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Revisiting the Hot versus Cold Debate: A Contemporary Comparison of Monopolar Diathermy-Assisted and Cold Steel Tonsillectomy

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ABSTRACT

Introduction: Tonsillectomy, a common surgery, uses either "cold" (steel) or "hot" (diathermy) dissection. Diathermy shortens the time needed for surgery and cuts down on bleeding during surgery, but it can also produce thermal damage, which makes pain worse after surgery, slows recovery, and raises the risk of subsequent bleeding. On the other hand, cold dissection keeps the tissue intact but makes main bleeding worse. Because each procedure has its own pros and downsides when it comes to patient comfort and surgical efficiency, there is no one right answer. This suggested study aims to conclusively compare different strategies within the ongoing debate and enhance patient safety outcomes.

Material and methods: This was a prospective, observational study to compare the morbidity of electrocautery (hot) dissection tonsillectomy versus cold dissection tonsillectomy in children aged 5 to 15 years presenting with recurrent tonsillitis or symptomatic adeno-tonsillar hypertrophy.

Results: This study compared hot (diathermy) and cold dissection tonsillectomy in 60 matched children (30 per group). Intraoperatively, hot dissection demonstrated clear advantages, significantly reducing mean blood loss (5.0 mL vs. 43.7 mL) and haemostasis time (5.1 mins vs. 16.4 mins). However, postoperative recovery favoured the cold dissection group. While immediate hospital pain scores were similar, children undergoing hot dissection required significantly more analgesic doses over a 15-day recovery period (31.7 vs. 23.2 doses) and experienced a clinically significant 3.5-day delay in returning to a normal solid diet (9.5 days vs. 6.0 days).

Conclusion: This study finds that although hot (electrocautery) tonsillectomy creates a bloodless surgical field, it substantially impairs paediatric home recovery, resulting in heightened discomfort, a postponed return to eating, and an increase in medical visits owing to thermal injury. Therefore, traditional cold steel dissection remains superior for minimizing patient suffering.

Keywords: Paediatric Tonsillectomy, Monopolar Diathermy, Post-op analgesia, Post op hemorrhage

INTRODUCTION

Tonsillectomy is still one of the most common otolaryngological surgeries done around the world. It is mostly done for recurrent tonsillitis and sleep-disordered breathing. Even though it has been done a lot in the past and there are set surgical guidelines for it, the treatment still has a lot

of problems after surgery. The search for the best tonsillectomy method—one that completely removes lymphoid tissue while causing as little bleeding as possible during surgery and no pain after surgery—has led to the development of surgical tools that range from traditional cold steel dissection to modern electrosurgical devices. But there is still no agreement on the best procedure, and present practice is mostly based on what the surgeon prefers rather than strong evidence. (1)

There are two main ways to surgically remove the tonsils: "cold" dissection and "hot" (diathermy) dissection. Traditional cold dissection entails the detachment of the tonsil from the pharyngeal musculature via non-powered devices, such scissors, scalpels, or dissectors, succeeded by haemostasis through ligatures or sutures. Diathermy tonsillectomy, on the other hand, uses a high-frequency electrical current to cut tissue and seal blood arteries at the same time. This method, especially when using bipolar or monopolar modalities, has become more popular since it can cut down on bleeding during surgery and cut down on the time it takes to do the surgery by up to 50%. Even if there are newer technologies like coblators, most of the peripheral centers still use diathermy since coblators are too expensive. Consequently, the application of diathermy is universal (1,2).

The introduction of thermal energy into the tonsillar fossa has sparked a long-standing debate regarding postoperative recovery. The main point of this debate is the trade-off between how well the surgery goes and how comfortable the patient is. Diathermy provides enhanced haemostasis during the procedure; however, recent research indicates it may cause increased thermal damage to the underlying pharyngeal musculature, particularly the superior constrictor muscle. It is thought that this thermal damage will cause more pain after surgery, slower healing, and a longer time before the person can eat and do typical activities again. On the other hand, cold dissection may cause more bleeding during the operation, but it keeps the tonsillar fossa intact, which should lead to less postoperative morbidity (2,3).

The clinical implications of this choice are profound. Post-tonsillectomy discomfort is the most important thing that affects a patient's quality of life. It can make it hard for them to eat, cause dehydration, and make them need to go back to the hospital. Moreover, haemorrhage is still a feared consequence, and it might happen either right away (within 24 hours) or later (beyond 24 hours). Diathermy efficiently manages acute bleeding; yet, apprehensions remain over its influence on secondary haemorrhage rates, attributed to the detachment of thermal eschar during the healing phase. A recent systematic analysis by the Cochrane Collaboration indicated that diathermy diminishes intraoperative blood loss but is correlated with heightened pain, so leaving the inquiry into the "optimal" procedure unresolved and necessitating further extensive exploration (1,4).

