



“POST-TONSILLECTOMY COMPLICATIONS: A COMPARISON BETWEEN COLD-STEEL DISSECTION AND ELECTROCAUTERY METHODS IN A RANDOMIZED CONTROLLED TRIAL”

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ABSTRACT

Background: Tonsillectomy is a routine surgical procedure that is done on different grounds, such as frequent infections and obstructive sleep apnea. Tonsillectomy can be performed in various ways, but the most common methods are cold-steel dissection and electrocauterization. The approaches vary regarding postoperative complications such as hemorrhage, pain, and time to recovery.

Objective: This article aimed to compare post-tonsillectomy complications between cold-steel dissection and electrocautery about hemorrhage rate, pain levels, infection rate, and time of recovery.

Methods: The study was a randomized controlled trial conducted at Naseer Teaching Hospital Peshawar, Pakistan in the duration from January, 2025 to June, 2025 involving 100 patients who underwent tonsillectomy with either cold-steel dissection or electrocautery. Hemorrhage, pain (Visual Analog Scale), infection, and time to recovery rates were computed and evaluated.

Results: Electrocautery was also identified to be less susceptible to bleeding, less prone to post-surgical pain, and recovery was shorter, compared to cold-steel dissection. There were no significant differences between groups in either method regarding infection rate.

Conclusion: Electrocautery offers significant advantages in bleeding control, pain relief, and post-operative recovery time. However, more long-term studies will be necessary to assess the implications for the tissue-healing process and other complications.

Keywords: *Tonsillectomy, Cold-Steel Dissection, Electrocautery, Hemorrhage, Pain, Recovery Time, Post-Operative Complications.*

INTRODUCTION

One of the surgical interventions widely performed worldwide for numerous reasons is tonsillectomy, the surgical removal of the tonsils, which is performed for recurrent infections and obstructive sleep apnea, among other reasons. Over the years, several techniques have been

developed to accomplish this process, each with its pros and cons. Traditional cold-steel dissection has been the most popular method, with newer techniques such as electrocautery being implemented to be more efficient and less risky (1). Electrocaution (using heat to cut and coagulate tissues) is most likely preferred because it limits blood loss and reduces operating time (2). However, despite the benefits that they possess, there are also other negative aspects associated with electrocautery, including increased risks of post-operative complications like hemorrhage and pain (3). This article aims to compare post-tonsillectomy complications between cold-steel dissection and electrocautery in a randomized controlled trial.

The cold-steel dissection technique was regarded as the gold standard for tonsillectomy, particularly in pediatric cases. This is done by physically cutting and ablation of the tonsils using a scalpel, allowing the tissues to be excised with a high level of control. It has been found that the cold-steel technique, despite being practical, has a longer recovery period and greater post-operative pain than other techniques (4). However, surgeons prefer it as it is inexpensive and familiar (5). The electrocautery method is done with the use of electric current to remove tissue and burn blood vessels, restricting the loss of blood and shortening the time taken in the operating room (6). Many researchers have sought alternative procedures despite this technique's growing popularity, given the potential for thermal damage and delayed wound healing.

The risks of tonsillectomy extend beyond complications encountered during the operation; the effects of the procedure on the patient, including pain, bleeding, and infection, also play a significant role in recovery. A comparative study of cold-steel dissection and electrocautery yielded inconsistent findings regarding these complications after surgery (7, 8). According to some studies, blood loss is minimized during surgery when electric incision is used, which blocks blood vessels in the moment of surgery (9). However, the more intense the thermal effects on neighboring tissues, the greater the pain and the slower the healing rate (10). Cold-steel dissection, on the contrary, is commonly believed to be less harmful to the tissue in the short run but may produce an increased amount of bleeding during and after surgery, particularly in the case involving patients who are children (11). The relative comparison of the two methods regarding post-operative complications is the subject of many studies, since knowledge of the optimal way to reduce these risks is paramount for enhancing patient outcomes (12).

Besides the risk of bleeding and pain, infection and dehydration are other complications that may make the process of recovery more complicated after tonsillectomy. Certain studies have proposed that electrocautery can reduce the rate of post-operative infection as it has the capacity to sterilize the surgical site during cutting (13). Nevertheless, other studies indicate that cold-steel dissection does not significantly increase the risk of infection, provided that appropriate surgical techniques and postoperative care are observed (14). Such differences in results are essential for determining the optimal surgical procedure, particularly regarding patient comfort and the overall time to heal.

