

Risk Factors For Post-Tonsillectomy Hemorrhage

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Abstract

Objectives: This research was undertaken to determine the frequency of post-tonsillectomy hemorrhage (PTH) in one particular clinical setting and to assess which risk factors exist for PTH.

Methods: Following a retrospective case review of 892 patients who had gone through either tonsillectomy or adenotonsillectomy, a subgroup of 50 records were selected for detailed study. These 50 patients were then classified as either pediatric cases (aged under 16) or adult cases (aged over 16). Their risk factors were then assessed. Risk factors included: age, sex, surgical indication; type of surgery; time hospitalized post-operatively; timing of PTH (primary and secondary); management used to staunch bleeding and time in hospital following PTH.

Results: The overall rate of PTH was 5.6% (3.0% pediatric, 2.6% adult). All PTH instances were secondary and no primary type occurred. In comparing the adult and pediatric cases of PTH, there was no statistically significant difference ($p>0.05$) in terms of age, sex, time hospitalized post-operatively, management used to staunch bleeding or time in hospital following PTH. There was, however, a statistically significant difference ($p<0.05$) between groups in terms of surgical indication and timing of PTH (primary or secondary).

Conclusion: There was an increased frequency of secondary PTH in both groups. PTH typically happened between day 5 and 10 post-operatively. Patients need to be advised about this risk and show caution regarding factors that increase the risk of PTH after surgery.

Keywords: Tonsillectomy, postoperative hemorrhage, pediatrics, adults

Introduction

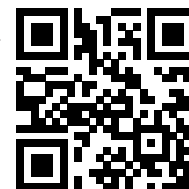
Both tonsillectomy and adenotonsillectomy are amongst the most frequent surgical procedures in Turkey. Surgical indications include chronic or recurrent tonsillitis, hypertrophic tonsils, peritonsillar abscess or an obstructed airway. The goal in both adult and pediatric cases is better life quality.^[1-7] Complications of surgery in this situation are pain, feeling nauseous or actual vomiting, fluid loss and hemorrhage.^[8,9] Post-tonsillectomy hemorrhage (PTH) numbers amongst the gravest consequences of tonsillectomy. It may be primary, in which case the bleeding hap-

pens within 24 hours of the operation, or secondary, where bleeding may happen any time following the initial 24 hour period.^[1,2,10] There is a wide range in how frequent PTH is reported to be, from 0.1% to 40%.^[2-4,11-13] If it is necessary to administer anesthesia to allow the hemorrhage to be controlled, PTH is defined as severe. This is because of the morbidity an anesthetic entails.^[14] The following factors have already been mentioned in the literature as risks for PTH: sex, age, surgical indication, type of operation and how skilled the surgeon is.^[15-17] This study reports ret-

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respectively on cases of PTH following tonsillectomy or adenotonsillectomy in a population with a wide age range. For the purposes of the research, age at operation below 16 qualified the case as pediatric, whilst all other cases were considered adults. The objective was to evaluate the frequency of PTH in this setting and clarify the pertinent risk factors.

Material And Methods

The research was based on 50 case records selected from those of 892 individuals who had undergone tonsillectomy or adenotonsillectomy between January 2007 and December 2014 at the Otolaryngology Clinic of the Firat University Faculty of Medicine. Ethical approval was first obtained from the local ethics committee. The cases were then reviewed retrospectively. The same surgical team in each case had performed the procedures using a uniform technique. The cases selected were from individuals with a presentation of post-operative hemorrhage. After dividing the group into pediatric (n=27; under 16 at time of operation) and adult (n=23; the rest), case records were examined for details of age, sex, surgical indication, type of surgery, time hospitalized post-operatively, timing of PTH (primary and secondary), management used to staunch bleeding and time in hospital following PTH. PTH was classified as primary if occurring within 24 hours of surgical procedure, or secondary if occurring after 24 hours. Grading of PTH was according to the severity of hemorrhage as follows: (I) minor hemorrhage that ceased following a noninvasive intervention; (II) hemorrhage necessitating local anesthesia for the intervention; and (III) hemorrhage such that an intervention under general anesthesia in the operating theatre was required.^[16]

Prior to analysis, the parameters examined were entered into electronic form for use with the Statistical Package for the Social Sciences (v. 22; SPSS Inc., Chicago, IL, USA). The Chi-square test was used for categorical data, whilst non-categorical data were analyzed with Student's *t* test. A value of $p < 0.05$ was taken to indicate statistical significance.

