Post-tonsillectomy haemorrhage rates at Nelson Hospital

Ahmed Sherif

Abstract
Removal of the tonsils and adenoids are common procedures performed across the globe. While the number of operations have been decreasing steadily over the past several decades, tonsillectomy remains the second most common day case surgery in the paediatric population. Although considered safe, tonsillectomy can manifest complications including nausea, pain, and difficulty eating. The most significant complication following surgical removal of the tonsils is post-tonsillectomy haemorrhage (PTH), which can develop immediately post-operatively or up to two weeks from the procedure. Clinical practice guidelines advocate the need for annual audits in centres where tonsillectomies are performed to ensure PTH rates are similar to international figures. We have investigated the complication of bleeding following patients undergoing tonsillectomy, adenoidectomy, or adenotonsillectomy in Nelson to assess PTH rates.

Introduction
Removal of the tonsils is a common procedure performed across the globe. While the number of operations has been decreasing steadily over the past several decades, tonsillectomy remains the second commonest day case surgery in the paediatric population. Although considered safe, tonsillectomy can manifest complications including nausea, pain, and difficulty eating. The most significant complication following surgical removal of the tonsils is post-tonsillectomy haemorrhage (PTH), which can develop immediately post-operatively or up to two weeks after the procedure. Clinical practice guidelines advocate the need for annual audits in centres where tonsillectomies are performed to ensure PTH rates are similar to international figures.

A 2017 meta-analysis of 87 studies from January 1980 to June 2016 by Francis et al. showed that the rate of PTH was roughly 4% following tonsillectomy in the paediatric population. Primary PTH, defined as bleeding within 24 hours of tonsillectomy, made up approximately 12% of all PTH. Secondary PTH, defined as occurring more than 24 hours following tonsillectomy, made up 63% with the remaining PTH unclassified in timing – either primary or secondary. Additionally, the analysis reports similar incidences of PTH amongst different operating techniques including cold dissection, electrocautery and coblation.

When reviewing New Zealand figures, a 2019 retrospective study of 2177 Auckland paediatric patients undergoing tonsillectomy alone or tonsillectomy with an additional procedure (e.g. adenoidectomy, inferior turbinate cautery etc.) revealed a PTH rate of 3.6%. The average time from surgery to PTH occurrence was 6.6 ± 3 days, with 99% of bleeds occurring within the first two weeks of operation.

We have investigated the complication of bleeding following patients undergoing tonsillectomy or adenotonsillectomy in Nelson to assess PTH rates within two weeks of their operation.

Methods
DESIGN/SETTING
The audit was conducted at Nelson Hospital, a 180-bed secondary-level hospital in New Zealand. Consistent with the methods used in audits conducted in Australasia, we retrospectively reviewed the clinical information of patients of all ages (adult and paediatric) who underwent tonsillectomy or adenotonsillectomy between 1 January 2019 and 31 December 2019. Ethics approval was not required, in accordance with National Ethics Committee guidelines for quality improvement projects.

Results
PATIENT CHARACTERISTICS
Our audit included 133 patients who were operated on at Nelson Hospital and 35 patients operated on at Manuka Street Hospital (Table 1). Overall, there was a fairly even split between female and male patients. In the paediatric population (<18), the ratio of female to male patients was 0.9:1. In the adult population, the ratio was 5.2:1 (Figure 1). The most common age group undergoing surgery was the five to nine year-old group. The mean patient age was 14 years old. The youngest patient in our cohort was two years old while the oldest was 70 years old (Figure 1).

<table>
<thead>
<tr>
<th>Hospital</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nelson Hospital</td>
<td>94</td>
</tr>
<tr>
<td>Manuka Street Hospital</td>
<td>74</td>
</tr>
<tr>
<td>Total</td>
<td>168</td>
</tr>
</tbody>
</table>

Table 1: Operation performed at Nelson Hospital and Manuka Street Hospital

![Figure 1: Nelson Hospital patients stratified by age and gender](image)

All patient bleeds presented to Nelson Hospital or Wairau Hospital Emergency Department (ED), irrespective of whether the operation was done privately or publicly. The characteristics of the 35 patients operated on privately at Manuka Street Hospital were not...
available to us due to confidentiality policies. However, Manuka Street Hospital cases were still included in the audit.

