

Are Intravenous Antibiotics Routinely Indicated in the Management of Secondary Post Tonsillectomy Haemorrhage?

Abstract

Objective: To review secondary posttonsillectomy hemorrhage (SPTH) patients in our unit, assess them for evidence of infection and make recommendations about the routine use of intravenous (iv) antibiotics. **Methods:** Retrospective review of our departmental tonsillectomy database over 3 consecutive years. Inflammatory markers, temperature, and throat swab results were analyzed. **Results:** 3160 tonsillectomies were performed; 1856 on children. The patient's age range 273 years. One hundred and twenty-three SPTH cases were recorded (3.9% rate), with a slight female preponderance (61%). All received broad-spectrum IV antibiotics. Twenty percent of SPTH presented on the 5th postoperative day (range days 227). Eighty-four-and-a-half percent of patients had no clinical or laboratory evidence of infection. Nineteen (15.5%) patients had elevated C reactive protein, white cell count, and neutrophils. Forty patients had throat swabs performed with no pathogens isolated. **Conclusions:** Clinical signs of infection are uncommon in SPTH. The decision to use iv antibiotics in SPTH should be on an individual basis, guided by clinical and laboratory findings.

Keywords: C reactive protein, postoperative bleed, posttonsillectomy hemorrhage, secondary bleed, tonsillectomy

Introduction

Tonsillectomy was first described in Hindu medicine ~1000 BC and has become one of the most commonly performed surgeries worldwide. In Ireland, 3737 tonsillectomies were performed in the public sector in the year 2011, with 23.2% of these being performed in the west of the country.^[1,2] Being a “common” procedure, the public often perceives tonsillectomy as routine surgery with little risk. However, significant complications may occur. Hemorrhage is the most feared complication, potentially life-threatening.^[3]

Tonsillectomy is the surgical excision of the entire tonsil and its capsule. When the majority of the tonsil tissue is removed, leaving the capsule *in situ*, the procedure is called a tonsillotomy. Tonsillectomy can be performed via a variety of cold or hot techniques (scissors, dissector, microdebrider; mono/bipolar diathermy, coblation, harmonic scalpel, respectively).

Primary hemorrhages occur in the first 24 postoperative hours, while secondary hemorrhages (SPTH) occur beyond 24 h.

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Secondary hemorrhage is more frequent and occurs in 3-20% of patients.^[3] Both primary and secondary hemorrhages occur less frequently posttonsillotomy.^[4-6] Because the surgical site is in the oropharynx with a plentiful blood supply, upper airway compromise, and hypovolemic shock are significant complications, particularly in small children. The approximate mortality rate of SPTH is 1 in 40,000.^[7,8] Therefore, it is not surprising that clinicians are continuously searching for a causative factor in SPTH to appropriately manage and, more importantly, to prevent this complication.

Our objective was to look for signs of infection as a causative factor in patients presenting with SPTH. We make evidence-based recommendations regarding the use of antibiotics.

Materials and Methods

Our otorhinolaryngology (ORL) department is a tertiary referral center for adult and pediatric patients in the west of Ireland. We retrospectively reviewed our departmental

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tonsillectomy database for SPTH presentations over 3 consecutive years (2017-2019).

The Hospital Research Committee granted ethical approval for our retrospective cohort study.

Tonsillectomy was performed under general anesthesia by cold steel dissection with ties (2-0 Ethicon PERMA-HAND Silk Suture tie, Ethicon US, LLC) or localized used of bipolar diathermy (ERBE VIO 300d, ERBE Elektromedizin GmbH, Tübingen, Germany) for hemostasis. No perioperative antibiotics were administered. All patients who underwent tonsillectomy were admitted overnight. Standard analgesia (paracetamol and a nonsteroidal anti-inflammatory drug [NSAID]) was prescribed to all patients on discharge, but no antibiotics. All patients were issued typed postoperative instructions on discharge.

