Intensity of hemorrhage following tonsillectomy

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Introduction

In the literature, the data on the incidence of post-tonsillectomy hemorrhage are often conflicting. Over the years, the incidence of post-tonsillectomy hemorrhage has been reported from less than 1% to more than 10%. Some authors record only bleeding requiring hemostasis under general anesthesia, others include each bleeding event and recognise two \(^1\) or three categories of bleeding \(^2\) depending on the demand for treatment to achieve hemostasis. Up to the present day, there has been no universally accepted classification of post-tonsillectomy hemorrhage intensity. The five-grade classification of bleeding following tonsillectomy proposed by Windfuhr and Seehafer \(^3\) records each bleeding event depending on the applied technique to accomplish hemostasis and blood transfusion. The aim of the study was to assess intensity and timing of post-tonsillectomy hemorrhage.

Methods

This prospective study was conducted in the Ear, Nose and Throat (ENT) Department, University Hospital “Zvezdara” in Belgrade, during one year. The study included 408 consecutive patients (children and adults) undergoing elective bilateral tonsillectomy. Inclusion criteria were history of recurrent acute tonsillitis, chronic tonsillitis, quinsy,..
and hypertrophy of the tonsils (airway obstruction with sleep-disordered breathing and/or dysphagia). Exclusion criteria were personal or family history of bleeding disorder, unilateral tonsillectomy for suspected malignancy, tonsillectomy as a part of uvlulopalatopharyngoplastica, and acute quinsy and infective mononucleosis. Tonsillectomy was performed by five ENT consultants and three residents. All of them used the same technique for tonsil removal and hemostasis.

Tonsillectomy was performed under endotracheal anesthesia using cold steel dissection with snare, and bipolar diathermy for hemostasis. Pre-operative assessment of the patients included a complete blood count and bleeding time. Post-operative antibiotics were given for one week. All the patients had been admitted one day before and discharged on the third postoperative day. Traditionally, patients have to drink liquid two hours after procedure, and if it is possible, they are allowed to eat soft food. At the time of discharge, all the patients were scheduled to return for a routine follow-up appointment, one, two, four and six weeks following surgery, and all were placed on similar dietary and activity restrictions and given instructions to return immediately in the hospital if any bleeding occurred at home. With this close supervision of the cases, both in the hospital and after discharge, the statistics given in this paper appear reliable.

The main outcome measure was the occurrence of any post-operative bleeding noted by the patients, parents or the staff. Primary and secondary bleeding events were recorded regardless of the severity or measures needed for their treatment and blood transfusion. In addition, patients’ age and gender were recorded.

According to the criteria proposed by Windfuhr and Seehafer 3, the intensity of post-tonsillectomy hemorrhage was classified in grade 1 (stopped spontaneously or after clot removal), grade 2 (infiltration of local anesthetic necessary), grade 3 (treatment in general endotracheal anesthesia), grade 4 (ligature of the external carotid artery) and grade 5 (in case of lethal outcome). Primary hemorrhage following tonsillectomy was defined as any bleeding event occurring within the first 24 h after the operation. Secondary bleeding was defined as the reporting of any bleeding between 24 h and six weeks after the procedure. Primary and secondary post-operative bleeding events were grouped into five categories based on medical treatment used for achieving hemostasis.

Medical records data were entered into a computer spreadsheet program for statistical analysis. The \( \chi^2 \)-test, Mann-Whitney, and Fisher test were used to compare the groups to determine the presence of a statistically significant difference, taken as \( p < 0.05 \). Statistical analysis was performed by the IMSL routines for statistical analysis (IMSL Inc, 1989).

### Results

During a one-year study period, 408 patients, aged from 2 to 54 years (mean ± SD; 13 ± 10 years), underwent tonsillectomy, with \( n = 261 \) or without \( n = 147 \) adenoidectomy, in the ENT Department of the University Hospital “Zvezdara”. There were significantly more patients who underwent tonsillectomy with adenoidectomy (\( \chi^2 \) test, \( p = 0.00 \)). This study included significantly (\( \chi^2 \) test, \( p = 0.00 \)) more children \( n = 266 \) than adults \( n = 142 \). The difference between the number of females \( n = 196 \) and males \( n = 212 \) was not significant (\( \chi^2 \) test, \( p = 0.428 \)). In this study, males \( \bar{X} \pm SD; 11 ± 9 \) years were significantly younger (Mann-Whitney test, \( p = 1.2 \times 10^{-5} \)) than females \( \bar{X} ± SD; 16 ± 11 \) years.