Results

50 case records, from 27 pediatric and 23 adult cases, all with PTH, were selected from the records of 892 individuals who had undergone tonsillectomy or adenotonsillectomy. In every instance, the procedures were conducted under general anesthesia by the same surgeons utilizing

a cold steel dissection technique. Control of intraoperative bleeding was achieved with bipolar cautery. Review of these records showed PTH had occurred in 50 individuals (50/892=5.6%). All the instances (5.6% of all cases) of PTH were of secondary type. No primary hemorrhage was recorded. The pediatric PTH group consisted of 14 girls and 13 boys. The age range was 2 to 15 years, with a mean age of 6.5 ± 0.7 years. The adult group contained 6 women and 17 men, with an age range of 16-54 years. The mean age was 27.6 ± 1.7 years.

The principal indication for surgery (70.4%) in the pediatric group was recurrent tonsillitis and hypertrophied tonsils, whereas in the adult group it was principally (69.6%) tonsillar hypertrophy. The two groups differed in surgical indication at a statistically significant level ($p < 0.05$). 74.1% of the pediatric cases underwent adenotonsillectomy. By contrast, all the adults (100%) underwent tonsillectomy. This difference in surgical intervention was also found statistically significant ($p < 0.05$). Regarding the time of hospital discharge, 88.9% of pediatric cases and 91.3% of the adults had been discharged by 24 hours post-surgery. The demographic profile of the study population, surgical indication and type of surgery type are shown in Table 1.

100% of PTH in this study was determined to be secondary. The timing of PTH was found to differ in a statistically significant way ($p < 0.05$) between the adult and pediatric groups. For the pediatric group, the most frequent post-surgical days for PTH to occur were the 9th and 10th days. For the period between 2 and 15 days post-surgery the mean days elapsed were 8.3 ± 0.6 ; for the adult group, the most frequent post-surgical day for PTH to occur was the 5th day. For the period between 2 and 10 days post-surgery the mean days elapsed were 5.7 ± 0.4 . For details, see Figure 1.

Amongst the pediatric PTH cases, 74.1% (n=20) were grade I. Among the adults, the corresponding figure was 56.6% (n=13). 6 cases amongst the pediatric group had grade II PTH and all received a blood transfusion. One patient was transfused fresh frozen plasma. Amongst the adult PTH cases, 5 cases were grade III. Of these 5, one went on to be transfused blood. The groups did not differ significantly with regard to management of PTH and the transfusing of blood ($p > 0.05$).

Pediatric cases remained in hospital for between 1 and 4 days (1.2 ± 0.1) following surgery, while adult patients remained for between 1 and 3 days (1.2 ± 0.1). PTH resulted in 1-8 days' ($2, 9 \pm 0, 3$) additional hospitalization for pediatric

Table 1. Clinical datas for post-tonsillectomy hemorrhage patients.

	Pediatric group %/(n=27/50)	Adult group %/(n=23/50)	p value
Gender			
Male	48.1/(13/27)	73.9/(17/23)	0.06
Female	51.9/(14/27)	26.0/(6/23)	
Indication for surgery			
Recurrent tonsillitis (RT)	18.5/(5/27)	8.7/(2/23)	0.3
Tonsillar hypertrophy (TH)	11.1/(3/27)	69.6/(16/23)	0.0001
RT + TH	70.4/(19/27)	17.4/(4/23)	0.0001
Peritonsillar abscess	0.0/(0/27)	4.3/(1/23)	0.3
Type of surgery			
Tonsillectomy alone	25.9/(7/27)	100.0/(23/23)	0.0001
Tonsillectomy and other	74.1/(20/27)	0.0/(0/23)	0.0001
Hospitalization time after operative			
24 hours	88.9/(24/27)	91.3/(21/23)	
48 hours	7.4/(2/27)	8.7/(2/23)	0.8
>48 hours	3.7/(1/27)	0.0/(0/23)	
The day of the post-operative bleeding	1-8 (5.7±0.4)	1-12 (8.3±0.6)	0.001
Treatment category			
I	74.1/(20/27)	56.6/(13/23)	
II	3.7/(1/27)	21.7/(5/23)	0.1
III	22.2/(6/27)	21.7/(5/23)	
Blood transfusion	22.2/(6/27)	4.3/(1/23)	0.06
Hospitalization time after hemorrhage			
24 hours	11.1/(3/27)	13.0/(3/23)	
48 hours	37.0/(10/27)	17.4/(4/23)	0.2
>48 hours	51.9/(14/27)	69.6/(16/23)	

ric cases, and 1-12 days' (3.9±0.6) hospitalization for adults. This difference between groups was not statistically significant ($p>0.05$) (Figure 2, Figure 3).

