

# Critical Intelligence Unit

## Evidence brief

### Post-tonsillectomy bleeding and pain

05 February 2024

### Evidence check questions

Are there any patterns or risk stratification for post-tonsillectomy bleeding and pain? Do the following factors influence the likelihood of post-tonsillectomy bleeding and pain?

- Surgery technique.
- Patient and clinical characteristics.

What are the main reasons for patients presenting to the emergency department (ED) following tonsillectomy surgery? When (how many days after) do patients usually present to an ED after the surgery?

How long do patients need to stay close to where they had the tonsillectomy surgery, especially in rural or regional areas?

### Summary

- The method and techniques of tonsillectomy can be associated with different risk profiles for post-operative haemorrhage and pain in both paediatrics and adults. Overall, the intracapsular coblation method appears to be associated with lower risks of bleeding and pain compared to other methods.<sup>1-5</sup>
- Several patient and clinical characteristics, such as male gender, older age (15 years or over), multiple indications for surgery, comorbidity and coagulopathy, and the severity of illness at admission, are associated with an increased risk of post-tonsillectomy bleeding.<sup>6-15</sup> Antibiotic or steroid use does not appear to decrease or increase the risk of post-tonsillectomy bleeding.<sup>16-23</sup> There is mixed evidence regarding the use of non-steroidal anti-inflammatory drugs (NSAIDs), especially ibuprofen, and their impact on the risk of post-operative bleeding, with some reporting no impact while others reporting an increased risk.<sup>24-28</sup>
- Laryngopharyngeal reflux and obese or overweight status appear to be associated with an increased risk of post-tonsillectomy pain.<sup>29, 30</sup> Pre-or-intra-operative medication uses such as paracetamol, NSAIDs, intravenous dexamethasone, ketamine, and platelet-rich plasma are associated with improved outcomes for post-tonsillectomy pain.<sup>31, 32</sup>
- The main reasons for presenting to an ED following tonsillectomy surgery include bleeding, dehydration, infection, nausea and pain in paediatrics. For adults, the most common reasons include pain and bleeding.<sup>33, 34</sup> The median days to presentation post-operation ranged from 5-7 for paediatrics<sup>35-37</sup> and a similar range for adults.<sup>38</sup>
- Australian data suggest that the rates for post-tonsillectomy haemorrhage for all ages and paediatrics alone are 1.6% and 1% respectively.<sup>8</sup> Of those who returned to an ED with secondary

post-tonsillectomy bleed, around 91% were managed conservatively and 9% required operative intervention (paediatrics).<sup>37</sup>

- The evidence evaluating the safe geographical proximity or travel distance for patients to stay close to where they had the operation is scant. A retrospective review study from Wagga Wagga Base Hospital suggested no increased risk of haemorrhage or complications when patients lived  $\geq 100$  km from the regional hospital; and could be managed remotely and transferred when clinically indicated.<sup>39</sup> In Victoria, a tonsillectomy and adenotonsillectomy service in an outer regional hospital provided by visiting specialists who remain on-site for 24 hours post-surgery is found to be safe when strict patient selection criteria and ED management protocols were implemented.<sup>40</sup> In a survey study however, Australian surgeons (comprising mainly of those practising in major or capital cities) appear to be more likely to advise patients to stay close to the hospital for 10-14 days compared to New Zealand surgeons (52.6% versus 9.4%).<sup>41</sup> In this cross-sectional self-reported study, which is prone to selection and representation bias, no clinical or safety outcomes were evaluated and therefore, an association between practices and patient clinical and safety outcomes cannot be drawn.

