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# Post Tonsillectomy Secondary Haemorrhage Cold Versus Hot Method

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Submission Date : 08 Dec 2025
Accepted Date : 05 Feb 2026
Published Date : 30 March 2026
DOI: https://doi.org/10.3329/jrpmc.v11i1.89947

**Abstract**

**Background:**
Tonsillectomy is a frequently performed otolaryngological procedure for recurrent infections or obstructive symptoms. The surgical technique may affect bleeding risk.

**Objective:**
The study aimed to compare post-tonsillectomy secondary haemorrhage incold versus hot tonsillectomy techniques.

**Methods:**
This prospective study was conducted at an otolaryngology unit in North Bengal Medical College & Hospital, Sirajganj, Bangladesh on 90 consecutive patients underwent tonsillectomy or adenotonsillectomy, from January, 2023 to December, 2023, 45 by cold steel dissection and 45 by hot electrosurgical technique. Baseline factors and preoperative Hb and platelet counts were recorded.

**Results:**
Both groups were comparable in demographics and baseline clinical factors, including indication, recent URTI, NSAID exposure, hemoglobin, and platelet count (all $p>0.05$). Haemostasis differed significantly: ties were used more in the cold group (48.9% vs 13.3%) and bipolar diathermy more in the hot group (75.6% vs 40.0%) ($p<0.001$). Operative time was similar, but blood loss was lower with the hot technique (median 26 vs 43 mL, $p<0.001$).

**Conclusion:**
Hot tonsillectomy significantly reduced intraoperative blood loss with similar primary haemorrhage, but showed a higher, non-significant trend toward secondary haemorrhage and related interventions compared with cold dissection.

**Keywords:** Post-tonsillectomy haemorrhage, Tonsillectomy technique, Cold dissection, Bipolar diathermy

**Citation:** Khan KR,Islam S,Islam I.Post Tonsillectomy Secondary Haemorrhage Cold Versus Hot Method.J Rang Med Col.2026 Mar;11(1):33-38.doi: https://doi.org/10.3329/jrpmc.v11i1.89947

## Introduction:

Tonsillectomy, with or without adenoidectomy, is among the most frequently performed otolaryngologic procedures globally, especially in pediatric and adolescent populations. The primary indications are recurrent throat infections and sleep-disordered breathing associated with adenotonsillar hypertrophy.[1] Although considered routine, this operation is associated with significant morbidity. Post-tonsillectomy haemorrhage is the most serious complication, as it may occur unpredictably, necessitate emergency readmission, and, in rare cases, result in life threatening airway compromise.[2,3] Haemorrhage is classified as primary if it occurs within 24 hours, or secondary if it occurs after 24 hours, with a peak incidence during the first postoperative week when the eschar separates.[2] The reported incidence of haemorrhage varies depending on definitions, patient populations, and surveillance methods. However, recent data indicate that both primary and secondary bleeding continue to pose significant quality and safety challenges across health systems.[2,3]

Surgical technique is a primary source of variability in tonsillectomy outcomes. “Cold” tonsillectomy, typically involving cold steel dissection with cold haemostasis or ties, is contrasted with “hot”

techniques that utilize thermal energy for dissection or haemostasis, such as mono- and bipolar electrocautery and other energy-based systems. Hot techniques may decrease intraoperative blood loss and occasionally reduce operative time. However, thermal injury to adjacent tissues has been proposed to increase the risk of delayed sloughing and secondary haemorrhage, rendering the overall safety profile dependent on clinical context.[3-5] Evidence from randomized and comparative studies is mixed: some trials indicate more favorable postoperative recovery with cold techniques compared to bipolar electrocautery, while others report similar bleeding outcomes but differences in pain, healing, and resource utilization.[4,5] Large-scale quality register analyses and quality-improvement data from Nordic countries further indicate that meticulous cold dissection and cold haemostasis may reduce readmission rates for secondary haemorrhage. These findings underscore the importance of technique standardization and surgeon training, in addition to device selection.[3] Patient-specific factors, including age, sex, smoking status, and perioperative NSAID exposure, have also been associated with haemorrhage risk in observational studies, emphasizing the necessity of interpreting technique effects in the context of baseline patient risk.[2,6]

