent a tonsillectomy, tonsilloadenotomy or adenectomy in our Department. Demographic parameters, indication, complication, performed operation and PHD were analyzed in patients.

Results. A total of 240 patients with a mean age of 12.29 years, a median age of 8 years and an interquartile range of 5 to 15 years. In relation to the age limit of 16 years, 181 (75.4%) patients were 16 or younger, and 59 (24.6%) were over 16. 9 (5%) children had PTH, primary in 2.2%, and secondary in 2.8%. 8 adults (13.6%) had secondary PTH. Patients older than 16 had a 2.73 times higher risk of bleeding than patients younger than 16 (RR=2.73; p=0.030). In terms of gender, 9 male patients (8%) and 8 female patients (6.3%) experienced bleeding. There was no significant statistical difference (p=0.529).

Conclusion. The risk of PTH has increased with age. In terms of gender, there was no difference.

Keywords: tonsillectomy, demographic, complication, hemorrhage, treatment.

INTRODUCTION

According to the American Academy of Otolaryngology – Head and Neck Surgery, tonsillectomy is defined as a "surgical procedure performed with or without adenoidectomy that completely removes the tonsil, including its capsule, by dissecting the peritonsillar space between the tonsil capsule and the muscular wall." Depending on the context in which it is used, it may

indicate tonsillectomy with adenoidectomy, especially in relation to sleep *breathing* diseases (SBD) (1).

It is one of the most common operations during childhood and the majority of studies so far have been conducted on the children's population. Obstructive sleep apnea (OSA), chronic tonsillitis with *or without* adenoides vegetations are most common reasons for

surgery (2). Post-tonsillectomy hemorrhage (PTH) is the most common and most serious complication. It may occur at any time in postoperative period, usually in the first postoperative week. PTH is often divided into primary (within 24 hours of surgery) and secondary (24 hours after surgery). *Complications of tonsillectomy include sore throat, postoperative nausea, vomiting, dehydration, otalgia, Eustachian tube dysfunction, pneumothorax and fatality* (3).

After a long history of tonsillectomy, its necessity is still controversial. *Treatment* or outcomes of PTH were shown only in a few studies. No PTH management guidelines currently exist (4).

Primary objective of this study was to show our experience with tonsillectomy and retrospectively reviewed PTH in a population with a wide age range, and to assess the association between patients' age, time of PTH, and the need for surgery to control bleeding.

METHODS

Patients and study design

A retrospective cross-sectional study was conducted of 240 patients who underwent a tonsillectomy, tonsilloadenotomy or just adenectomy in our Department of Otolaryngology and Maxillofacial Surgery of the Cantonal Hospital Zenica, in the period from 01/01/2020 to 12/31/2022. This study was approved by the Ethics Committee of the Cantonal Hospital Zenica (No:00-03-35-166-5/23).

Methods

All patients had preoperative examination and normal coagulation parameters. They were examined postoperatively, before discharge from the hospital and 15 days after discharge or earlier in case of bleeding. All patients were operated using the cold method with electrocoagulation hemostasis, under general or local anesthesia by six surgeons.

We divided all patients into two groups. All patients under 16 were defined as pediatric group, and 16+ patient age groups were defined as adults.

All patients who underwent tonsillectomy with or without adenectomy and myringotomy at the Department of Otorhinolaryngology in the period from January 1, 2020 until December 31, 2022 were included in the analysis.

Patients who were indicated for tonsillectomy or adenectomy and did not consent, patients who were indicated for tonsillectomy or adenectomy and did not undergo preoperative preparation, and patients in whom only myringotomy was performed were excluded.

Data were collected by searching the medical records of the patients included in the research. Data were collected on age, gender, existing comorbidities, clinical diagnosis, surgical procedure, type of anesthesia, intraoperative and postoperative complications, the method of their management, whether the removed tissue was sent for pathohistological analysis, and final pathohistological findings.

Statistical Methods

Results are presented in tables and graphs, with a *significant* level of $p < 0.05$. Statistical analysis was performed with IBM SPSS v27.0. Distribution of data among examined groups was tested using Chi square test. When expected cells had the value of 0 or 20% or more, and when their value was less than 5, Fisher's exact test was used.