The frequency of post-tonsillectomy hemorrhage in 408 patients according to the grade and timing of bleeding is shown in Table 1. Eleven patients had grade 1, four patients had grade 2 and two patients had grade 3 of post-operative bleeding. No ligature of the external carotid artery (grade 4) was recorded. In addition, there was no case with lethal outcome (grade 5) following tonsillectomy and no patient received blood transfusion.

Post-tonsillectomy hemorrhage was primary in 2.70% of the patients occurring between 3 and 13 hours (mean ± SD; 6 ± 3 h) after the surgery. Sixty four per cent of the patients bled during the first 6 after surgery and 82% of the patients had post-operative bleeding during 8 h after the surgery. Secondary hemorrhage was recorded in 1.47% of the patients and it occurred between the first and seventh postoperative day (mean ± SD; 5 ± 2 days). The difference in the frequency between primary (65%) and secondary bleeding (35%) did not reach a statistical significance (\( \chi^2 \) test, \( p = 0.220 \)).

The overall hemorrhage rate was 4.17% (17/408). The patients who experienced post-tonsillectomy bleeding were aged between 4 and 40 years (mean ± SD; 23 ± 2 years). Bleeding was recorded in 3.06% (6/196) of females and 5.19% (11/212) of the males with no significant difference (\( \chi^2 \) test, \( p = 0.283 \)). The overall frequency of bleeding in the adult patients (14/142; 9.86%) was statistically significantly higher (\( \chi^2 \) test, \( p = 2.7 \times 10^{-5} \)) than the frequency of bleeding in children (3/266; 1.13%). In addition, the overall frequency of bleeding in the group of patients who underwent tonsil-

### Table 1

<table>
<thead>
<tr>
<th>Bleeding grade</th>
<th>Primary bleeding [n (%)]</th>
<th>Secondary bleeding [n (%)]</th>
<th>Total [n (%)]</th>
</tr>
</thead>
<tbody>
<tr>
<td>1°</td>
<td>6 (1.47)</td>
<td>5 (1.23)</td>
<td>11 (2.70)</td>
</tr>
<tr>
<td>2°</td>
<td>3 (0.74)</td>
<td>1 (0.25)</td>
<td>4 (0.98)</td>
</tr>
<tr>
<td>3°</td>
<td>2 (0.49)</td>
<td>0</td>
<td>2 (0.49)</td>
</tr>
<tr>
<td>4°</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5°</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>11 (2.70)</td>
<td>6 (1.47)</td>
<td>17 (4.17)</td>
</tr>
</tbody>
</table>

lectomy without adenoidectomy (14/147; 9.52%) was statistically significantly higher (χ² test, \( p = 1.4 \times 10^{-4} \)) than the frequency of bleeding in the group of patients who underwent tonsillectomy with adenoidectomy (3/261; 1.15%).

The comparison of post-tonsillectomy bleeding rates obtained in the this study and the study performed by Windfuhr and Seehafer (Table 2) showed no significant difference for grade 1, grade 2 and grade 4 bleeding. The difference between the two studies in hemorrhage rate for grade 3 and overall incidence of post-tonsillectomy bleeding were significant.

Table 2

<table>
<thead>
<tr>
<th>Bleeding grade</th>
<th>Present study</th>
<th>Windfuhr/Seehafer study</th>
<th>Test, ( p )-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1°</td>
<td>11/408 (2.70)</td>
<td>21/602 (3.49)</td>
<td>( \chi^2, p = 0.481 )</td>
</tr>
<tr>
<td>2°</td>
<td>4/408 (0.98)</td>
<td>1/602 (0.17)</td>
<td>( \chi^2, p = 0.176 )</td>
</tr>
<tr>
<td>3°</td>
<td>2/408 (0.39)</td>
<td>14/602 (2.33)</td>
<td>( \chi^2, p = 0.042 )</td>
</tr>
<tr>
<td>4°</td>
<td>0</td>
<td>2/602 (0.33)</td>
<td>Fisher, ( p = 0.355 )</td>
</tr>
<tr>
<td>5°</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Blood transfusion</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>17/408 (4.17)</td>
<td>38/602 (6.31)</td>
<td>( \chi^2, p = 0.140 )</td>
</tr>
</tbody>
</table>

**Discussion**

Low overall incidence of post-operative bleeding (4.2%) in the present study confirms that tonsillectomy continues to be a very secure surgical procedure. Although post-tonsillectomy hemorrhage could be serious and life-threatening, most often it does not require any medical treatment. Usually the removal of a coagulum and infiltration of the tonsillar fossa with local anesthetic are sufficient to stop bleeding. The procedure under endotracheal anesthesia (0.4%) is rarely necessary for achieving hemostasis and blood transfusion.

