Post-Tonsillectomy Bleeding: The Effect of Surgical Experience

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Abstract

Aim: We aimed to discuss and investigate the relationship between the surgeon's experience and post-tonsillectomy bleeding (PTB) in the light of the literature.

Methods: The retrospective data was obtained from 280 patients who underwent tonsillectomy (32 PTB and 248 no-PTB) operated by residents or consultant surgeons.

Results: The overall bleeding rate after tonsillectomy was 11.43% (32/280). The bleeding rate was 14.3% in the <16 age group and 9.7% in the ≥16 age group (p=0.246). While the rate of bleeding after tonsillectomy operation was 6.16% in the resident group; it was 27.53% in the consultant group (p<0.001). In patients who bled after tonsillectomy operation, the operation time was significantly shorter in the consultant group (p=0.032). Binary Logistic Regression analysis revealed that being a consultant surgeon is a risk factor for bleeding after tonsillectomy operation (p<0.001). Short operation time was a weak risk factor (p=0.048).

Conclusions: More experience in surgery does not decrease the risk for PTB, quite the reverse, it increases the PTB risk. The effort to finish surgery in a short time, and possibility of performing a less careful and more traumatic surgery might have caused this result.

Keywords: *Tonsillectomy, post-tonsillectomy bleeding, resident, consultant, surgeon's experience*

1. Introduction

Tonsillectomy is one of the most common interventions in oto-rhinolaryngology practice, comprising approximately 20-40% of the surgical procedures in this field[1,2]. Recurrent infections and airway obstruction are the primary indications for tonsillectomy in both adults and children, and more than 500.000 tonsillectomies are performed each year in patients younger than 15 years of age[3]. Tonsillectomy decreases the rate of bacterial tonsillitis, and improves overall quality of life[4,5]. Post-tonsillectomy bleeding (PTB) is divided into two main categories as primary bleeding, which happens within 24 hours after surgery and secondary bleeding that occurs >24 hours after the surgery.

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Primary bleeding rate has been reported as 0.2-2% [4] while secondary bleeding rate has been reported as 3-5%[1]. Primary bleeding is usually associated with surgical technique, while environmental factors affecting oropharyngeal healing contribute to secondary (delayed) bleeding, although the exact mechanism is not known[6,7]. Old age, recurrent tonsillitis, attention deficit hyperactivity disorder[8], 15-30 years of age [9], chronic / cryptic tonsillitis[9,10] and low household income[11] have been reported as the risk factors for PTB. The causes of secondary PTB may be solid food intake, tonsillary bed infection, postoperative use of non-steroid anti-inflammatory drugs, or it may be idiopathic[12-15].

In this study, we investigated the relationship between PTB and the surgeon's experience.

2. Materials and methods

2.1. Informed consent and ethical approval

This retrospective study was conducted at a area hospital in 2017, in accordance with the principles of the Declaration of Helsinki, by informing the patients and obtaining their consent. Ethics committee approval was obtained from ethics committee of a area hospital (Date: June 28, 2017; No:69).

2.2. Subjects

The data of the patients who underwent tonsillectomy in ENT clinic of our hospital between January 2015 and June 2017 were reviewed retrospectively, from the electronic patient recording system of the hospital. The ones with chronic disorders (asthma, hypertension, etc.) and the ones who smoked were excluded, and the remaining 280 patients were reviewed. The patients did not use drugs before the operation, and the same recommendations were made and implemented in terms of post-operative nutrition.

There was PTB in 36 patients; one patient was excluded for not taking prescribed antibiotics postoperatively, and three patients were excluded for not obeying their post-tonsillectomy diet, and finally 32 patients who had PTB were included in the study (PTB group). The remaining 248 patients who met the inclusion criteria and did not have PTB were included in no-PTB group. At the end, the study population included 280 patients who had tonsillectomy.

The PTB and non-PTB groups were further divided into two subgroups to investigate the role of the surgeon's experience on PTB, as the patients in whom surgical procedures were performed by consultant surgeons, and the patients in whom the surgical procedures were performed by the residents under the supervision of consultants.

2.3. Preoperative investigations, surgical technique and postoperative care

Complete blood count, routine blood chemistry, prothrombin time (PT) and international normalized ratio (INR) were done in all patients preoperatively, and were in normal limits in all patients included in the study.

Tonsillectomy was performed with cold dissection and snare method, under general anesthesia. Hemostasis was achieved using bipolar diathermy, if necessary. None of the patients had an additional surgical procedure, such as adenoidectomy or ventilation tube insertion.

The patients were administered paracetamol (10 mg/kg q.i.d. for children, 500 mg q.i.d. for adults, both in suspension form) and amoxicillin (50 mg/kg b.i.d. for children, 750 mg b.i.d. for adults, both in suspension form) postoperatively. All patients were given a diet postoperatively, and hot and solid food was avoided between postoperative 0-10th days. All patients were discharged from the hospital the next day after surgery.

