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OUTCOME OF TONSILLECTOMY BY DISSECTION METHOD VS BIPOLAR DIATHERMY

Original Research

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ABSTRACT

Background: Tonsillectomy remains one of the most frequently performed surgical procedures among children and adolescents worldwide, typically indicated for recurrent tonsillitis or obstructive sleep-disordered breathing. Two commonly practiced surgical approaches include the conventional cold dissection method and bipolar diathermy technique. Postoperative throat pain is a key concern influencing recovery, quality of life, and return to normal function. Despite existing studies, comparative evidence from local populations remains limited.

Objective: To compare the postoperative pain outcomes of tonsillectomy performed via dissection method versus bipolar diathermy in patients aged 4 to 18 years.

Methods: This randomized controlled trial was conducted at the Department of ENT – Head and Neck Surgery, Lady Reading Hospital, Peshawar, from July 12, 2024, to January 12, 2025. A total of 84 patients aged 4–18 years undergoing tonsillectomy were equally divided into Group A (dissection method) and Group B (bipolar diathermy) through blocked randomization. Pain was assessed 24 hours postoperatively using the Visual Analogue Scale (VAS; 0 = no pain, 10 = worst pain). Demographic characteristics, socioeconomic status, residence, and speech outcomes were also recorded. Data were analyzed using SPSS version 22, with $p \leq 0.05$ considered statistically significant.

Results: The mean age was 11.36 ± 4.11 years in Group A and 10.26 ± 4.79 years in Group B. The mean VAS pain score at 24 hours was significantly lower in Group A (1.21 ± 1.22) compared to Group B (1.88 ± 1.13), with a p-value of 0.01. Pain incidence was 59.5% in Group A versus 81.0% in Group B ($p = 0.03$), while absence of pain was more frequent in Group A (40.5%) than Group B (19.0%).

Conclusion: Tonsillectomy using the dissection method demonstrated significantly lower postoperative pain compared to bipolar diathermy, highlighting its potential benefit in patient comfort and recovery.

Keywords: Bipolar Diathermy, Dissection Technique, Postoperative Pain, Randomized Controlled Trial, Tonsillectomy, Visual Analogue Scale, Young Patients.

INTRODUCTION

Tonsillectomy remains one of the most commonly performed surgical procedures worldwide, particularly among pediatric populations. Each year, over half a million children under the age of 15 undergo this surgery, primarily for two major indications: sleep-disordered breathing and recurrent tonsillitis (1). The procedure itself involves the complete removal of the tonsils, including the tonsillar capsule, through dissection within the peritonsillar space between the capsule and the pharyngeal musculature, with or without concurrent adenoidectomy. According to the American Academy of Otolaryngology-Head and Neck Surgery, the term "tonsillectomy" may sometimes encompass adenoidectomy as well, especially in the context of treating obstructive sleep-related conditions (2–5). Despite its widespread use and therapeutic benefits, tonsillectomy is not without risks. One of the most concerning complications is post-operative hemorrhage. A large-scale study involving more than 100,000 pediatric cases from 2009 to 2013 found that 2.8% of patients experienced unplanned revisits due to post-operative bleeding. Of these, 1.6% required emergency care, while 0.8% underwent a secondary surgical intervention (6). Notably, hemorrhagic episodes tend to occur during specific nighttime and early morning hours, primarily between 10 PM to 1 AM and 6 AM to 9 AM. This temporal pattern is hypothesized to result from factors such as circadian rhythm fluctuations, the vibratory trauma of snoring, and dehydration of the oropharyngeal mucosa due to habitual mouth breathing. The risk is further elevated in individuals with underlying coagulopathies, necessitating vigilant perioperative assessment and management (7,8).

Surgical techniques for tonsillectomy have evolved over time, with different methods showing variable outcomes in terms of pain, healing, and risk of complications. The traditional dissection method involves incising the pharyngeal mucosa with scissors and carefully separating the tonsil from the surrounding musculature. Hemostasis is achieved by ligating or suturing blood vessels after removal (9,10). In contrast, bipolar diathermy utilizes electric current passing between two prongs of a forceps-like instrument to simultaneously dissect tissue and coagulate vessels. Although initially used only for hemostasis, bipolar diathermy has gained traction as a standalone technique capable of performing both dissection and bleeding control efficiently (11,12). Emerging evidence suggests differences in patient outcomes between these two approaches. For instance, one study reported lower mean post-operative throat pain scores in the dissection method compared to bipolar diathermy (1.59 ± 0.57 vs 1.93 ± 0.99), indicating a potential benefit in terms of patient comfort (13,14). While several international studies have compared these techniques, there remains a paucity of localized data assessing the efficacy and outcomes of dissection versus bipolar diathermy tonsillectomy within the local population. This gap underscores the need for context-specific evidence to guide clinical decision-making. The present study aims to address this deficiency by systematically comparing post-operative outcomes between dissection and bipolar diathermy methods. By doing so, it seeks to provide evidence-based recommendations to improve surgical practice and enhance patient care in our clinical setting.