The ongoing presence of contradictory data and the absence of a universally recognised "gold standard" for tonsillectomy require a reassessment of surgical methodologies. Even while modern electrosurgery has certain potential advantages, the existing corpus of research, including the Cochrane Review (2011), says that there isn't enough data to indicate that one procedure is better than another (1). There exists a considerable divergence between surgical endpoints and patient-centered outcomes. Studies have shown that diathermy lowers blood loss during surgery, with a mean difference of almost 20 mL in certain trials. However, there is controversy about how important this decrease is in the real world (4). The selection of technique possesses extensive economic ramifications beyond the surgical environment. Diathermy may shorten the time spent in surgery, but the fact that patients who have it take longer to get back to their normal activities and diet (up to 2.5 days longer), which is a big social cost (1,3). Bleeding is still the most dangerous

consequence following tonsillectomy. Diathermy is great at stopping primary bleeding, although there is still some debate over whether it causes secondary bleeding (5,6). The definition of "dissection" and "diathermy" varies widely. Some "cold" procedures nevertheless involve diathermy to stop bleeding, which makes it hard to tell the difference between groups. Choosing between diathermy and cold steel is not just a technical choice; it has a big effect on patient safety and quality of life (6,7). This study seeks to furnish the requisite facts so as to try to address this longstanding issue.

MATERIALS & METHODS

This study was conducted in semirural tertiary teaching hospital in south India between April 2025 to August 2025.

Study Design This was designed as a prospective, observational study to compare the morbidity of electrocautery (hot) dissection tonsillectomy versus cold dissection tonsillectomy. The protocol was approved by the institutional ethics committee, and written informed consent was obtained from the parents of all participating children.

Participants The study population consisted of children aged 5 to 15 years presenting with recurrent tonsillitis or symptomatic adeno-tonsillar hypertrophy. Exclusion criteria included a history of bleeding disorders, comorbid conditions like Type 1 Diabetes mellites, asthma, known drug allergies or an inability to attend follow-up appointments/not willing to consent.

Patients were allocated into one of two groups. Allocation was determined preoperatively by a computer-based lottery allotment to two groups:

1. Hot Dissection (Diathermy) Group:

Tonsillectomy was performed using monopolar diathermy forceps. The anterior palatopharyngeal arch was incised using the cutting mode at 20 W. Dissection of the tonsil from the fossa was performed in coagulation mode at 20 W, with specific care taken to coagulate vessels prior to division to minimize charring.

2. Cold Dissection Group:

Tonsillectomy was performed using traditional cold steel instruments. The anterior pillar was incised with No 12 scalpel. The tonsil was separated from the fossa using the blunt end of the dissector, and the lower pole was pedicled and removed using an Eves tonsillar snare. Haemostasis was achieved only after removal, using bipolar diathermy for specific bleeding points or by ligature with 3.0 vicryl.

The surgeries were performed by the three authors who were also the investigators.

Outcome Measures

- Blood loss was quantified by measuring suction aspirate volume (excluding adenoidectomy loss).
- Postoperative pain was assessed via Visual analog scale (VAS) while in the hospital from the patient. Once the patient was discharged, the parents were asked to maintain a diary with pain intensity on a VAS from 1 to 10 on day-to-day basis. However, for the ease of analysis only presence and absence of pain was recorded.
- Analgesic consumption (number of doses and days) was recorded by parents in the diary and submitted to investigator during follow up visits.
- The time taken to return to a normal diet, normal activity was also recorded by parents and informed during follow up visits. Normal diet was defined as able to take solid food similar to pre operative state. Normal activity was defined as resuming school and routine play activities.
- The data was recorded on Microsoft Excel sheet for analysis

Statistical Analysis

Data were analysed in SPSS statistics 20 using mean and standard deviations for demographic data, unpaired *t*-tests for the

blood loss and for the pain scores. Sample size calculations indicated that 26 children per group were required to detect a difference of 1 standard deviation in recovery time with a power of 0.9 at an alpha level of 0.05. We were able to recruit 30 children in each limb.

RESULT

Study Population and Demographics

A total of 60 children were recruited for the study who completed the full protocol and were available for analysis.