2.4. Parameters investigated

The demographic characteristics of the patients, duration of surgery, the experience of the surgeon who performed surgery (consultant surgeon or resident under the supervision of the consultant surgeon), date of re-admission for bleeding, and the hemoglobin level at the time of bleeding were noted.

2.5. Statistical Analysis

SPSS package program (version 16.0) was used for statistical analysis. Chi-square test, Wilcoxon Signed Ranks Test, Independent Samples t-Test, Mann Whitney U test, Spearman's correlation test and Binary Logistic Regression (Backward LR) were used where appropriate. A p value <0.05 was considered as statistically significant. The study population was determined as 5320 with G-power program by taking impact size 0.362, α=0.05, power (1-β) =0.80 at a confidence level of 95% and a substitute group composing of 280 individuals was added.

3. Results

3.1. Comparison of the PTB and no-PTB groups

The characteristics and the comparisons of PTB and no-PTB groups are presented in Table 1. Among 280 patients who had tonsillectomy, 32 (11.43%) patients had PTB. One (3%) patient had primary bleeding (consultant group) and 31 patients (97%) had secondary bleeding. The mean postoperative day for PTB was 7.77±3.28 (range: 1-15 days).

There were 20 males and 12 females in PTB group, and 124 males and 124 females in no-PTB group; two groups were similar for gender distributions (p=0.184). The mean age was not different in PTB no-PTB groups (18.5±11.5 years in PTB, and 22.5±14.6 years in no-PTB group, p=0.347) (Table 1).

In the PTB group, the mean duration of surgery was 35.46±9.18 minutes (range: 20.0-55.0 minutes). In the no- PTB group, the mean duration of surgery was 35.06±8.91 minutes (range: 15.0 -75.0 minutes). The mean durations of surgery were similar in PTB and no-PTB groups (p=0.808) (Table 1). There was no significant correlation between PTB and duration of surgery (r= 0.026, p=0.669). The day of PTB and duration of surgery were not significantly correlated, either (r= - 0.68, p=0.716).

3.2. Comparison of Resident and Consultant Surgeon groups for PTB

Residents performed tonsillectomy in 211, and consultants performed tonsillectomy in 69 patients. Among 32 patients with PTB, residents performed surgery in 13 (40.6%), and consultants performed surgery in 19 (59.4%) patients. PTB rate was 6.16% (13/211) in the resident group, and 27.53% (19/69) in the consultant group. In consultant group, PTB was significantly more frequent than the resident group (p<0.001, r=0.290) (Table 2).

The mean ages of the patients with PTB were 23.62±11.77years and 15.05± 10.25 years in in resident and consultant groups, respectively (p=0.044) (Table 2).

Table 1

The characteristics of PTB and no-PTB groups.

	PTB group	No-PTB group	Total	p
Number	32 (11.43%)	248 (88.57%)	280	
Mean age (years)	18.5±11.5	22.5±14.6	22.06	0.347
Male	20	124	144	0.184
Female	12	124	136	
Mean surgery time (min)	35.46±9.18	35.06±8.91	35.11±8.93	0.808

PTB: Post-tonsillectomy bleeding.

Table 2
Comparison of resident and consultant surgeon groups for PTB

	RES group	CONS group	p
PTB rate	6.16%	27.53%	<0.001
Age (years)	23.62±11.77	15.05±10.25	0.044
Mean surgery time (min)	39.61±7.49	32.63±9.33	0.032

PTB: Post-tonsillectomy bleeding; RES: Resident group; CONS: Consultant group

Table 3
Risk factors for PTB.

	S.E.	Wald	Exp(B)	p
Being a resident or attending surgeon	0.427	21.931	7.384	0.000
Duration of surgery	0.022	3.898	1.044	0.048
Age	0.016	2.754	0.973	0.097

S.E.: Standard Error Difference; Exp(B): exponentiation of the B coefficient; PTB: Post-tonsillectomy bleeding.

When all patients who had tonsillectomy were taken into account, the mean duration of surgery was 36.45±8.60 minutes (range: 20.0 - 75.0 minutes) in the resident group, and it was 31.01±8.72 minutes (range: 15.0- 55.0 minutes) in the consultant group (p<0.001). When only the patients with PTB were taken into account, the mean duration of surgery was 39.61±7.49 minutes in the resident group, and 32.63±9.33 minutes in the consultant group, and the duration of surgery was significantly shorter in consultant group in patients with PTB (p=0.032) (Table 2).

To determine the confounding variables on PTB, Binary Logistic Regression (Back-ward LR) analysis was performed (Table 3). Confounding variables were age, duration of surgery, and experience of the surgeon (being a resident or a consultant surgeon). Binary Logistic Regression analysis revealed that being a consultant surgeon was risk factor for PTB (p<0.001, Exp(B): 7.38, Wald=21.93). Duration of surgery was a weak risk factor (p=0.048, Exp(B): 1.044, Wald=3.898).

4. Discussion

In this study, we investigated the experience of surgeons on PTB, and found that being an experienced surgeon increased the risk of bleeding following tonsillectomy.