METHODS

This randomized controlled trial was conducted at the Department of ENT – Head and Neck Surgery, Lady Reading Hospital, Peshawar, over a six-month period from July 12, 2024, to January 12, 2025, following ethical approval from the Institutional Review Board (IRB). Informed consent was obtained from the parents or guardians of all participants prior to enrollment. A total of 84 patients aged between 4 and 18 years, scheduled for elective tonsillectomy, were included in the study. Participants were recruited through consecutive non-probability sampling and then randomly allocated into two equal groups using blocked randomization based on a sample size calculated from previously reported post-operative throat pain means in dissection (1.59 ± 0.57) and bipolar diathermy techniques (1.93 ± 0.99), with 80% power and a 95% confidence level (14). Eligibility criteria included patients aged 4 to 18 years undergoing tonsillectomy for either recurrent tonsillitis or sleep-disordered breathing. Exclusion criteria, although not explicitly stated, should have ideally included patients with bleeding disorders, syndromic conditions, prior history of peritonsillar abscess, or any concurrent procedures such as adenoidectomy, which could confound pain perception or healing outcomes.

Group A underwent conventional dissection tonsillectomy. The procedure involved a mucosal incision along the palatoglossal fold using a No. 12 blade, followed by meticulous dissection of the peritonsillar connective tissue. The tonsil was then excised using Eve's wire snare, and hemostasis was achieved using absorbable ligatures. Group B received bipolar diathermy tonsillectomy, where dissection was

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performed from the superior to inferior pole using bayonet bipolar forceps, with simultaneous cauterization of vessels to ensure adequate intraoperative hemostasis. In both groups, complete hemostasis was confirmed before the conclusion of the surgery. Baseline demographic variables including age, gender, weight, residence (urban/rural), and socioeconomic status (categorized as low, middle, high) were recorded preoperatively. The primary outcome was postoperative throat pain assessed 24 hours after surgery using a validated Visual Analogue Scale (VAS) ranging from 0 (no pain) to 10 (worst imaginable pain). Secondary outcomes included the duration of tonsillitis prior to surgery and speech status postoperatively (categorized as normal or hypernasal). Data were collected using structured and pre-validated questionnaires under the supervision of ENT consultants, each with a minimum of five years of post-fellowship clinical experience. Data were analyzed using SPSS version 22. Continuous variables such as age, duration of tonsillitis, and pain scores were presented as mean ± standard deviation, while categorical variables including gender, socioeconomic status, residence, pain intensity categories, and speech status were reported as frequencies and percentages. The Chi-square test was applied for between-group comparisons of categorical variables, particularly postoperative pain, with a p-value of ≤0.05 considered statistically significant. Stratification was conducted for key variables including age, gender, residence, socioeconomic status, and speech status to control for potential confounders.

RESULTS

The study enrolled 84 patients who were equally divided into two groups. The mean age of patients in Group A (dissection method) was 11.36 ± 4.11 years, while in Group B (bipolar diathermy), it was 10.26 ± 4.79 years. The average duration of tonsillitis prior to surgery was 4.83 ± 1.58 days in Group A and 5.07 ± 1.46 days in Group B. Gender distribution showed that in Group A, 64.3% (n=27) were male and 35.7% (n=15) were female, whereas Group B comprised 54.8% (n=23) males and 45.2% (n=19) females. Regarding socioeconomic status, the majority of participants in both groups fell within the middle-income bracket (61.9% in Group A and 59.5% in Group B), with a smaller proportion from low (23.8% vs 28.6%) and high-income strata (14.3% vs 11.9%). In terms of residence, urban dwellers constituted 61.9% of Group A and 64.3% of Group B. Speech status post-surgery revealed that 57.1% of Group A had normal speech, compared to 33.3% in Group B. Conversely, hyper-nasality was observed in 42.9% of patients in Group A and 66.7% in Group B. Postoperative throat pain was significantly lower in Group A, with a mean VAS score of 1.21 ± 1.22 compared to 1.88 ± 1.13 in Group B (p = 0.01). Pain incidence was 59.5% (n=25) in Group A and 81.0% (n=34) in Group B (p = 0.03), whereas absence of pain was reported by 40.5% in Group A and only 19.0% in Group B.