## Surgical technique and risk of post-tonsillectomy haemorrhage and pain

- **Intracapsular coblation tonsillectomy** was associated with the lowest absolute risk of post-operative bleeding incidence and lowest mean post-operative pain score, followed by cold dissection tonsillectomy, extracapsular coblation, monopolar diathermy tonsillectomy and bipolar diathermy tonsillectomy in both the paediatrics and adults (2023 systematic review and meta-analysis).<sup>1</sup>
- **Intracapsular tonsillectomy versus extracapsular tonsillectomy** in both adult and paediatric patients was associated with significantly lower rates of post-operative haemorrhage and secondary haemorrhage (retrospective cohort studies).<sup>2-4</sup>
- **Coblation versus bipolar diathermy** in paediatric patients undergoing tonsillectomy was associated with a significantly lower rate of bleeding after 24 hours and post-operative pain scores; but similar rates of intra-operative bleeding and reactionary haemorrhage (2022 systematic review and meta-analysis).<sup>5</sup>
- **Coblation versus cold dissection** in paediatric tonsillectomy patients was associated with significantly less pain, less intra-operative blood loss, a shorter operative time and similar rates of post-operative haemorrhage (2020 systematic review and meta-analysis).<sup>42</sup>
- **Coblation versus laser tonsillectomy** was associated with a significantly lower intra-operative blood loss and operative time, however, there was no significant difference in terms of post-operative pain scores and post-operative haemorrhage rates (2022 systematic review and meta-analysis).<sup>43</sup>
- **CO2 laser versus dissection tonsillectomy** was associated with a significantly lower intra-operative blood loss and operative time, however, there was no significant difference in terms of post-operative pain scores and post-operative haemorrhage rates (2023 systematic review and meta-analysis).<sup>44</sup>
- **Plasma ablation versus other hot techniques** had no significant differences in post-operative pain on day 1 and day 3, incidence of post-operative bleeding, reoperation haemostasis, and return to normal diet and activities (2020 meta-analysis).<sup>45</sup>

## Patient characteristics, medication history and risk of post-tonsillectomy haemorrhage and pain

- Factors associated with an **increased risk of post-tonsillectomy haemorrhage** include:
  - Multiple indications for surgery (i.e., a combination of chronic/recurrent tonsillitis and obstructive sleep apnoea/sleep-disordered breathing versus chronic/recurrent tonsillitis alone) (paediatrics)<sup>6</sup>
  - Concomitant adenoidectomy<sup>13</sup>
  - Aged >15 years versus aged ≤15 years<sup>7-9</sup>; those aged between 20 and 24 had the highest odds of bleeding compared to other age groups in Australia<sup>8</sup>
  - Male gender<sup>8, 10</sup>
  - Coagulopathy<sup>11-13</sup>
  - The index admission severity of illness (associated with readmission risk for pain or bleeding in paediatrics)<sup>14</sup>
  - Deficiency anaemia (paediatrics)<sup>11, 12</sup>
  - Fluid and electrolyte disorders (paediatrics)<sup>11</sup>
  - Preceding postoperative respiratory event (paediatrics)<sup>46</sup>
  - Body mass index (BMI) z-score of 2 or greater or body mass index for age (≥85th percentile) (paediatrics)<sup>47, 48</sup>
  - Comorbidity (adults)<sup>15</sup>
  - Higher pain scores on days 1 and 2 following tonsillectomy (adults)<sup>49</sup>
  - Occurrence of primary haemorrhage for secondary haemorrhage (adults)<sup>34</sup>
  - Focal infection of IgA nephropathy (adults).<sup>50</sup>
- Pre-or-post-operative medication uses that are shown to have **no significant effect on the risk of post-tonsillectomy haemorrhage** include:
  - Antibiotic use after tonsillectomy<sup>16-20</sup>
  - Steroids (intravenous, local and oral routes) used peri-or-post-operatively.<sup>21-23</sup>
- There is mixed evidence for the use of NSAIDs, especially ibuprofen, and the risk of post-tonsillectomy haemorrhage.<sup>25</sup> In one cohort study from the United States in adults, use of NSAIDs postoperatively was not associated with an increased risk of post-tonsillectomy haemorrhage. However, in another study from Taiwan, NSAID use was associated with an increased risk of readmission or reoperation for bleeding.<sup>51</sup>
  - Some studies report that Ibuprofen use peri-or-post-operatively did not impact the risk of post-tonsillectomy haemorrhage compared to a non-ibuprofen regimen<sup>24</sup> or non-use.<sup>25, 26</sup> While others report an increased risk<sup>27, 28</sup>
  - Intravenous ibuprofens used intra-operatively in paediatrics was not associated with an increased risk for ED visits or return to operating room due to bleeding<sup>52</sup>
  - Perioperative and intraoperative ketorolac use (paediatrics and adults) was not associated with an increased risk.<sup>53-56</sup>