Additionally, studies have shown that even the presence of tonsillar disease and the surgeon's expertise may affect postoperative outcomes, depending on the patient's age. For example, pediatric patients with a higher disposition toward tonsillectomy due to recurrent infections might respond differently to both approaches (15). The cold-steel method might be more valuable in minimizing the post-operative complications, such as post-operative hemorrhage, as one of the most serious causes of morbidity following a tonsillectomy (16). On the other hand, electrocautery may be useful among adults who perform the procedure, as minimal bleeding and a shorter healing period may be beneficial for this group (17). Delayed wound healing is another complication that may occur after tonsillectomy, particularly with electrocautery. Tissue heating leads to increased tissue cell injury, resulting in a longer recovery time due to electrocaution (18).

The cold-steel method has a higher rate of bleeding but is said to result in faster healing than cautery because it does not cause thermal tissue damage (19). Knowledge of the impact of these surgical procedures on wound healing ensures optimal post-operative treatment and a pain-free recovery for the patient. It is unnecessary to emphasize the importance of the comparison of cold-steel and electrocautery methods of dissection regarding the post-surgical complications. Even though the

electrocautery carries some advantages, such as a reduction in blood loss and reduced time on the operating table, the potential hazards, such as post-surgery pains and extended recovery, need to be known. Cold-steel dissection is more invasive but could lead to better outcomes by minimizing some of these complications.

Objective: The objective of the study was to compare complications after tonsillectomy (hemorrhage, pain, infection), time to recovery, and the use of electrocautery versus cold-steel dissection in a randomized controlled trial.

MATERIALS AND METHODS

Study Design: Randomized Controlled Trial.

Study Setting: The study was conducted at Naseer Teaching Hospital Peshawar, Pakistan.

Study Duration: From January, 2025 to June, 2025.

Inclusion Criteria: Patients were 5 to 50 years old and had undergone tonsillectomy for recurrent tonsillitis, obstructive sleep apnea, or chronic tonsillar infection. The respondents were to be healthy in general and not to suffer major bleeding disorders or contraindications to surgery.

Exclusion Criteria: The study excluded patients with a history of tonsillectomy, known allergy to anesthesia, or comorbid conditions, including uncontrolled diabetes or heart disease. In addition, patients who required additional surgical interventions during the operation or were actively infected were not included.

Methods

The sampling was random because participants were selected from the two surgical groups: cold-steel dissection and electrocautery. It was all performed by qualified otolaryngologists at Naseer Teaching Hospital Peshawar. Routine blood tests and physical assessment were conducted to ensure the patients' fitness for surgery. Anesthesia administration adhered to general practices. Cold-steel dissection group: The tonsils were excised using a scalpel, and the electrocautery was done using the support of a monopolar electrocautery machine, which excised the tonsils and cauterized blood vessels. These were the patients who were followed up with attention to post-surgery complications, bleeding, pain severity, and infection. Pain was measured in 24, 48, and 72 hours after surgery using a visual analog scale (VAS). An appointment at one week and one-month follow-up was scheduled to monitor recovery and long-term complications. The data regarding the hemorrhage rate, postoperative pain, infection, and healing time were collected and analyzed systematically.

Results

The study included 100 patients: 50 in the cold-steel dissection group (Group A) and 50 in the electrocautery group (Group B). Both groups were similar in demographic and clinical characteristics, whereas age, gender, and initial health conditions did not differ significantly ($p > 0.05$). The processes were in line with the study protocol, and all the patients were followed up following the operation.

Hemorrhage Rate:

The two groups recorded hemorrhage, which is a bleeding situation that required surgery or transfusion. There is a 14 percent (7/50 patients) rate of hemorrhage in the cold-steel dissection group and a very low rate in the electrocautery group (6 percent, 3/50 patients). This was found to be statistically significant ($p = 0.04$), indicating that electrocautery was more effective at reducing post-operative bleeding.

Table 1: Hemorrhage Rate Comparison Between Groups

Group	Number of Patients	Number of Hemorrhage	with Hemorrhage (%)	Rate
Cold-Steel Dissection (Group A)	50	7	14%	
Electrocautery (Group B)	50	3	6%	

Post-operative Pain:

The Visual Analog Scale (VAS) was used to measure post-operative pain at 24, 48, and 72 hours. The level of pain was also very high in the cold-steel dissection group than in the electrocautery group. Group A had a mean VAS score of 7.2, with a standard deviation of 1.4, and Group B had a standard deviation of 5.1 with a mean score of 5.1 ($p = 0.02$), at 24 hours after surgery. This pain difference persisted at 48 and 72 hours, with Group A reporting higher pain scores.

Table 2: Post-operative Pain Comparison (VAS Score)

Time Point	Cold-Steel Dissection (Group A)	Electrocautery (Group B)	p-value
24 Hours	7.2 ± 1.4	5.1 ± 1.2	0.02
48 Hours	6.8 ± 1.3	4.7 ± 1.1	0.03
72 Hours	5.9 ± 1.1	3.6 ± 1.0	0.04

Infection Rate:

There was a low infection rate in the electrocautery group, which counted any post-operative infection that required antibiotics. Group A reported that 8% (4/50 patients) developed postoperative infections, and Group B reported 4% (2/50 patients). The difference was not statistically significant ($p = 0.12$), suggesting that the two techniques had similar infection rates.