On presentation with SPTH, each patient was reviewed by the ORL specialist following initial stabilization in the emergency department. All were admitted for at least 24 h of observation or, if indicated, transferred to the operating theater for SPTH arrest. Treatment with intravenous (iv) antibiotics was initiated for all patients as per acute tonsillitis protocol. Amoxicillin/clavulanic acid was used unless the patient was allergic to penicillin, in which case clarithromycin or clindamycin was prescribed. Our standard regime of regular analgesia consisting of paracetamol and an NSAID, with a per-request, *pro re nata* morphine-based product, was started in all cases. Tranexamic acid was only prescribed to patients with a second presentation of SPTH.

Patients were included in our study if:

- They had a tonsillectomy performed in our department during the years 2017-2019;
- The indication for surgery was recurrent acute tonsillitis;
- They had the initial surgery performed in other hospitals but presented with SPTH at our institution;
- They presented with SPTH (with or without evidence of active bleeding);
- Their SPTH was managed conservatively or surgically;
- Their complete medical records were available.

Patient's demographics, hemoglobin levels (Hb), coagulation screens, inflammatory markers (C reactive protein [CRP], white cell count [WCC], and neutrophils), temperature, and throat swab results were analyzed. Screening for further coagulopathy was only performed at a second presentation with SPTH. The temperature recorded in the patients' observation charts from admission to discharge was reviewed. Pyrexia was defined as a temperature of over 38°C. Throat swabs for culture and sensitivity were not routinely performed; however, retrospectively, we decided to include this parameter in our analysis to provide important information. Throat swabs were taken, before antibiotic therapy, from patients presenting with SPTH who consented to and could tolerate a tonsil swab.

Data analysis was performed using Minitab 17 (Minitab LLC, Pennsylvania, USA).

Results

During the 3-year study period, 3160 tonsillectomies were performed in our department, 1856 (58.7%) of which were on pediatric patients (0-16 years). The patients' age range was 2–73 years of age, with a mean of 15 years.

One hundred and 23 patients were admitted with SPTH, representing a rate of 3.9%. The majority (97%) of patients presented within 14 days of tonsillectomy, with one patient presenting on the 27th day. Day 5 postsurgery was the most common day for presentation (25 patients). Table 1 describes the relevant details.

SPTH occurred in 73 females (59.3%) and 50 males (40.6%). Sixty-four children (52%) and 59 adults (48%) had SPTH. A quarter of our patients (30 cases) presented from November to February, while 43% of them (53 cases) presented from May to August.

The majority of patients (76%) presented during nighttime hours (8 p.m. to 8 a.m.). The vast majority (90%) of them had significant pain and a reduced diet due to odynophagia.

All SPTH patients were admitted for at least 24 h of observation or surgical treatment, depending on their clinical scenario. Twenty-one cases (17%) required the operating theater for SPTH arrest. The majority (94%) of patients were admitted for 24-48 h. Six percent were admitted for 2-5 days.

All patients received intravenous (iv) antibiotics and regular analgesia.

Eighty-four-and-a-half percent of patients had no clinical or laboratory evidence of infection. Nineteen (15.5%) had elevated CRP, WCC, and neutrophils. Details are provided in Table 2.

Forty patients (32.5%) had tonsil fossae swabs performed. No bacterial pathogens were reported on any swab. All patients were afebrile during their admission.

All patients' Hb levels were measured. The median value was 12.7g/dL (grams per decilitre), with a minimum of 7.8 and a maximum of 17. One patient required blood transfusion.