RESULTS

The study included data from 240 patients with a mean age of 12.29 years, a median age of 8 years, and an interquartile range of 5 to 15. In relation to the age limit of 16 years, 181 (75.4%) patients were 16 or younger, and 59 (24.6%) were over 16. The distribution of respondents by gender in relation to the age limit did not show a signifi-

cant difference ($\chi^2=0.286$; $p=0.593$). Table 1 shows indications for surgery. PTH was the most common complication with *frequency* of 7%. Patients older than 16 had a 2.73 times higher risk of bleeding than those younger than 16 ($RR=2.73$; $p=0.030$). In terms of gender, 9 male patients (8%) and 8 female patients (6.3%) experienced bleeding. There was no significant statistical difference ($p=0.529$) (Table 2). PTH occurred in average on the 4th day, with mean of 4.41. Median value was 5 days, with interquartile range from 2 to 6 days.

Regarding the type of anesthesia used, 225 (93.7%) operations were performed under general anesthesia, and 15 (6.3%) under local anesthesia. One patient had a reaction to the anesthesia, resulting in heart failure with pulmonary oedema, and heart infection.

Analyzing the co-morbidities of operated patients, arthritis was presented in 0.4%,

asthma in 0.8%, bronchitis in 2.1% of patients, and allergic rhinitis was presented in 2.5% of operated patients. Neurological diseases were presented in 1.2% of cases, and syndromes affecting development were presented in 0.8% of cases. Comorbidities on heart as aberrant chords or hypertension, or valve insufficiency were present in 2.8% of patients. There was no significant difference in the incidence of cardiovascular or neurological diseases between the sexes or age groups. Also, when *hemorrhage* was compared to the comorbidities, it was observed that 14 (82.35%) patients with PSH did not have any comorbidity. Among three patients with comorbidities, one patient had psoriasis, one had Down syndrome, and one patient had *hypothyroidism*.

DISCUSSION

Tonsillectomy and/or adenotomy is the most performed surgery at the Otorhinolaryngology Clinic, and one of the most performed surgeries in childhood and adolescence. However, numerous studies attempt to analyze the necessity of its performance. Tonsillectomy is also associated with postoperative complications. PTH is one of the most common complications. Incidence of PTH is the main objective of this study. However, we also analyzed indication, surgical procedures, pathohistological evaluation and other postoperative complications in patients who underwent tonsillectomy and/or adenotomy.

The main finding of this study, which included 240 patients, was mean PTH rate of 7%. In childhood, PTH was found in 5% patients. Also, our study showed PTH in 13.6%

Table 1. Distribution of patients based on the indication for surgery, by age

Diagnosis	Indication for surgery					
	Total		≤16 years		>16 years	
	N	%	N	%	N	%
Focalosis	1	0.42	1	0.55	0	0.00
Secretory otitis media	1	0.42	1	0.55	0	0.00
Tonsillitis chronica	69	28.75	15	8.29	54	91.53
Tonsillitis chr et vegetatio adenoides epypharngis	139	57.92	139	76.8	0	0.00
Tumor	6	2.50	1	0.55	5	8.47
Vegetatio adenoides epyohsringis	20	8.33	20	11.05	0	0.00
Vegetatio adenoides epyohsringis, secretory otitis media	4	1.67	4	2.21	0	0.00

N - number of patients; %- percentage

Table 2. Distribution of postoperative complications

Complications	Presented	?16 years		16+ years		Fisher's exact test
		N	%	N	%	
Bleeding	In 24 hours	4	2.2 %	0	0.0 %	0.08
	After 24 hours	5	2.8 %	8	13.6 %	
Heart failure and pulmonary edema	No	181	100.0 %	58	98.3 %	0.245
	Yes	0	0.0 %	1	1.7 %	
Heavy breathing	No	180	99.4 %	59	100.0 %	0.999
	Yes	1	0.6 %	0	0.0 %	

N - number of patients; %- percentage

adult patients. It was found that patients older than 16 had a 2.73 times higher risk of bleeding than those under 16 ($RR=2.73$; $p=0.030$). In terms of gender, there was no significant statistical difference. We did not note any fatal cases.