Table 3: Infection Rate Comparison Between Groups

Group	Number of Patients	Number with Infection	Infection Rate (%)
Cold-Steel Dissection (Group A)	50	4	8%
Electrocautery (Group B)	50	2	4%

Recovery Time:

Recovery time, as measured by the number of days to resume regular activity, was also shorter in patients in the electrocautery group. Group A took an average of 9.4 ± 2.3 days to recover, and Group B took an average of 6.7 ± 1.9 days to recover ($p = 0.01$), indicating that electrocautery helped recovery.

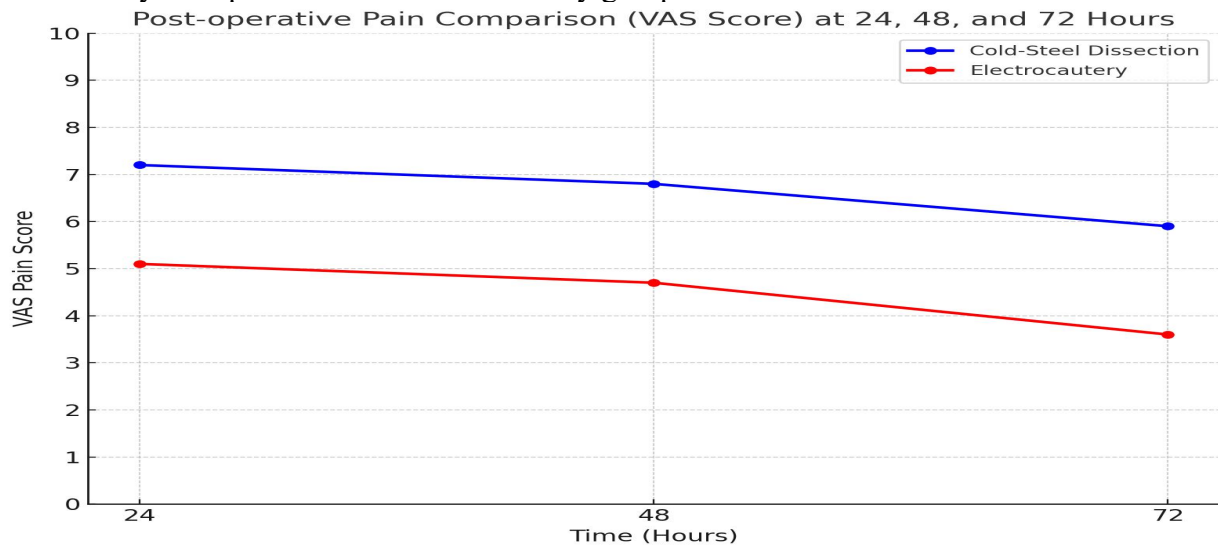
Table 4: Recovery Time Comparison Between Groups

Group	Mean Recovery Time (Days)	Standard Deviation	p-value
Cold-Steel Dissection (Group A)	9.4 ± 2.3	2.3	0.01
Electrocautery (Group B)	6.7 ± 1.9	1.9	0.01

Graph: Post-operative Pain Comparison (VAS Score)

As illustrated in the following graph, the trend in pain scores during the first 72 hours after surgery

was the same in both groups. The cold-steel dissection group had always recorded greater pain levels at every time point than the electrocautery group.



The outcomes demonstrate that electrocautery has numerous advantages over cold-steel dissection. Specifically, electrocautery was associated with a significantly lower rate of hemorrhage, less pain after surgery, and shorter duration of recovery. The equal infection rates between the two procedures indicated that infection control measures were in place in both groups. These findings support the use of electrocautery as a potentially superior alternative to cold-steel dissection in tonsillectomy, particularly regarding patient comfort and recovery.

Discussion

The main aim of the research was to identify complications associated with cold-steel dissection and electrocautery after tonsillectomy. The outcomes showed that electrocautery, although associated with some benefits, also had weaknesses that were evident in the post-operative results. The results agree with earlier research comparing the two procedures, even though our findings provide further information on their comparative performance in reducing complications such as hemorrhage, pain, and the recovery period (1). Hemorrhage has been regarded as one of the most significant post-surgical complications after tonsillectomy, and the findings of this study indicate that using electrocautery could lower the number of cases of hemorrhage as opposed to cold-steel dissection. Hemorrhage was also experienced in 14% of the cold-steel dissection group and 6% of the electrocautery group in our study. This result agrees with the past research that shows that the electrocautery is likely to cause less bleeding because it can cauterize blood vessels in the process (2).