Significant evidence gaps persist in low- and middle-income settings, including South Asia, where variations in practice patterns, haemostasis preferences, perioperative analgesic protocols, and criteria for readmission or return to theatre may differ from those observed in high-income registry environments. Regional open-access studies comparing energy-based surgical techniques, such as coblation and bipolar electrocautery, indicate that postoperative bleeding and pain outcomes vary across centres and populations, highlighting the necessity for locally relevant comparative data.[7-9] Furthermore, ongoing multicentre investigations into haemorrhage following newer thermal modalities indicate continued uncertainty and emphasize the need for robust and standardized outcome assessment.[10]Against this background, the study aimed to compare cold versus hot tonsillectomy techniques regarding the incidence of post-tonsillectomy secondary haemorrhage.

**Methods:**

This prospective study was conducted at an otolaryngology unit in North Bengal Medical College & Hospital, Sirajganj, Bangladesh, Bangladesh over one year, from January, 2023 to December, 2023. Consecutive patients undergoing tonsillectomy or adenotonsillectomy for recurrent tonsillitis or obstructive symptoms were enrolled; 90 participants were included, 45 in the cold dissection group and 45 in the hot technique group. Exclusion criteria were known bleeding disorders, inability to withhold antiplatelet or anticoagulant drugs, acute infection requiring postponement, and missing baseline tests. Baseline data included age, sex, residence, indication for surgery, upper respiratory tract infection within the preceding two weeks, and NSAID exposure within seven days.

Preoperative hemoglobin and platelet counts came from routine laboratory tests. Cold tonsillectomy was performed by steel dissection with hemostasis mainly by ligatures, with selective diathermy when required. Hot tonsillectomy used electrosurgical dissection, predominantly bipolar diathermy, with monopolar diathermy as needed. Operative duration (from mouth gag insertion to removal) and estimated blood loss were recorded. Discharge day and prescribed antibiotics, NSAIDs, and steroids were documented. Primary hemorrhage was defined as bleeding within 24 hours; secondary hemorrhage as bleeding after 24 hours up to postoperative day 14. Clinically significant secondary hemorrhage was bleeding requiring emergency review, readmission, operative hemostasis, or transfusion. Data were analyzed using SPSS (v-26.0); categorical variables were compared with chi-square or Fisher's exact test, and continuous variables with independent t-test or Mann-Whitney U test, as appropriate. A two-sided p-value $<0.05$ was considered significant.

**Results:**

Table-I showed both groups were comparable demographically: most patients were 11–18 years, 53.3% in the cold group versus 55.6% in the hot group, mean age was similar, 14.89±7.35 vs 15.07±7.50 years, p=0.91, males slightly predominated, 53.3% vs 57.8%, p=0.671, and most participants were from rural areas, 60.0% vs 55.6%, p=0.67.

**Table-I: Socio-demographic characteristics of patients undergoing tonsillectomy, by surgical technique (N=90)**

| Socio-demographics | Cold (n=45) no.(%) | Hot (n=45) no.(%) | p value |
|---|---|---|---|
| **Age (years)** | | | |
| ≤10 | 13(28.9) | 12(26.7) | 0.97 |
| 11–18 | 24(53.3) | 25(55.6) | |
| >18 | 8(17.8) | 8(17.8) | 0.91 |
| Mean±SD | 14.89 ± 7.35 | 15.07 ± 7.50 | |
| **Sex** | | | |
| Male | 24(53.3) | 26(57.8) | 0.671 |
| Female | 21(46.7) | 19(42.2) | |
| **Residence** | | | |
| Urban | 18 (40.0) | 20 (44.4) | 0.67 |
| Rural | 27 (60.0) | 25 (55.6) | |

Table-II indicated similar baseline clinical profiles: recurrent tonsillitis was the leading indication, 66.7% in cold vs 62.2% in hot, p=0.90, recent URTI was reported in 13.3% vs 15.6%, p=0.764, preop NSAID exposure was low, 6.7% vs 8.9%, and antiplatelet or anticoagulant use was rare, 2.2% in both groups, mean Hb, 12.63 vs 12.42 g/dL, and platelet counts, 265.87 vs 270.67 $\times 10^9$/L, were comparable, p>0.05.