Discussion

Tonsillectomy and adenotonsillectomy are the most common ENT operations. Complications following surgery, such as pain, insufficient intake by mouth, fluid loss, and

hemorrhage can create problems in both adult and child patients.^[8,9] Tonsillectomy has its own associated problems, including hemorrhage and infection.^[11,18] The prevalence of PTH is recorded as between 0.1 and 40.0%,^[2-4,7,11,12,19] whilst it causes death in between 0.001 and 0.006% of cases.^[7] In this research, the combined risk of PTH was 11.6%, with primary PTH occurring in 1.6% of cases, secondary PTH in 10%.^[15,20,21] The rate of PTH found in the literature can be as low as 1 to 3%, that of secondary

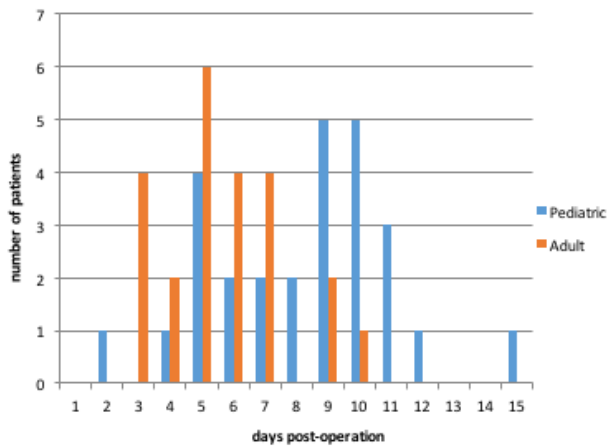


Figure 1. Postoperative day for the evaluation of hemorrhage after tonsillectomy.

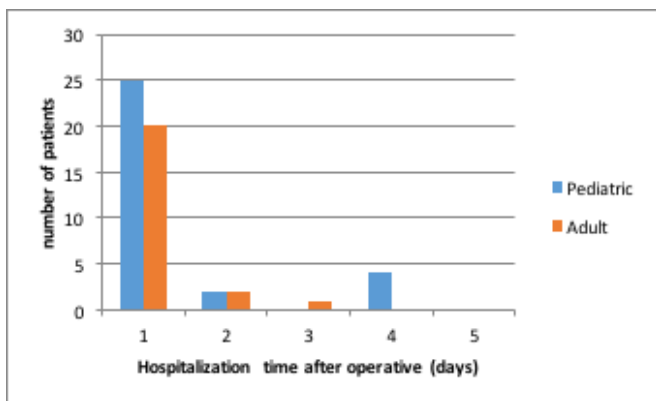


Figure 2. Tonsillectomy/adenotonsillectomy operations of patients after hospital stay (days)

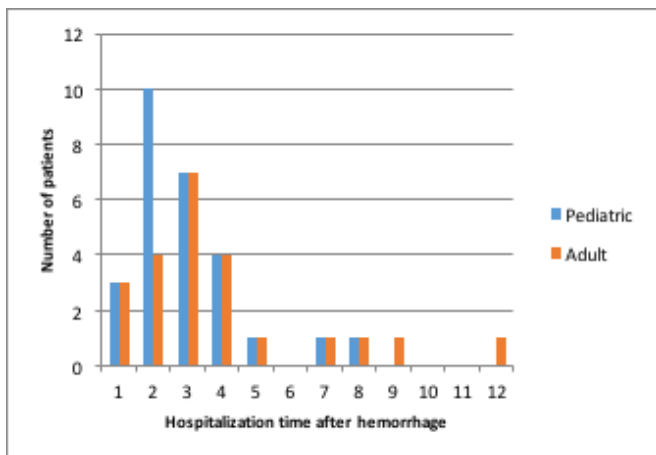


Figure 3. Post-tonsillectomy hemorrhage of patients after hospital stays (days)

PTH 1 to 5%.^[7,22,23] Our results are therefore in line with published rates, since our PTH rate was 5.65%. No cases of primary PTH occurred in our sample, as all instances of PTH happened more than 24 hours after surgery. In the pediatric group, the secondary PTH prevalence was 3.0%, whilst adult prevalence was 2.6%.

Since primary hemorrhage occurs within 24 hours of surgical intervention, it has been reasoned that the phenomenon is affected by surgical technique.^[24] Secondary PTH, on the other hand, reflects the loss of protective scab from the site, damage incurred by eating hard food, infection at the base of where the tonsil used to be, use of NSAIDs after surgery, or it may have an unknown etiology.^[6,11,12,25] Numerous reports indicate that, whilst secondary PTH may happen between one day and one month post-surgery, it tends to happen within the first seven days.^[10,25,26] Achar and colleagues^[25] observed that the mean and mode for secondary PTH were day 7 post-operation. In our study, PTH was seen on days 2 to 15 in the pediatric cases, and on days 2 to 10 in the adults. The most frequent values for pediatric cases were days 9 and 10, and day 5 was most common for the adults. This difference was confirmed to be real by statistical analysis ($p < 0.05$). Blood transfusions were given to 6 children and one adult in our sample. However, whilst blood transfusion was more common for children than adults in our sample, this was not a statistically significant result ($p > 0.05$).