The final cohort consisted of 30 children each in the Hot Dissection (Diathermy) and Cold Dissection group. The demographic analysis revealed no statistically significant differences between the two groups regarding age, sex, or weight (Table 1). The mean age was 8.2 and 8.6 years in hot dissection and cold dissection group respectively. This baseline homogeneity ensures that any observed differences in postoperative morbidity can be attributed to the surgical technique rather than confounding patient variables.

Table 1: Patient Demographics and Baseline Characteristics

Characteristic	Hot Dissection (n=30)	Cold Dissection (n=30)	P-value
Mean Age (years)	8.2 (SD 2.1)	8.6 (SD 2.0)	0.98
Sex (M/F)	13 / 17	11 / 19	0.65
Mean Weight (kg)	30.3 (SD 7.8)	29.4 (SD 9.1)	0.99

Intraoperative Findings

The difference between the two techniques was observed in intraoperative haemostasis. The Hot Dissection group demonstrated a statistically significant reduction in intraoperative blood loss compared to the Cold Dissection group.

- **Blood Loss:** The mean intraoperative blood loss was 5 mL (95% CI, 3.0 – 7.0) for the Hot Dissection group, compared to 43.7 mL (95% CI, 36.4–51.0) for the Cold Dissection group ($P < .001$). This represents a greater than 80% reduction in blood loss when diathermy is used for both dissection and haemostasis.
- **Operative Time:** While precise operative timing was secondary to the study aims, the Hot Dissection technique showed a trend toward shorter operative duration due to the simultaneous nature of dissection and coagulation and there was a statistical significance in this cohort (Table2).

Table 2: Intraoperative Outcomes

Outcome Measure	Hot Dissection (Mean ± SD)	Cold Dissection (Mean ± SD)	P-value
Intra-operative Blood Loss (mL)	5 ± 2.0	43.7 ± 18.4	< 0.001
Haemostasis time (mins)	5.1 ± 1.5	16.4 ± 2.8	< 0.01

Postoperative Recovery

The analysis of postoperative morbidity revealed that the immediate outcomes in the hospital setting were similar, significant divergence occurred after discharge.

- **Pain Scores:** Objective pain scores (using VAS scale) in the immediate post-operative period showed no significant difference ($P > .05$), possibly due to the fact that the inflammatory response is similar regardless of the thermal energy used.
- **Total Analgesic Consumption:** Over the 15-day home recovery period, children in the hot dissection group required significantly more pain relief. The mean total doses consumed were 31.7 (SD 6.2) in the Hot group compared to 23.2 (SD 10.1) in the Cold group ($P = .02$). This indicates a prolonged duration of severe pain necessitating medication.
- **Dietary Return:** The return to a normal solid diet was significantly delayed in the diathermy group. The median time

to tolerate a normal diet was 9.5 days (95% CI, 7–11) for the Hot Dissection group, compared to 6.0 days (95% CI, 3–8) for the Cold Dissection group ($P < .05$). This 3.5-day delay represents a clinically significant burden on the child and caregivers.

Complications

A significantly higher proportion of patients in the Hot Dissection group sought medical attention after discharge. 16 children (53%) in the Hot group visited ENT OPD for complications, compared to only 10 children (33.3%) in the Cold group ($P <.05$). Reasons for Consultation were uncontrolled pain and otalgia (ear pain). Severe throat pain as a primary complaint was three times more common in the Hot group. No Secondary haemorrhage was reported in either group.

Summary of Findings

The findings of this study validate a specific trade-off in tonsillectomy outcomes. The Hot Dissection method has significant benefits during surgery, such as an 80% decrease in blood loss. However, this comes at the cost of significantly increased postoperative morbidity. The Cold Dissection group, despite higher intraoperative bleeding, got back to their normal diet faster (by 3.5 days), needed fewer painkillers overall (by around 7 doses), and had fewer unscheduled medical visits.

These findings align with the hypothesis that thermal energy causes deeper tissue injury that manifests as delayed pain during the healing phase. While the reduction in blood loss is statistically significant, its clinical relevance in a hemodynamically stable child is debatable when weighed against the extended recovery period observed in the Hot Dissection cohort.

DISCUSSION

The present study was designed to evaluate the morbidity profile of electrocautery (hot) dissection tonsillectomy versus traditional cold dissection in a paediatric cohort. The main results show that there is a clear trade-off in surgery: hot dissection greatly reduces blood loss during surgery, but it also leads to more problems after surgery, such as needing more analgesics, taking longer to get back to a normal diet, and needing more medical care. These results contradict the increasing inclination towards electrosurgical techniques, requiring a meticulous comparison with similar studies to elucidate the actual influence of thermal energy on the pharyngeal recovery process.