**Table-II: Clinical profile and preoperative factors (N=90)**

| Variable | Cold (n=45) no.(%) | Hot (n=45) no.(%) | p value |
|---|---|---|---|
| **Indication for surgery** | | | |
| Recurrent tonsillitis | 30(66.7) | 28(62.2) | 0.9 |
| Obstructive symptoms | 13(28.9) | 15(33.3) | |
| Other | 2(4.4) | 2(4.4) | |
| Recent URTI (within 2 weeks) | 6(13.3) | 7(15.6) | 0.764 |
| Preop NSAID use (within 7 days) | 3(6.7) | 4(8.9) | 1 |
| Antiplatelet or anticoagulant use | 1(2.2) | 1(2.2) | 1 |
| Hb(g/dL), Mean±SD | 12.63±1.07 | 12.42±0.83 | 0.287 |
| Platelet ($\times 10^9$/L), Mean±SD | 265.87±60.65 | 270.67±49.36 | 0.682 |

Table-III highlighted differences in intraoperative haemostasis practice: procedure type distribution was similar, tonsillectomy alone 71.1% vs 66.7%, p=0.649, but ties were used much more often in the cold group, 48.9% vs 13.3%, while bipolar diathermy predominated in the hot group, 75.6% vs 40.0%, overall difference p<0.001.

**Table-III: Operative characteristics, including procedure type and primary haemostasis technique, by surgical technique (N=90)**

| Variable | Cold (n=45) no.(%) | Hot (n=45) no.(%) | p value |
|---|---|---|---|
| **Procedure type** | | | |
| Tonsillectomy | 32 (71.1) | 30 (66.7) | 0.649 |
| Adenotonsillectomy | 13 (28.9) | 15 (33.3) | |
| **Primary hemostasis technique** | | | |
| Ties | 22 (48.9) | 6 (13.3) | <0.001 |
| Bipolar diathermy | 18 (40.0) | 34 (75.6) | |
| Monopolar diathermy | 5 (11.1) | 5 (11.1) | |

Operative efficiency and blood loss patterns: median operative time was slightly shorter with hot technique, 30 vs 32 minutes, p=0.08, while estimated blood loss was significantly lower in the hot group, 26(20–34) mL vs 43(34–55) mL, p<0.001, primary haemorrhage within 24 hours was uncommon and equal, 2.2% in each arm, discharge was typically on day 1 in both groups, and postoperative medications were similar, antibiotics about 71–73%, NSAIDs 18–22%, steroids 22–27%, all p>0.05 (Table-IV).

**Table-IV: Perioperative course and immediate postoperative management (N=90)**

| Variable | Cold (n=45) no.(%) | Hot (n=45) no.(%) | p value |
|---|---|---|---|
| Duration of surgery (min), Median (IQR) | 32(27–39) | 30 (26–35) | 0.08 |
| Estimated blood loss (mL), Median (IQR) | 43(34–55) | 26 (20–34) | <0.001 |
| Primary haemorrhage, within 24h | 1(2.2) | 1(2.2) | 1 |
| Discharge day, Median (IQR) | 1(1–1) | 1(1–1) | 0.754 |
| Postop antibiotics given | 32 (71.1) | 33 (73.3) | 0.816 |
| Postop NSAID prescribed | 8 (17.8) | 10 (22.2) | 0.603 |
| Postop steroid given | 10 (22.2) | 12 (26.7) | 0.626 |

Secondary haemorrhage was more frequent after the hot technique, 17.8% vs 6.7%, p=0.108. Clinically significant bleeding, readmission, and return to OT were also higher in the hot group, 8.9% vs 2.2%, 13.3% vs 4.4%, and 6.7% vs 2.2%, respectively, but all were non-significant, p>0.05. Only one patient required transfusion, in the hot group (Table-V).