Stratified analysis showed significant differences in pain outcomes among males, with 91.3% of males in Group B reporting pain compared to 59.3% in Group A (p = 0.01). Among females, no statistically significant difference in pain was observed (p = 0.61). For patients with normal speech, the pain incidence was lower in Group A (41.7%) than in Group B (64.3%), though the difference was not statistically significant (p = 0.17). However, among hypernasal patients, high rates of pain were reported in both groups (83.3% vs 89.3%, p = 0.55). Analysis by socioeconomic status revealed a trend of more pain among lower and middle-income patients in Group B, though without statistical significance. Urban participants in Group B experienced significantly more pain (88.9%) compared to Group A (57.7%, p = 0.01), while no significant difference was observed among rural patients (p = 0.80). Regarding age, younger participants (4–10 years) and adolescents (11–18 years) in Group B experienced more pain than those in Group A, though these differences were not statistically significant. Pain was significantly more frequent in Group B among those with a shorter duration of tonsillitis (3–5 days), where 81.8% experienced pain versus 48.0% in Group A (p = 0.01). No significant difference was observed in the subgroup with symptoms lasting more than five days (p = 0.79).

Table 1: Demographics

Demographics		**Groups**			
		Group A (Dissection method)		**Group B (Bipolar diathermy)**	
		N	**%**	**N**	**%**
Gender	Male	27	64.3%	23	54.8%
	Female	15	35.7%	19	45.2%
Speech status	Normal	24	57.1%	14	33.3%

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Demographics		**Groups**			
		Group A (Dissection method)		**Group B (Bipolar diathermy)**	
		N	**%**	**N**	**%**
	Hypernasal	18	42.9%	28	66.7%
Socioeconomic status	Low (<50K Rs/Month)	10	23.8%	12	28.6%
	Middle (50K to 100K Rs/Month)	26	61.9%	25	59.5%
	High (> 100K Rs/Month)	6	14.3%	5	11.9%
Residence	Urban	26	61.9%	27	64.3%
	Rural	16	38.1%	15	35.7%

Table 2: Comparison of Postoperative throat pain (VAS) between both groups

		Groups				P value
		Group A (Dissection method)		Group B (Bipolar diathermy)		
		N	%	N	%	
Postoperative throat pain (VAS)	Pain	25	59.5%	34	81.0%	0.03
	No pain	17	40.5%	8	19.0%	

Table 3: Stratification of demographic and clinical parameters with postop throat pain

				Groups				**P value**
				Group A (Dissection method)		**Group B (Bipolar diathermy)**		
				N	**%**	**N**	**%**	
Gender	Male	Postoperative throat pain (VAS)	Pain	16	59.3%	21	91.3%	0.01
			No pain	11	40.7%	2	8.7%	
	Female	Postoperative throat pain (VAS)	Pain	9	60.0%	13	68.4%	0.61
			No pain	6	40.0%	6	31.6%	
Speech status	Normal	Postoperative throat pain (VAS)	Pain	10	41.7%	9	64.3%	0.17
			No pain	14	58.3%	5	35.7%	
	Hypernasal	Postoperative throat pain (VAS)	Pain	15	83.3%	25	89.3%	0.55
			No pain	3	16.7%	3	10.7%	
Socioeconomic status	Low (<50K Rs/Month)	Postoperative throat pain (VAS)	Pain	5	50.0%	9	75.0%	0.22
			No pain	5	50.0%	3	25.0%	
	Middle (50K to 100K Rs/Month)	Postoperative throat pain (VAS)	Pain	16	61.5%	21	84.0%	0.07
			No pain	10	38.5%	4	16.0%	
	High (> 100K Rs/Month)	Postoperative throat pain (VAS)	Pain	4	66.7%	4	80.0%	0.62
			No pain	2	33.3%	1	20.0%	
Residence	Urban	Postoperative throat pain (VAS)	Pain	15	57.7%	24	88.9%	0.01
			No pain	11	42.3%	3	11.1%	
	Rural	Postoperative throat pain (VAS)	Pain	10	62.5%	10	66.7%	0.80
			No pain	6	37.5%	5	33.3%	
	4 to 10		Pain	10	55.6%	17	73.9%	0.21