**POST-OPERATIVE PRESENTATION**

Within two weeks of their operation, 30 patients out of the total 168 cases (18%) presented to Nelson or Wairau Hospital ED (Figure 2). Over half of these were caused by haemorrhage, and four cases attributed to sore throat, fever and acute pharyngitis. A significant number of patients (9) had an unspecified diagnosis (Figure 2).

Seventeen patients out of the total 168 cases (10%) presented to the ED within two weeks due to bleeding (Figure 2). All of these patients were considered to have secondary bleeding, as the bleed occurred after 24 hours post-operatively. The red dashed line denotes the point at which secondary bleeds occur. The average time from surgery to bleed occurrence was 7.1 days for the total population, 6.8 days for the adult population and 7.5 days for the paediatric population (Figure 3).

Patients who underwent tonsillectomy alone made up the significant majority of those presenting to the ED with bleeding (Figure 4). The incidence of bleeds within two weeks following tonsil removal at Nelson was 10.1% (Figure 2). Bipolar dissection alone had the highest rates of associated bleeding with 30.8%. Despite being the second commonest method of tonsillectomy at 57 procedures, coblation had one of the lowest rates of bleeding with 5.3% (Table 2).

Female presentation to the ED due to bleeding was almost double that of males. Additionally, it appears that up until adolescence, males and females are equally represented in patients presenting with post-tonsillectomy bleeding. After this point, female patients are disproportionately presenting. The mean age of presentation with a bleed was 26 years old. When considering our paediatric population, eight patients presented with bleeding. The total number of paediatric cases performed was 134 which decreases the incidence of bleeding to 6% in the paediatric population (Figure 5).

All patients who presented to Nelson and Wairau ED with bleeding were admitted onto the Ear Nose and Throat (ENT) ward and observed overnight. Around two thirds were managed medically (i.e. received tranexamic acid, antibiotics and supportive cares). Four patients required a return to theatre to achieve surgical haemostasis, indicating a return to theatre rate of 24%. Three patients (18%) presented to the ED twice with bleeding. Of those three, one patient (6%), a three-year-old, required a single unit blood transfusion (Figure 6).

Table 2: Incidence of bleeds by tonsillectomy technique

<table>
<thead>
<tr>
<th>Tonsillectomy Technique</th>
<th>Bleeds</th>
<th>Incidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bipolar and blunt dissection</td>
<td>64</td>
<td>5</td>
</tr>
<tr>
<td>Bipolar dissection</td>
<td>26</td>
<td>8</td>
</tr>
<tr>
<td>BiZact</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Coblation</td>
<td>57</td>
<td>3</td>
</tr>
<tr>
<td>Monopolar and bipolar cautery</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Monopolar diathermy</td>
<td>16</td>
<td>1</td>
</tr>
<tr>
<td>All tonsils</td>
<td>168</td>
<td>17</td>
</tr>
</tbody>
</table>

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of the four patients were part of the paediatric population. Despite having a relatively low rate of bleeding incidence (Table 2), bipolar and blunt dissection made up 50% of patients returning to theatre (Table 3).

### Return to Theatre

<table>
<thead>
<tr>
<th>Age</th>
<th>Gender</th>
<th>Operating technique</th>
<th>Time to Post-tonsillectomy haemorrhage (days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>56</td>
<td>Female</td>
<td>Bipolar and blunt dissection</td>
<td>9</td>
</tr>
<tr>
<td>18</td>
<td>Female</td>
<td>Bipolar and blunt dissection</td>
<td>5</td>
</tr>
<tr>
<td>10</td>
<td>Female</td>
<td>Bipolar and blunt dissection</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>Female</td>
<td>Coblation</td>
<td>8</td>
</tr>
</tbody>
</table>

Table 3: Characteristics of patients returning to theatre

### Discussion

In our cohort, 168 patients underwent tonsillectomy or adenotonsillectomy from 1 January to 31 December 2019 at Nelson Hospital or Manuka Street Hospital. Seventeen of these patients presented to Nelson or Wairau Hospital ED within two weeks of their operation due to bleeding. As a percentage, 10.1% of the total patients presented with bleeding (Table 2).