- Platelet-rich plasma was associated with a significantly reduced risk for primary and secondary haemorrhage compared to the control (2023 systematic review and meta-analysis).<sup>32</sup>
- Factors associated with an **increased risk of post-tonsillectomy pain** include:
  - Laryngopharyngeal reflux (on day 7 and 14 in adults)<sup>29</sup>
  - Overweight or obese status (prolonged pain in children).<sup>30</sup>
- Pre-or-intra-operative medication uses or interventions that were associated with **reduced rates or scores of post-tonsillectomy pain** include:
  - Paracetamol, NSAIDs, intravenous dexamethasone, ketamine (only assessed in paediatrics), gabapentinoids, dexmedetomidine, honey and acupuncture (2021 systematic review)<sup>31</sup>
  - Platelet-rich plasma for early post-operative pain on day 0 and 3 (2023 systematic review and meta-analysis)<sup>32</sup>
  - Intra-operative local anaesthetic injection during paediatric tonsillectomy – associated with reduced odds of patients receiving one or more narcotic doses on day 0 and 1.<sup>57</sup> Similarly, single dose of intraoperative intravenous morphine during anaesthetic induction reduced the intensity of immediate post-operative pain in paediatric patients undergoing tonsillectomy.<sup>58</sup>
- Factors that had shown to have **no significant impact on post-tonsillectomy complications including both pain and bleeding** include:
  - Antibiotic use after tonsillectomy – not associated in a decreased risk of post-operative complications including pain and bleeding requiring admission<sup>16-20</sup>
  - Peri-operative opioid prescription – not associated with a decreased risk of return visits for post-operative pain, dehydration or haemorrhage.<sup>59</sup>
- **Tranexamic acid** (administered by nebulized, intravenous or topical applications) treatment of post-tonsillectomy haemorrhage, in both children and adults, was associated with lower rates of operative intervention and lower rates of repeat bleeding events.<sup>60-63</sup>

## ED or hospital revisits following tonsillectomy surgery

- A 2022 Australian study evaluated the incidence, timing and risk factors for any surgery-related hospital revisits (both emergency presentation and readmission) following **paediatric** tonsillectomy and adenotonsillectomy in Victoria (46,583 patients and 47,054 total surgeries). Findings include:
  - 10.11% of total surgeries (4758 out of 47054) had an ED presentation and of those 33.02% (n=1571, 3.34% of total surgeries) were haemorrhage related.
    - 4.96% ED presentations (n=236, 0.5% of total surgeries) required transfer to another hospital. Common reasons for transfer included 'otorhinolaryngologist not available', 'previous patient of the destination hospital' and 'general bed not available'.
  - 5.84% of total surgeries had a readmission and of those 67.93% (1868, 3.97% of total surgeries) were haemorrhage related.
  - The other common reasons for ED presentation included unspecified surgical complications, upper respiratory complications, infection and dehydration (see Table 1).
  - The other common reasons for hospital readmission include dehydration, unspecified surgical complication, upper respiratory complications and pain.

- Day 5 post-surgery was the median revisit time for both ED presentations and readmission. Peak presentation for haemorrhage occurred at Day 5.<sup>35</sup>

**Table 1. Reasons for emergency department presentations<sup>35\*</sup>**

Complications	Percentage (%)	Frequency (N)
Haemorrhage	33.02	1571
Unspecified surgical complication	21.02	1000
Upper respiratory complication	14.25	678
Infection	13.07	622
Dehydration	5.07	241
Other	3.97	189
Nausea	3.57	170
Lower respiratory complication	2.98	142
Pain	1.85	88
Anaesthesia-related complication	1.51	72
Cardiovascular complication	0.25	12
Airway compromise	0.06	3
Surgical burn	0.00	0

\*This table is reproduced from *Hospital revisits after paediatric tonsillectomy: a cohort study (2022)* by Tran et al. which was published under a Creative Commons Attribution 4.0 International License.<sup>35</sup>

- A 2023 study from Western Australia reported that after presenting to an ED for secondary post-tonsillectomy bleed, 90.8% paediatric patients were managed conservatively.<sup>37</sup>
- Similarly, the most common reasons for readmission following paediatric tonsillectomy in other studies were post-operative haemorrhage, dehydration, infection, nausea and pain.<sup>12, 33, 64, 65</sup> Children younger than three years of age were more likely to return to an ED for dehydration, while older children are more likely to return for bleeding and need for control of oropharyngeal hemorrhage.<sup>33</sup> Paediatric patients who were admitted in late afternoon or discharged early evening are more likely to present to an ED for revisits than those who were discharged or admitted earlier in the day.<sup>65</sup>
- For adults, a population-based cohort study from Canada found that for tonsillectomy surgeries, acute pain (26.5%) and haemorrhage (20.8%) were the most common reasons for visiting an ED post-operation.<sup>33</sup> This finding for common reasons for ED visits is similar to that of an Australian study.<sup>34</sup>
- In other smaller scale studies involving paediatrics only, the median to presentation to an ED for post-tonsillectomy bleeding was around day 7.<sup>36, 37</sup> In a study from the United States, most paediatric secondary haemorrhage cases occurred in the 8 days following tonsillectomy.