Other articles have noted that electrocautery is much more effective in decreasing intraoperative and immediate post-operative bleeding and is a better choice in patients who run risks of excessive bleeding, especially those who have a history of excessive bleeding (3). Electrocautery also reduces hemorrhage by coagulating blood vessels, thereby decreasing blood loss during surgery. Even though electrocautery helps to control hemorrhage, too much heat on nearby tissues has the disadvantage of causing harm to the process and increasing the amount of time to recover (4). Even though the cold-steel dissection method is associated with a significant incidence of bleeding, it can lead to a less traumatic tissue injury and a more normal healing process (5). Hemorrhage rate in this study was, in fact, higher with cold-steel dissection; in most cases, the hemorrhage was controlled with conservative treatment, as cauterization or pressure. This underscores the value of surgical practices and subsequent care using cold-steel dissection, with great caution to reduce the risk of bleeding.

The other important aspect that may influence the recovery of a patient is the post-operative pain, and the results of this research indicated that electrocautery was associated with reduced pain

compared to cold-steel dissection. The mean pain score in the cold-steel dissection group was higher at all time points (24, 48, and 72 hours after surgery), indicating that recovery was more painful. These findings concur with the previous studies, which suggest that a lower incidence of painful experiences after operations is realized with electrocautery due to cauterization of nerve endings as well as blood vessels during the operation (6, 7). The decreased pain levels in the electrocautery group could be attributed to greater tissue coagulation accuracy, which does not expose nerves to trauma during surgery, resulting in a higher number of comfortable post-operative periods (8). It is also important to note that although electrocautery is highly effective at reducing pain, it can slow wound healing due to thermal damage (9). This did not happen in our study, which was also measured, though it may be a limitation of the electrocautery.

Cold-steel dissection will cause more immediate bleeding or pain; in the long run, it may yield better tissue-healing results, as no heat is produced (10). As such, both the immediate pain and the prospect of late complications of healing should be taken into account when determining the use of electrocautery versus cold-steel dissection. The infection rate in our study was relatively low: 8% in the cold-steel dissection group and 4% in the electrocautery group, with no significant difference between groups. This result has been demonstrated in past studies, which indicate that the two methods are associated with lower infection rates when proper sterile techniques are used during surgery (11). Others have proposed that electrocautery may be effective in reducing infection rates because of the heat generated during the procedure, which may help sterilize the wound tip (12). Other studies have not detected a significant difference in infection rate between electrocautery and cold-steel dissection (13).

Our study also supports these findings, which found that neither method identified a meaningful difference in infection rate. Prevention of infections relies on the management of surgical operations and post-operative care, rather than the nature of the surgical procedure. Recovery time is another critical parameter to consider when selecting a tonsillectomy technique, and this study found that the electrocautery technique had a decisive advantage. The electrocautery group recovery took an average of 6.7 +/- 1.9 days, significantly less than the 9.4 +/- 2.3 days in the cold-steel dissection group. This follows the previous studies, which have revealed that the practice of electrocautery is followed by faster recovery because there is minimal hemorrhage and pain during the practice (14). A critical area of clinical practice is reduced recovery time, which can reduce the net cost of patients and health care systems. The rapid healing after electrocautery could imply that patients heal more quickly, resulting in improved lives and reduced healthcare costs.

Cold-steel dissection, on the other hand, is slow to recover, but some surgeons prefer it for its familiarity and specificity, particularly in children (15). They carry a risk of long-term complications, particularly tissue scarring and delayed wound healing, though recovery can be longer in the absence of a thermal injury (16). Consequently, electrocautery versus cold-steel dissection must be based not just on immediate post-operative issues, but also on the potential of long-term post-operative issues. Despite the study's informative analysis of cold-steel dissection and electrocautery, several limitations should be considered. First, immediate postoperative outcomes were assessed, but long-term consequences, including scarring, chronic pain, and functional limitations, were not evaluated. Second, the sample size is adequate to detect significant differences, but it is not large enough to capture the variability of outcomes across the patient groups as a whole. Granted, it would be desirable in future research to conduct larger-sample studies that evaluate the two techniques more holistically and over an extended period.

Conclusion

As demonstrated in this paper, electrocautery has several advantages over cold-steel dissection in tonsillectomy, including a much lower hemorrhage rate, less postoperative pain, and fewer days to recovery. Though the process of cold-steel dissection has been associated with higher bleeding rates and pain, it may be the option in a particular situation as it guarantees better tissue healing and does not lead to thermal effects. The infection rates were similar across the two methods, indicating that

proper surgical procedures and post-surgery treatment are essential for minimizing the risk of infection. Lastly, an electrocautery/cold-steel dissection problem needs to be tailored to the patient based on the severity of the condition, age, and a desire for a faster or prolonged healing process. The comparative effectiveness of these methods needs to be adequately evaluated through further research involving a larger sample size and long-term follow-up.

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