Francis et al. and Alvo et al. report rates of post-tonsillectomy bleeding of 4%, less than half the rate of our cohort.\(^4\)\(^5\) However, they only include paediatric populations, while our cohort comprises all ages. When only considering our paediatric population, the rate of bleeding decreases to 6% (Figure 5), closer to what Francis et al. and Alvo et al. report. A study in Australia, which included adults as part of the population, demonstrated PTH rates of 6.9%,\(^6\) reasonably less than our cohort’s bleeding incidence of 10.1%. However, the difference here is likely to be caused by our small sample size.

Table 2 highlights the large variation in incidence of bleeds by tonsillectomy technique. This is in contrast to what Francis et al. report. They did not observe an appreciable difference in bleeding rates amongst different tonsillectomy techniques.\(^3\) A possible reason for the large difference in bleeding rates by technique in our cohort is the small sample size, which is a cause of random error reducing generalisability of our results. As suggested by Francis et al. it is unlikely that surgical technique produces a true difference in bleeding rates.\(^1\)

When considering Figure 5, it is apparent that a discrepancy exists in the rates of ED presentation between males and females, with nearly double the number of females presenting due to bleeding compared to males. This is in contrast to Alvo et al. who reports higher incidences of PTH amongst males (Table 4)\(^4\) and Kwok et al. who observed no difference.\(^7\) The discrepancy in our cohort is likely due to our patient demographics. As noted earlier, PTH rates are comparable between males and females up until adolescence, when more females present with bleeding (Figure 5). This is consistent with our ratio of female to male patients, which is similar in the paediatric population but 5:1 in the adult population (Figure 5).

The management of patients who presented to Nelson ED with bleeding is consistent with that as described by Alvo et al. and Dharmawardana et al.\(^1\)\(^2\) All patients who present to Nelson are admitted onto the ENT ward and observed overnight. Alvo et al. had a return to theatre rate of 28% in their Auckland cohort, which closely matches our rate of 24%.\(^4\) Dharmawardana et al. had a rate of 21% in their Australian cohort.\(^7\)

### Limitations

The largest limitation in our audit is the subjectivity surrounding presentation. As there is no clear margin for what is considered a “bleed”, some patients may not present despite a bleed. This is an expected issue in a retrospective study. Additionally, some patient presentations were not stated clearly and left unspecified. As a result, it is unknown why they presented. These patients are viewed as lost to follow-up and can be a source of incomplete data resulting in cohort bias. Finally, our small sample size is a cause of random error reducing generalisability of our results.

### Recommendations

1. Clearly state in ED notes why the patient presented rather than leaving it “unspecified”. The rates of bleeding postoperatively could potentially be much higher. An ED code linked to Nelson Hospital’s database could prove beneficial in future.

2. If tonsillectomy is indicated for childhood obstructive sleep apnoea (OSA), partial tonsillectomy (tonicotomy) could be considered as it yields similar results but with substantially less postoperative pain, quicker recovery, and most critically less postoperative (and intra-operative) bleeding.\(^8\)

### References


### Acknowledgements

Ahmed Sherif would like to acknowledge Dr Nicola Hill for setting up this clinical audit opportunity.

### Patient Consent

Individual patient consent was not sought or required for this clinical audit.

### Correspondence

Ahmed Sherif: ahmed98sherif@gmail.com

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Ahmed Sherif is a fifth-year medical student at the University of Auckland. He had an immersive experience in his selective in otolaryngology at Nelson Hospital. He enjoys population health, cycling, and re-reading Harry Potter.