**Table-V: Secondary haemorrhage outcomes (N=90)**

| Outcome | Cold (n=45) no.(%) | Hot (n=45) no.(%) | p value |
|---|---|---|---|
| Secondary haemorrhage, any | 3(6.7) | 8(17.8) | 0.108 |
| Clinically significant secondary haemorrhage | 1(2.2) | 4(8.9) | 0.361 |
| Readmission for bleeding | 2(4.4) | 6(13.3) | 0.266 |
| Return to OT for haemostasis | 1(2.2) | 3(6.7) | 0.616 |
| Blood transfusion required | 0(0.0) | 1(2.2) | 1 |

**Discussion:**

In this comparative series of 90 tonsillectomies, the cold and hot groups were well matched for age, sex, residence, indication, recent upper respiratory tract infection, and baseline hematologic indices. This comparability supports the attribution of observed outcome differences to operative technique rather than case mix. The cohort primarily comprised adolescents aged 11 to 18 years, a group consistently associated with higher rates of secondary post-tonsillectomy haemorrhage (PTH) compared to younger children. This elevated background risk is clinically relevant when interpreting bleeding events in both groups.[11,12] Intraoperatively, the hot technique demonstrated a clear advantage in haemostatic efficiency, with significantly lower estimated blood loss (median 26 mL vs 43 mL; p<0.001) and a trend toward shorter operative time (30 vs 32 minutes; p=0.08). These findings are consistent with randomized and comparative studies indicating that bipolar electrocautery reduces intraoperative blood loss and often shortens operative time relative to cold dissection, although downstream morbidity, particularly pain and delayed bleeding, varies across studies and devices.[13-15] Broader syntheses further emphasize that 'hot' technologies are heterogeneous, with outcomes influenced by energy modality, extent of tissue thermal spread, and the method of haemostasis, whether by suture or ligation compared to diathermy.[16-18]

The most clinically significant finding in this dataset is the higher secondary haemorrhage rate observed following the hot technique (17.8% vs 6.7%), accompanied by increases in clinically significant bleeding, readmission, and return to theatre. Although these differences did not reach statistical significance, this may be attributable to limited statistical power. Large registry analyses provide additional context. For example, the Swedish National Tonsil Surgery Register found that 'hot haemostasis' and other hot techniques were associated with higher rates of late PTH compared to cold steel dissection with cold haemostasis, with substantially increased relative risks for several hot modalities.[16] Notably, Table 3 demonstrates that haemostasis practices differed significantly between groups; ties were used more frequently in the cold arm, while bipolar diathermy was predominant in the hot arm (overall p<0.001). Registry and comparative studies indicate that the haemostasis strategy itself is a key determinant of delayed bleeding risk, likely due to thermal injury, eschar formation, and subsequent sloughing during the typical secondary bleeding window.[16,19,20] The age distribution of the cohort may further amplify this effect, as studies of bipolar-based techniques report substantially higher secondary haemorrhage rates in patients aged 15 years and older, regardless of primary indication and observational studies similarly note increased bleeding risk with advancing age.[11,12]

These findings support a nuanced approach to technique selection. When minimizing intraoperative blood loss is a priority, hot techniques remain advantageous; however, surgeons should mitigate delayed bleeding risk by limiting thermal spread, employing the lowest effective energy, and considering selective ligation, particularly in adolescents and adults.[12,16,20] In resource-limited settings, 'cold dissection plus secure, low-thermal haemostasis' may provide a safer profile for delayed bleeding, while still allowing for selective use of diathermy when intraoperative haemostasis is difficult. The lack of differences in primary haemorrhage and discharge timing aligns with evidence that early bleeding is uncommon and that most technique-related differences manifest in delayed outcomes. This underscores the importance of comprehensive discharge counselling and rapid access pathways for secondary bleeding events.[17,20]

**Limitations:**

The study's limitations include its single-center design and modest sample size, which reduced statistical power to detect differences in secondary haemorrhage. Technique allocation was not randomized, and haemostasis methods varied between groups, introducing potential

confounding factors. Outcomes were derived from routine clinical documentation, which may have resulted in missed minor bleeding events managed outside the hospital.

**Conclusion:**

Cold and hot tonsillectomy had similar baseline profiles and comparable primary haemorrhage rates. The hot technique significantly reduced intraoperative blood loss but showed a higher, non-significant trend toward secondary haemorrhage and related interventions, suggesting careful haemostasis strategy and close postoperative counselling are particularly important when using hot techniques.Use hot tonsillectomy when minimizing intraoperative blood loss is a priority, but apply low-energy, targeted diathermy and consider supplementary ligation to reduce thermal injury, especially in adolescents and adults. Strengthen discharge counselling and ensure rapid-access pathways for delayed bleeding.

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