240 patients were included, 113 male and 127 female, and average age was 12.29 years. 181 patients were under 16 (children), and 59 patients were older (adults). All patients under 16 were prepared for surgery by a pediatrician. Adults were prepared by an internist. Tonsillectomy is more common in childhood than in adults, according to literature (5).

We found chronic tonsillitis with adenoiditis as the most common ailment. Tonsillectomy was the most often performed surgical procedure. Results can be comparable to those of Šumilo et al. (6). Our findings are not similar to those of De Benedeto et al. who observed that OSA was the most common ailment. Discrepancy in the results can be related to the practice of performing preoperative polysomnography and diagnosis of OSA. We did not perform polysomnography preoperatively in our study. Maybe we should change our practice and take a role in pediatric OSA through polysomnography and surgery as the literature recommends (7). Also, effects of tonsillectomy on IgA nephropathy should be considered (8,9).

In adults, chronic tonsillitis was found as the most common ailment, and tonsillectomy was the most performed surgical procedure. These results are similar to those of Zagolski et al. (10). However, several studies showed that tonsillectomy could be considered in adult patients with OSA with medium to large tonsils and normal soft palate (11,12).

Suspicion of tonsillar malignancy was found in six patients. Five of them were older than 16. Tonsil specimens were sent for histopathological evaluation only in case of suspected malignancy (13). Studies showed lower risk of malignancy in children (14). There was only one malignancy suspicion in children's population, and histopathological evalua-

tion found chronic tonsillitis. Four adults had squamous cell carcinoma. Our findings are similar to results of other studies which showed squamous cell carcinoma as the most common tonsillar malignancy in adults (15).

Our study found that PTH and tonsillectomy occurred in 5% of children. 2.2% of PTH was primary, and 2.8% secondary. Four patients were reoperated due to primary PTH, and only one after secondary PTH. David et al. found PTH frequency of 4.9% (16). Other studies showed cases of primary hemorrhage accounted for approximately 33.70%, and secondary hemorrhage occurred in 66.30% of cases (17). Alvo et al. showed that the overall PTH rate was 3.6% (0.23% occurring within the first 24 hours (primary) and 3.4% after 24 hours (secondary)). Mean time to PTH was 6.6 ± 3 days (18). Overall, primary PTH occurrence was found to be 2.2%, and secondary PTH accounting for 0.78% and 1.34% (19). PTH was found as the most common reason for revisit, and 5th postoperative day was the median revisit time. The higher risk of revisits was associated with older children. (20). In a study of case day tonsil surgery, 5.7% patients experienced hemorrhage, and 4.1% were readmitted (17).

On the other hand, PTH and associated utilization after tonsillectomy occurred in more than 13.6% of adults. All of them were revisited. Only one (1.6%) patient required second surgery. Inuzuka et al. found in their study, which included 325 adult patients who underwent a tonsillectomy, that PTH in 21.8% of patients and 1.5% of patients required the second surgery for hemostasis (22). A study which included 193 adult patients showed PTH in ten (5.18%) adult patients of whom seven (70%) were male.

The risk of postoperative complications

We did not find that comorbid diseases could increase the risk of postoperative complications in children. Demir et al. findings are similar (23).

There are different limitations of this study. We do not have a national health system

register which would contain information on all citizens. Data were collected by searching the medical records of the patients included in this study. Information were insufficient and posed limits on the assessment and variables.

The retrospective design of this study limited the variables and the ability of control for confounders. In this study, we were not able to control risk factors such as surgeon's level of experience or change in surgery techniques from cold to hot. Also, we did not investigate other risk factors. We were not allowed to control speculative PTH confounders like excessive weight, medicine use, pre and post operative medications, recent upper respiratory infection, smoking habits, or alcohol consumption.

This study predominantly included young population. However, obstructive sleep apnea was not diagnosed in our study. Sometimes, short-lived PTH with minimal bleeding could be managed at home with observation and ice per os but patients were usually readmitted to the hospital. This may have an impact on indication or PTH incidence in our study.

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CONCLUSION

PTH has low incidence rates, and the risk increases with age. It should be given more attention in preparations for surgery. Conclusively, surgeons should prepare and choose a conservative or surgical approach to PTH management. I recommend careful preoperative counseling with patients and their families in order to set the PTH expectations.

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