- In an Austrian study involving both adults and paediatric patients with severe post-tonsillectomy haemorrhage and subsequent emergency surgery, the median time to bleeding was 6 days.<sup>38</sup>

### How long do patients need to stay close to where they had the tonsillectomy surgery, especially in rural or regional areas?

- The peer-reviewed literature on the ideal time period for patients to stay close to where they had the tonsillectomy post-operation is scarce.
  - A retrospective review of patients who underwent tonsillectomy performed at Wagga Wagga Base Hospital over a four-and-a-half-year study period suggested that there was no increased risk of haemorrhage or complications when patients lived  $\geq 100$  km from the regional hospital. Patients living outside “safe” proximity to a hospital ear, nose and throat service (less than 60 minutes) could be managed remotely and transferred when clinically indicated. Of 1209 patients who underwent a tonsillectomy over the study period:
    - Rates for primary and secondary haemorrhage were 1% (n=36) and 3% (n=36).
    - Three patients required a return to the operating theatre (0.2% of total surgeries).
    - Two patients required blood transfusion (0.17% of total surgeries).
    - Five patients were transferred from surrounding facilities (0.4% of all patients) via road ambulance with a median time to transfer of 4.1 hours.<sup>39</sup>
  - In Victoria and in outer regional areas (e.g., Swan Hill District Health, which is 200 km from the nearest tertiary hospital centre), a retrospective study over a period of 6 years reported outcomes relating to a visiting ear, nose and throat service.
    - Strict selection criteria are applied to determine the eligibility of patients to the service.
    - Patients who do not meet the criteria (i.e., younger than two years of age, has severe asthma, congenital heart disease etc, have a pre-operative oximetry McGill oximetry score (MOS) equals or greater than 3, and have moderate to severe sleep apnoea) referred to metropolitan centre.
    - All patients were admitted overnight.
    - Protocols for post-operative management was developed for ED.
    - Patients remained within a 30 min radius of a 24-hour ED for two weeks.
    - Of 204 patients with a median age of six, all intra- and peri-operative complications were managed locally in outer regional ED and two patients (around 1% were transferred to other hospitals for monitoring post-tonsillectomy bleeds).<sup>40</sup>
  - In a cross-sectional survey study of Australian (77.8% from major or capital city, 17.5% from large regional city, and 4.9% from rural and regional areas) and New Zealand surgeons, Australian surgeons are more likely not to offer tonsillectomy to patients if they resided more than one hour from an ear, nose and throat serviced hospital and intended to go home on day 1 post-operatively (61.7% versus 25.0%). Australian surgeons are also more likely to advise patients to stay close to the hospital for 10-14 days than New Zealand surgeons (52.6% versus 9.4%).<sup>41</sup>

## Methods

### PubMed search terms

#### Question 1

("tonsillectomy"[MeSH Terms] OR "tonsillectom\*" [Title/Abstract]) AND ("bleed\*" [Title/Abstract] OR "hemorrhage"[MeSH Terms] OR "hemorrhage"[Title/Abstract] OR "haemorrhage"[Title/Abstract] OR pain[Title/Abstract]) AND ("risk\*" [Title/Abstract] OR "pattern\*" [Title/Abstract] OR "likelihood"[Title/Abstract] OR "odds"[Title/Abstract]) AND (2018:2023[pdat])

211 hits.

#### Question 2

("tonsillectomy"[MeSH Terms] OR "tonsillectom\*" [Title/Abstract]) AND ("emergency"[Title/Abstract] OR "ED"[Title/Abstract]) AND 2013/01/01:2023/12/31[Date - Publication] AND "english"[Language]

126 hits.

### Google search terms

Tonsillectomy post-discharge management, tonsillectomy post-operative care, tonsillectomy follow-up

### Inclusion and exclusion criteria

Inclusion	Exclusion
<ul style="list-style-type: none"><li>Published in English</li><li>Published since 2018</li><li>Population: children and adults</li><li>Intervention or exposure: tonsillectomy surgery</li><li>Comparison: nil</li><li>Outcomes: risk factors and patterns for bleeding, reasons for presenting to ED and time period for patients stay close to the hospital where they had the surgery</li><li>Study types:<ul style="list-style-type: none"><li>Review studies with systematic search strategy and methods</li><li>Randomised or non-randomised clinical trials</li><li>Observational studies with quantitative data</li><li>Grey literature such as guidelines and consensus statements</li><li>Letters, comments, editorials, study protocols, conference abstracts</li></ul></li></ul>	<ul style="list-style-type: none"><li>Not in English</li><li>Published prior to 2018</li><li>Studies that do not meet <b>PICOS</b> criteria</li><li>Letters, comments, editorials, study protocols, conference abstracts</li></ul>

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