PTB is the most common complication of tonsillectomy. Primary bleeding is thought to be due to inadequate hemostasis during surgery while the cause of secondary bleeding has not been yet not fully understood [16]. Most of our patients (97%) had secondary PTB.

Since PTB may be a life-threatening complication, a number of surgical techniques have been compared for PTB rate. Ali et al. [17] reported that in 494 patients, 33 patients (6.68%) had PTB, 3 being primary and 30 being secondary. The most frequently used surgical technique was cold-steel dissection with bipolar diathermy for hemostasis (55.87%). The lowest PTB rate was observed with cold dissection technique (3.14%) while the highest PTB rate was seen after bipolar diathermy tonsillectomy (8.47%). In our study, we used cold dissection technique for tonsillectomy, and our overall PTB rate was 11.43%.

Age has been suggested as a risk factor for PTB. Ali et al. [17] reported that the highest PTB rate was above 15 years of age (9.41%), followed by the 10-14-year-old (8.75%) and the < 5-year-old age (5%) groups. They found the lowest PTB rate in the 5-9-year-old age group (3.66%). Lee, et al. (4) investigated retrospective data of 8347 patients who underwent tonsillectomy. The overall bleeding rate was 1.3%. Patients ≥12 years old had a significantly higher bleeding rate when compared to the younger group. PTB rates were 0.5% for patients <12 years, and 3.2% for those ≥ 12 years of age (p<0.0001). Kim et al. [18] provided data on 1489 patients who underwent tonsillectomy. PTB rates were 3.1%, 2.5% and 10.8% in younger children (under 11 years), older children (12-15 years) and adults (over 15 years old). After tonsillectomy, the bleeding was more common in adults compared to children. In our study, the mean ages were similar in PTB no-PTB groups (p=0.347, Table 1). We divided our study population into two, as the ones <16 years of age and the ones ≥16 years of age, however the two age groups were also similar for PTB rate (p=0.246), and we did not determine age as a risk factor for PTB (p=0.203, r= -0.076). Since the mean age our study population was 22.06 years, our high PTB rate may be related to older age of our study group.

The effect of the experience of surgeons on PTB has been studied, and a number of studies reported that surgeon's experience did not affect PTB rate [4,12,15,19-21]. Lee et al. [4] reported that there was no significant difference of bleeding rates in tonsillectomy procedures performed at academic versus community sites in the data of 8347 tonsillectomies (p =0.59). Similarly, Leader et al. [21] reported that consultants performed tonsillectomy quicker, and concluded that residents and attending surgeons were similar for readmission or postoperative hemorrhage rates. On the other hand, Hinton-Bayre et al. [22] reported that primary PTB rate was similar in trainees and consultants, however secondary PTB was seen less after tonsillectomies performed by experienced surgeons (3.3% vs. 10%). Similarly,

Manimaran et al. [23] reported that 69.5% of the patients with PTB were operated on by trainees, while 30.5% were operated on by consultants (p=0.03), and there was a negative correlation between experience and PTB.

In this study, we investigated the effect of the surgical experience on postoperative bleeding rates in tonsillectomy. Among 32 patients in which PTB was detected, 40.6% was operated by residents, and 59.4% was operated by the consultant ENT surgeons. The bleeding ratio was significantly higher in the consultant group compared to the resident group (27.53% vs. 6.16%, p<0.001). Logistic regression analysis showed that being a consultant surgeon was a risk factor for PTB (p<0.001). The reason for this result may be the slower and more careful surgery of the residents causing less trauma to the tonsillary bed, since duration of tonsillectomy was significantly longer in the resident group. The consultant surgeons might have had overconfidence while performing tonsillectomy and had the anxiety for finishing surgery in a short time, resulting in reduced attention and a more traumatic surgery causing PTB.

Our study has some limitations. Since it is a retrospective study, we could not perform a histopathological analysis to show whether tonsillectomy materials included surrounding muscle tissue, indicating a more traumatic tonsillectomy in the consultant surgeon group.

4.1. Limitations

Classifying the patients we included in the study as adults and pediatrics would have enabled us to obtain more precise results, but the insufficient number of our patients did not allow us to make this distinction. Not all operations were performed by a single surgeon.

5. Conclusions

We concluded that expertise in surgery does not decrease the risk for PTB, quite the reverse, it increases the PTB risk. The effort to finish surgery in a short time, and possibility of performing a less careful and more traumatic surgery might have caused this result. Further prospective studies on larger cohorts are needed to make more clear conclusions.

5.1 Implications

- The result we obtained at the end of our study is that surgical experience has no effect on bleeding after tonsillectomy operation.
- Tonsillectomy operation is a common procedure in ENT practice.
- Bleeding after tonsillectomy can cause serious loss of work and time, and even a small amount of mortality.

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Statement of ethics

This study was conducted in accordance with the ethical principles of the Declaration of Helsinki and was approved by SBÜ. Adana City E&R Hospital ethics committee(Date: June 28, 2017; No:69).

Conflict of interest statement

The authors declare that they have no financial conflict of interest with regard to the content of this report.

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Author contributions

All authors contributed to the study conception and design.

All authors read and approved the final manuscript.

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