The overall incidence of postoperative hemorrhage of 4.2% reported in this study appears similar to the rates described in recently published papers on cold dissection tonsillectomy in non-selected patients 3-9. In the literature, there is no agreement on the definition of significant or major bleeding, and consequently no uniform method for quantifying hemorrhage following tonsillectomy exists. As a result, some authors count all bleeding events and therefore report higher hemorrhage rates than do authors who include only hemorrhages requiring surgical intervention. Some authors classify posttonsillectomy bleedings in two 1 or three grades 2 depending on the need for surgical treatment in general anesthesia to achieve hemostasis. The advantage of generally accepted classification would include a direct comparison between two studies or different techniques and reliable evaluation of a very rare case of severe post-tonsillectomy bleeding with lethal outcome.

In case of post-operative bleeding, effort has to be made to avoid treatment under second general anesthesia. Bleeding requiring no procedure under general anesthesia can be minimal and stop spontaneously without any medical treatment or after clot removal. In addition, infiltration of tonsil fossa with local anesthetics is often sufficient for bleeding control. The management of more severe bleeding requires a procedure in general anesthesia including bipolar diathermy or suture ligation with or without blood transfusion. Rarely severe bleeding could not be sufficiently controlled by these procedures and multiply blood transfusion, arteriography, embolisation and/or ligation of external carotid artery could be necessary. Bleeding events with lethal outcome still exist although very rarely, or maybe their incidence could be underestimated.

Classification of postoperative hemorrhage includes five types of bleeding events according to medical treatment requiring to achieve hemostasis and blood transfusion. It allows us a detailed analysis of this unpredictable and potentially life-threatening complication and a direct comparison of different studies. In a one-year retrospective study of cold dissection tonsillectomy with suture ligation hemostasis, Windfuhr and Seehafer 5 recorded bledding grade 1, grade 2, grade 3 and grade 4 in 3.49%, 0.17%, 0.33% and 0.33% of 602 non-selected patients, respectively. One patient received blood transfusion and no bleeding with lethal outcome was recorded. The comparison between the study Windfuhr and Seehafer and our study points out a very similar post-tonsillectomy bleeding rate except for grade 3 bleeding, which was slightly lower in our study. In our experience, the five-grade classification of post-tonsillectomy hemorrhage is clear-cut and very helpful. It allows us a reliable comparison of different studies or techniques and helps us to improve preoperative and postoperative management as well as technique of tonsillectomy and hemostasis.

The cause of primary bleeding is generally acknowledged to be inadequate hemostasis during the procedure. Although the cause of secondary bleeding is less certain, the sloughing of the superficial eschar from the tonsillar fossa is believed to be the inciting event. No agreement on primary and secondary bleeding incidence exists. Some studies reported a higher rate of primary hemorrhage 1, but some articles cite a lower rate of primary bleeding and describe the rate of secondary hemorrhage as low and stable 4-9. The differences seem to be a consequence of no universally accepted definition of bleeding and classification scheme. In the present study, the overall rate of primary bleeding was higher than the rate of secondary bleeding. This is consistent with the findings of a recent study 3.

According to recently published studies, the technique of hemostasis 4, quinsy tonsillectomy 5-9 and the surgeon experience 7 have no significant influence on bleeding inci-
The bleeding rate seems to be somewhat higher among older patients and males. In present study, no significant difference in post-tonsillectomy bleeding rate between females and males was found. Older patients and patients with tonsillectomy without adenoidectomy bled significantly more often than younger patients and patients with the tonsillectomy with adenoidectomy, which is consistent with results of previous studies.

Usually, authors do not report data on post-operative diet and the length of refrain from drinking and eating. Early return to normal diet with liquid and soft food is important to avoid dehydration and, probably, to improve healing of tonsillar bed. In our Department, traditional post-operative diet includes cold liquid intake 2 hours post-tonsillectomy while Windfuhr and Seehafer's study protocol delays liquid intake for 6 hours. The post-tonsillectomy healing process is characterized by a reactive inflammation with healing by second intention and the role of post-operative diet in healing tonsillar bed remains unclear.

**Conclusion**

Post-tonsillectomy hemorrhage can be expected in a small number of patients undergoing tonsillectomy. Hemorrhage is mostly primary and rarely requires treatment under endotracheal anesthesia. Any tonsillar bleeding is significant, but those requiring operative intervention to arrest hemorrhage are by their nature more serious.

**REFERENCES**


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