Ten patients (8%) presented with SPTH on two separate occasions. Eight were adults (six males and two females)

Table 1: Secondary posttonsillectomy haemorrhage presentation day in numbers and percentage

SPTH Day of presentation	Patients, n (%)
2–13	119 (96.75)
14	3 (2.4)
27	1 (0.8)

SPTH: Secondary posttonsillectomy haemorrhage

Table 2: Inflammatory markers results of our population and their normal range

Inflammatory markers	Normal range	Normal results patients (%)	Elevated results patients (%)	No blood results recorded patients (%)
WCC (mg/L)	4–10	71	28	2
Neutrophils ($\times 10^9/L$)	2–7	72	24	4
CRP (mg/L)	0–5	28	57	15

WCC: White cell count, CRP: C reactive protein

and two were pediatric females. All presented within 14 days from their surgery. A single patient had all three inflammatory markers mildly elevated. Four of these patients were diagnosed with bleeding disorders following hematology assessment. Two children (siblings) were diagnosed with congenital platelet storage pool deficiency. One adult and one child were diagnosed with Von Willebrand disease.

Discussion

Our SPTH rate (3.9%) is comparable to other Irish studies, showing rates of 3.6% to 6.6%.^[3] International SPTH rates vary widely (3–20%). It is challenging to compare SPTH rates between studies, as the definition of SPTH varies among institutions.

In our hospital, any patient presenting with a history of SPTH was admitted, even if there was no clinical evidence of active/past hemorrhage on oropharyngeal examination or hemodynamic parameters. Our SPTH management strategy is to admit the patient, keep them nil per mouth, optimize analgesia and start iv antibiotics along with various other treatments, for example, iv fluids or hydrogen peroxide gargles. It is not our departmental protocol to routinely use tranexamic acid for every patient, but only for the patients with the second presentation of SPTH. We do not routinely perform tonsil fossae swabs. However, 40 patients were swabbed on admission.

In our population, females had a slightly increased incidence of bleeding (61%) compared to males. Although most previous studies have found a male preponderance, a few other studies have demonstrated a female preponderance.^[9]

Some studies have suggested that the time of day or night might influence bleeding, with nighttime being the most common time for this presentation.^[10] Even a seasonal variation was observed by some studies, with an increased risk of SPTH in the winter months.^[11,12] Almost half of the SPTH (43%) in our study presented in the summer months. It is not clear the significance of this finding considering that in Ireland, particularly in Galway, the weather is temperate and not substantially different between the seasons.

Inflammatory markers are used by clinicians to assess for infection or inflammation. A single test is not helpful; however, the variation of tests over time can guide clinicians toward a diagnosis and help them assess

treatment progress. CRP is an acute-phase protein produced by the liver and found in the blood. Its levels rise in response to acute inflammation or infection, and, in serial measurements, it is a guide to treatment response. Table 3 shows the clinical correlation of elevated levels of CRP.^[13] CRP levels are often mildly elevated following surgery.^[14] Patients presenting with SPTH are frequently treated with antibiotics to target a presumed infection, regardless of their CRP values.^[7]

The appearance of the tonsil fossa is at best subjective. A layer of superficial slough representing inflammation, granulation tissue, or even halitosis can give the false impression of infection. Although together, WCC and neutrophils are markers of bacterial infection, they rise and fall slightly separately during the infection process. A left shift (increased neutrophil count) does not occur in the very early or late phase of infection.^[15,16]

Postoperative antibiotics have not been shown to decrease SPTH.^[7,17–21] Increasing the length of hospital stay was not found to be beneficial, as the majority of SPTH occur more than three days postoperatively.^[22–24] A number of studies have investigated the link between SPTH and infection at the surgical site by analyzing the WCC, CRP, neutrophils, and body temperature, but no correlation has been found.^[25–27] Localized tissue necrosis was felt to be a better explanation for the SPTH rather than infection.^[28] However, Stephens *et al.*, in a small number study, swabbed the tonsils preoperatively and did find a positive relationship between bacterial colonization and SPTH.^[29] Persistence of pathogens in colonized throats was found to be present for up to 1 year, especially in young adults.^[30]

WCC, CRP, and neutrophils were raised in 15.5% of our patients. All patients were afebrile on admission, and no tonsil swabs grew pathogens. Our results align with other studies that have found that infection does not play a significant role in SPTH, and the postoperative prescribing of antibiotics does not reduce the SPTH rate.^[7,25–32] No evidence of infection was recorded in 84.5% of patients. It would be challenging to justify prescribing antibiotics on review of this data.