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				Groups				P value
				Group A (Dissection method)		Group B (Bipolar diathermy)		
				N	%	N	%	
Age distribution (Years)		Postoperative throat pain (VAS)	No pain	8	44.4%	6	26.1%	
	11 to 18	Postoperative throat pain (VAS)	Pain	15	62.5%	17	89.5%	0.44
			No pain	9	37.5%	2	10.5%	
Duration of tonsillitis (Days)	3 to 5	Postoperative throat pain (VAS)	Pain	12	48.0%	18	81.8%	0.01
			No pain	13	52.0%	4	18.2%	
	> 5	Postoperative throat pain (VAS)	Pain	13	76.5%	16	80.0%	0.79
			No pain	4	23.5%	4	20.0%	

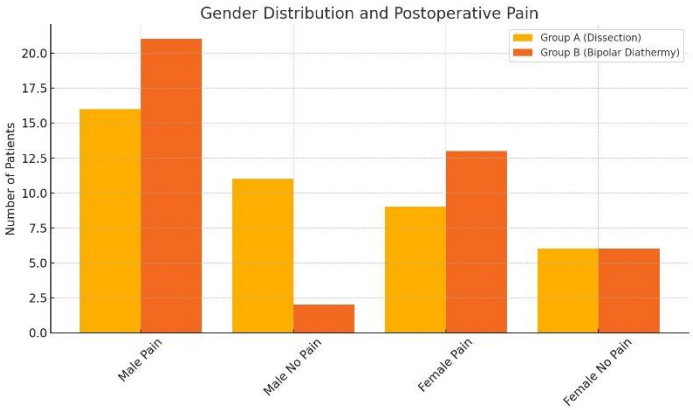


Figure 2 Gender Distribution and Postoperative Pain

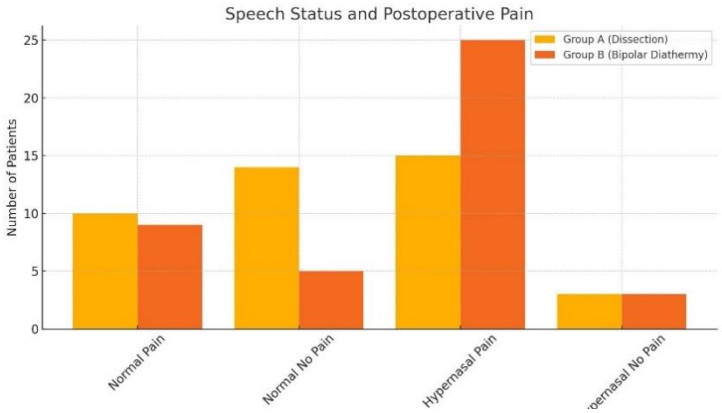
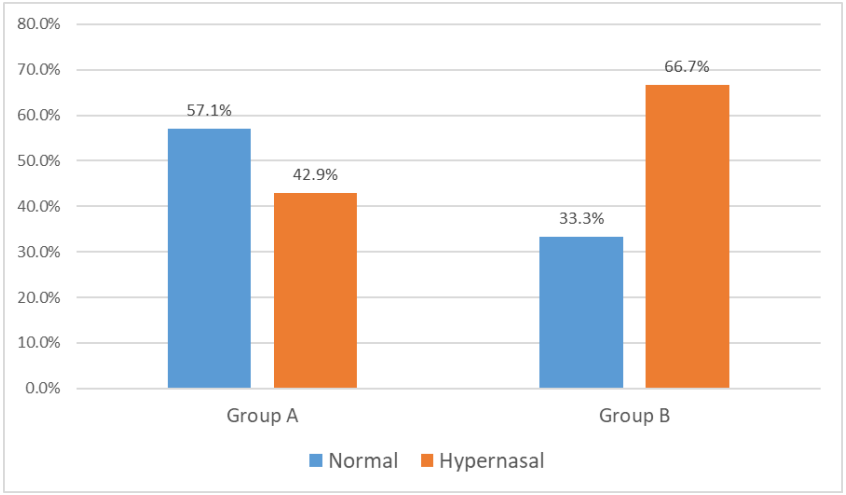