Our study finding that hot dissection diminishes intraoperative blood loss by roughly 80% aligns with the prevailing literature. Cochrane Review (1) also looked at bipolar electro dissection and dissection/snare procedures and found that the electrosurgical group had a lot less bleeding during the procedure. The Cochrane Review (2011) (1) also backs up this agreement by combining data from several studies and finding a mean difference of 21.56 mL in favour of diathermy. The consistency of this finding across studies validates that simultaneous coagulation is technically preferable for preserving a dry surgical field. Nonetheless, as indicated in our findings and corroborated by MacGregor et al. (8), the therapeutic relevance of conserving 45–50 mL of blood in a haemodynamically stable infant is minimal when compared to the postoperative consequences.

The finding in our study about the significant increase in late-phase pain and analgesic use in the hot dissection group. This contradicts the findings of OP Singh et al. (5), who observed no significant difference in postoperative discomfort between electrodissection and ligation procedures in children. Our study similarly revealed no difference in discomfort within the first 24 hours. The difference only showed up after discharge, with the biggest difference being around days 5–7. Research that confines observation to the initial hospital stay does not account for the "secondary pain peak" resulting from the

detachment of the thermal eschar and the formation of new nerve endings, which heighten pain sensitivity. Also, Kujawski et al. (9) observed that utilising a tiny bipolar approach caused less discomfort than employing a macroscopic dissection. The fact that an electrical based dissection generated less discomfort, which seems to contradict what we would expect, is perhaps because the dissection was so precise. Kujawski's utilisation of the microscope facilitated precise subcapsular dissection, thereby safeguarding the superior constrictor muscle. In contrast, typical macroscopic diathermy, employed in our hot dissection group, was also utilised by S. Ghosh et al. (2) and Kamar MN et al. (4); it frequently entails "blind" thermal propagation to the muscle bed, resulting in increased inflammation and trismus. This indicates that it is not the electricity per se, but rather the extent of thermal injury in relation to the muscle plane that determines pain intensity.

The delay in resumption of normal diet noted in our hot dissection group (9.5 days vs. 6.0 days) serves as a major indicator of morbidity. This is in line with what Dorkar SN et al. (10) found, which was that patients who had electro-dissection took longer to get back to their typical activities than those who had sharp dissection. On the other hand, MacGregor et al. (8) did not find a statistically significant difference in the time it took for the bipolar and blunt dissection groups to go back to their normal diet. The discrepancy may stem from the distinct power settings and instrumentation; our study used monopolar diathermy at 20W for coagulation, potentially producing greater lateral heat compared to the bipolar forceps utilised by MacGregor. The long-lasting dysphagia in our diathermy dissection group is closely linked to the need for more painkillers, which creates a cycle in which pain makes it hard to eat and inadequate nutrition may slow down mucosal repair.

Bleeding is still the most feared consequence following tonsillectomy. Our study observed no secondary haemorrhage rates, which is similar to the Cochrane Review (2011) (1) meta-analysis, which reported an odds ratio of 0.56 (95% CI 0.19 to 1.63) suggesting no obvious advantage for either approach when it comes to late bleeding. However, previous data from Knubb et al. (3) and OP Singh et al. (5) indicated secondary haemorrhage rates reaching 7% for diathermy, markedly above those of cold methods. Even though current methods have probably gotten better, the biological possibility of more bleeding still exists. This is because separating a thick thermal eschar leaves a bigger raw surface area open to oral trauma than the organised granulation tissue of a cold steel wound.

CONCLUSION

In summary, this study shows that electrocautery (hot) dissection tonsillectomy gives the surgeon the benefit of a dry operating field, but it puts the burden of morbidity on the child during the home recovery period. The "hot" approach is linked to a statistically significant rise in analgesic use, a considerable delay in resuming a normal diet, and a twofold rise in the requirement for unscheduled medical consultations.

In relation to the larger body of literature, our findings elucidate a significant differentiation: immediate postoperative comfort does not serve as a predictor for late-phase recovery. The biphasic nature of heat injury indicates that studies examining only the initial 24 hours will erroneously determine equivalence across treatments. While precise, microscopic bipolar approaches (as delineated by Kujawski et al) may alleviate this damage, conventional macroscopic diathermy seems to inflict adequate collateral thermal damage to extend recovery.

For the usual paediatric tonsillectomy, cold steel dissection with selective haemostasis is the best way to reduce child discomfort and healthcare use. Surgeons must consider the advantage of a bloodless field in relation to the prolonged healing period for the youngster. Future research should

concentrate on "precision" solutions that integrate the haemostatic efficacy of diathermy with the tissue conservation of cold steel.

Declaration by Authors

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