All SPTH patients experienced pain,odynophagia, and poor oral intake. In our department, all patients were told to expect increased pain on postoperative days 5–7 and regarding the appearance and color change of their tonsil fossae. As every individual's tolerance to pain is different, there is no guarantee that every patient followed our

Table 3: Comparison of secondary posttonsillectomy hemorrhage rates of different surgical techniques by different studies

Bleeding rate of surgical techniques (study)	Cold steel (%)	Coblation (%)	Bipolar (%)	Ultrascissor (%)
Lane 2016 ^[9]	-	58.9	23.3	-
Elinder 2016 ^[10]	0.52	-	1.91	-
Basu 2019 ^[13]	-	7.8	-	1.5
McCoy 2020 ^[14]	-	2.7	2.7	-
Gendy 2005 ^[3]	1	-	2.3	-
Soderman 2015 ^[11]	1	3.2	4.28	5.63

Table 4: C reactive protein levels and its clinical correlation

Elevated CRP level (mg/L)	Correspondence	Indicative of
10–60 (mild)	Mild inflammation	Viral infection
60–100 (moderate)	Active inflammation	Bacterial infection
>200 (severe)		Severe bacterial infection

CRP: C reactive protein

posttonsillectomy analgesia regime. When patients present to their GPs with pain or poor oral intake, they are often prescribed antibiotics for their “infected-appearing” tonsil fossae. This should be discouraged in the absence of clinical signs of infection. The risk of adverse effects, such as allergic reactions, skin rashes, and diarrhea, must be considered before prescribing antibiotics. Multiple studies have made the same recommendations.^[31-33] Antibiotics must be used rationally, given increasing antimicrobial resistance.

With regards to surgical technique, cold steel tonsillectomy has consistently been found to cause the lowest rate of bleeding when compared to the hot methods. Table 4 presents a comparison of techniques.^[3,9,34-40]

It is estimated that approximately 2% of patients presenting with SPTH have undiagnosed bleeding disorders. Tonsillectomy is the first bleeding challenge many patients have encountered.^[41,42] Preoperative screening for bleeding disorders in patients with no personal or family history of prolonged bleeding it is not routinely undertaken.^[43,44] It becomes essential in patients presenting with multiple instances of SPTH.^[21] Notably, Von Willebrand disease is the most common bleeding disorder diagnosed in patients with SPTH.^[42,45] Thirty-three per cent of the Irish population diagnosed with Von Willebrand disease are children, 17% of whom are aged 4–13 years.^[46]

However, we have previously looked at our tonsillectomy patients’ quality-of-life issues. We have seen a significant improvement in quality of life in the first 6 months following surgery.^[47] We recommend tonsillectomy in cases fulfilling the surgical criteria while emphasizing adequate support postoperative exists for complications such as SPTH, pain, nausea, and vomiting.

Limitations

Retrospective studies have inferior levels of evidence (Level 3) compared to prospective studies; they are observational rather than of proven statistical significance. Our data extend over a 3-year period. There was no record-keeping designed for our study, and, as such, there were gaps in data collection. It was impossible to retrospectively control these biases. Our study was not a population-based one, which makes our results observations.

Conclusions

Despite a low SPTH rate (3.9%), this persistently represents a significant postsurgical tonsillectomy risk. Etiology continues to be elusive.

Eighty-four-and-a-half percent of patients with SPTH had no clinical signs of bacterial infection. We do not recommend the routine use of broad-spectrum antibiotics for patients presenting with SPTH. Antibiotics should be prescribed if the infection is clinically suspected, i.e., raised of all inflammatory markers associated or not with pyrexia.

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Conflicts of interest

There are no conflicts of interest.

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