Figure 1 speech Status and Postoperative Pain



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DISCUSSION

The present study assessed and compared the outcomes of tonsillectomy performed via the dissection method and bipolar diathermy, with a particular focus on postoperative throat pain and its association with various demographic and clinical parameters. The findings demonstrated that patients undergoing dissection tonsillectomy reported significantly lower postoperative pain levels, with a mean VAS score of 1.21 ± 1.22, compared to 1.88 ± 1.13 in the bipolar diathermy group ($p = 0.01$). The proportion of patients experiencing pain was also lower in the dissection group (59.5%) relative to the diathermy group (81.0%), while pain-free recovery was more frequently observed among those who underwent the dissection method. These findings are consistent with earlier literature reporting increased postoperative pain associated with thermal techniques, particularly during the early recovery period (15). The greater discomfort observed in the bipolar diathermy group is likely attributed to the thermal injury inflicted on adjacent tissues during electrosurgical dissection, which amplifies local inflammatory responses and slows mucosal healing (16). The present study reinforces the evidence that cold dissection techniques, despite being more time-consuming and potentially associated with increased blood loss, are better tolerated in terms of pain, particularly in pediatric populations and individuals with lower pain thresholds.

On the contrary, the literature has consistently shown that bipolar diathermy significantly reduces intraoperative blood loss, often by half, as compared to the dissection method (17). This hemostatic advantage is primarily due to the technique's ability to simultaneously dissect and coagulate, thereby minimizing intraoperative vascular trauma. This efficiency is particularly relevant in settings where minimizing blood loss is a priority, such as in patients with clotting disorders or in surgical environments with limited transfusion options. Regarding postoperative hemorrhage, the evidence remains inconclusive. Some authors have reported higher rates of secondary hemorrhage following diathermy procedures, likely due to tissue necrosis and delayed eschar separation (18), while others have found no significant difference between the two methods (19). This variability in reported outcomes may be attributed to inconsistencies in the definition of hemorrhagic events—whether including only those requiring surgical re-intervention or also minor bleeding episodes managed conservatively.

Additionally, several studies have noted a reduction in surgical duration with the diathermy method, which aligns with the clinical perception of it being a time-efficient approach (19,20). While this may be advantageous in high-volume surgical centers, the trade-off between surgical efficiency and postoperative morbidity remains a clinical challenge. Surgeons must carefully weigh these outcomes based on patient-specific priorities such as age, comorbidities, bleeding risk, and pain tolerance. The strength of this study lies in its randomized design and use of a validated pain assessment tool (VAS) to objectively compare clinical outcomes. However, some limitations must be acknowledged. The assessment of postoperative pain was restricted to a single time point (24 hours post-surgery), which may not fully capture the temporal progression of symptoms and recovery trajectory. Furthermore, intraoperative blood loss and operative time—critical surgical outcome indicators—were not evaluated, which limits the ability to comprehensively appraise the procedural efficiency of each method. Secondary outcomes such as return to normal diet, duration of hospital stay, or analgesic requirement were also not recorded, which could have further elucidated the recovery profile associated with each technique. In light of the observed findings and existing literature, it is evident that dissection tonsillectomy offers the benefit of reduced postoperative discomfort at the cost of increased intraoperative blood loss and operative time. Conversely, bipolar diathermy provides surgical expediency and improved hemostasis but carries a greater burden of postoperative pain. Future research should explore hybrid surgical approaches or technological modifications aimed at optimizing tissue handling and minimizing thermal damage, thereby enhancing postoperative outcomes while maintaining surgical efficiency. Additionally, long-term follow-up data and inclusion of broader outcome metrics would allow for a more comprehensive evaluation of patient recovery and procedural success.

CONCLUSION

In conclusion, the findings of this study indicate that the dissection method for tonsillectomy is associated with significantly less postoperative throat pain compared to bipolar diathermy, making it a more favorable option in terms of patient comfort during recovery. This has important implications for surgical decision-making, especially in pediatric cases or patients with low pain tolerance. While diathermy may offer procedural efficiency, the heightened postoperative discomfort warrants careful consideration. Future research should broaden the scope to include other clinical outcomes such as intraoperative blood loss, recovery time, and complication rates to provide a more comprehensive comparison between these techniques.

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AUTHOR CONTRIBUTION

Author	Contribution
Waleed Hidayat	Data Collection, Data entry & Analysis, Manuscript Writing, Conception of Study Design
Habib ur Rehman Afridi*	Critical Input, Conception of Study Design, Final Approval of Draft
Arif Ahmad	Critical Input, and Literature review
Muhammad Tariq	Critical Input, and Literature review

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