It has already been reported in the literature that age, sex, surgical approach and equipment plus reason for surgery all predict risk of PTH.^[11,23] Tomkinson et al. conducted a large prospective study of observational type across many settings, involving some 17,480 patients, from which it was calculated that being older than 12 years of age increased the risk of severe PTH by a factor of 3.^[27] A number of studies have claimed that male sex increases the possibility of PTH,^[13,15,27,28] but others have denied such an association exists.^[13,15,17,27-30] Our findings do not support a difference in risk of PTH between boys and girls, but men seemed more prone to the condition in our sample. The difference, however, was not at the level of statistical significance ($p > 0.05$).

Some researchers have discovered an association between the reason for tonsillectomy and the likelihood of PTH.^[1] For adults, recurrent or chronic tonsillitis is the usual indication for tonsillectomy, whereas the usual indications in pediatric cases were either hypertrophied tonsils or recurrent tonsillitis.^[4,23] Arora and colleagues^[23] failed to identify

an association between reason for surgery and subsequent risk of PTH. For our sample, children had tonsillectomy most often for either recurrent tonsillitis or hypertrophied tonsils (as expected), whilst the adults' main indication was tonsillar hypertrophy. All our adult cases underwent tonsillectomy, but only 25.9% of the children did. This difference was confirmed to be statistically significant ($p < 0.05$). A number of surgical techniques can be employed to carry out tonsillectomy, including use of a guillotine, cold steel, dissecting blindly, diathermy (both mono- and bi-polar types), laser-assisted, using the harmonic scalpel, cold ablation or microdebridement. It has been established that different methods carry variable risks of subsequent PTH.^[6,11,13,25,27,31] Despite the many choices, the rate of PTH still remains in the range 0.28 to 20%.^[6] Maniglia and colleagues^[32] found a rate of 0.28%, representing 4 instances of PTH (2 primary and 2 secondary), in a group of 1428 patients who each underwent cold steel tonsillectomy using bismuth subgallate for haemostatic control. Weirmert et al.^[33] compared tonsillectomy done with either the conventional scalpel or diathermy. They found that dissecting with diathermy was quicker, resulted in less bleeding and had a significantly lower associated rate of primary PTH, the biggest reason for death after tonsillectomy. Galabski et al.^[34] examined 534 case records from a retrospective perspective, observing when PTH occurred. They stated that PTH occurred in 0.37% of cases if criteria similar to those used by Maniglia et al.^[32] were followed. Lee et al.^[22] looked at how PTH rates differed depending on whether cold steel or diathermy were used for tonsillectomy. Where bipolar diathermy was used, the rates for primary and secondary PTH were 0.5 and 12%, respectively. The corresponding figures for cold steel were 0% (primary PTH) and 5.5% (secondary PTH). Ulualp^[6] gave a rate of 1.1% for patients returning to hospital with PTH in a series of 994 patients whose tonsillectomy involved bipolar cautery assisted by the operating microscope. The hemorrhage was managed in theatre under a general anesthetic. Amir et al.^[35] contrasted two surgical methods: in 2069 cases cold ablation was used, whilst on 472 other cases dissection was done with cold steel but bleeding controlled with

bipolar diathermy. There was no difference statistically, regardless of whether primary or secondary PTH was taken as outcome measure. For our cases, cold steel was used throughout, leading to results resembling those of Lee and colleagues.^[22]

There are reports in the literature suggesting that outpatient follow-up may be appropriate for cases of tonsillectomy or adenotonsillectomy, discharge from hospital being after a 6 to 8 hour observation period.^[34,36] In our research, 88.9% of the pediatric patients and 91.3% of the adult patients were discharged within 24 hours of tonsillectomy and followed up as outpatients afterwards. However, following PTH, 51.9% of pediatric and 69.6% of adult patients were hospitalized for more than 48 hours. PTH lengthens hospitalization and incurs higher costs. However the apparent difference in hospitalization between the groups in our study was not statistically significant ($p > 0.05$).

The present study suffers from the same limitations as other studies that have a retrospective design and lack a suitable randomized control group. Furthermore, it was impossible to quantify the extent of blood loss. This research did not address potential post-operative risk factors such as pyrexia or hypertension. No comparison with other operative techniques was possible.

To conclude, in this study, the rate of PTH was 5.6%. The majority of instances of PTH involved secondary hemorrhage on day 5 or day 10 of the postoperative period. Primary hemorrhage was not encountered. Pediatric and adult patients suffered similar rates of PTH. PTH was observed at an earlier postoperative stage in adults than in children. Advice to patients regarding the possibility of PTH should bear this timing in mind.

Ethical approval: The study adhered in all aspects to the ethical research criteria established by the ethics committee of the relevant institution (Firat University). The research was in full accordance with the 1964 Helsinki Declaration, its subsequent amendments and the standards presupposed by similar research guidance. Since the methodology was retrospective, obtaining formal consent was not a requirement.

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