

# Comparison of Post-Operative Outcomes of Blunt Dissection and Electrocautery Technique in Tonsillectomy; A Randomized Controlled Trail

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## ABSTRACT

**Introduction:** Tonsillectomy is most common procedure performed in ENT Practice. Various surgical techniques are used in this procedure, including blunt dissection, electrocautery, cryosurgery, ultrasonic removal, laser removal, monopolar and bipolar dissection. After tonsillectomy, morbidities associated are pain, fever and hemorrhage.

**Objective:** In our study we compared the bipolar electrocautery dissection with cold steel dissection method. We compared compare post tonsillectomy morbidities in terms of, pain, fever, post-operative hemorrhage.

**Methodology:** This study was a randomized controlled trial. All 100 patients scheduled for elective tonsillectomy was randomized to tonsillectomy with the hot technique (group-A) or the cold dissection technique (group-B). The randomization was performed by the use of a random number generator (Excel). Chi-square test/Fisher's exact test was applied to compare hemorrhage and fever. Independent sample t-test was applied to compare pain in both study groups.

**Results:** The mean age of patients in cold dissection was  $23.26 \pm 9.317$  whereas in hot dissection group the mean age of the patients was  $25.20 \pm 8.013$ . At first day of procedure mild post-operative pain in 28 (28.0%) patients, moderate pain in 39(39.0%) patients and severe pain in 33(33.0%) patients was seen. In cold dissection group 19(38.0%) patients had mild, 26 (52.0%) had moderate and 5(10.0%) had severe postoperative pain while in hot dissection group 9(18.0%) patients developed mild, 13(26.0%) developed moderate and 28(56.0%) developed severe postoperative operative pain at day 1.

**Practical Implications:** It will help in early and prompt management of patients of tonsils undergoing tonsillectomy with minimal invasion.

**Conclusion:** In our study, the cold dissection was observed to be better in terms of low pain however; in terms of hemorrhage the hot dissection was found to be better.

**MeSH Words:** Tonsillectomy, electrocautery, cold steel dissection, bleeding, pain, blood transfusion

## INTRODUCTION

Tonsillectomy is one of the commonest procedure performed in otorhinolaryngology, accounting 20%-40% of surgical procedures performed in this field. Epidemiological trends in tonsillectomy and adenotonsillectomy have shifted substantially.<sup>1-3</sup> Overall numbers have increased, and surgical indications have shifted from infection to upper airway obstruction. Chronic infection remains the most common indication for adult tonsillectomy in contrast to the pediatric population.<sup>4</sup> Various surgical techniques are used to perform this operation, including blunt dissection, guillotine excision, electrocautery, cryosurgery, coblation, ultrasonic removal, laser removal, monopolar and bipolar dissection. But superiority of one over another is not elaborated.<sup>5</sup>

The techniques of Tonsillectomy can be broadly divided into 2 major categories: extracapsular (total tonsillectomy, subcapsular) and intracapsular (partial tonsillectomy). Intracapsular is also known as "subtotal," and this procedure is also referred as tonsillotomy.<sup>6</sup> Extracapsular tonsillectomy involves dissecting lateral to the tonsil in the plane between the tonsillar capsule and the pharyngeal musculature, and the tonsil is generally removed as a single unit. Partial tonsillectomy, or tonsillotomy, involves removal of most of the tonsil, while preserving a rim of lymphoid tissue and tonsillar capsule in the most recent iteration of this older technique.<sup>7-8</sup>

Different tonsillectomy techniques have different impact on post-operative morbidity. After the surgical procedure of tonsillectomy, hemorrhage ranks among its serious postoperative complications. The overall hemorrhage rate of 4.1% found in a meta-analysis was same as bipolar diathermia. One study reported that secondary post-tonsillectomy hemorrhage, the rates of revision surgery to stop bleeding were 1 out of 3 (33%) and 2 out of 4 (50%) in DCT and control groups, respectively. This study was designed to see outcomes of hot and cold techniques for

tonsillectomy in adults of our population. Study reports nosuperiority of one over another.<sup>9</sup>

Tonsillectomy with Bipolar electrocautery dissection is better than cold steel dissection method with less post tonsillectomy morbidities in terms of Pain, Fever and Hemorrhage

## MATERIAL AND METHODS

A Randomized controlled trial was done at Otorhinolaryngology Department of Central Park Teaching Hospital from July 2022 to January 2023 in which a total of 100 patients with the age range of 18 to 55 years were recruited. The study participants were grouped into two groups, i.e. Group 1 (patients undergoing for hot dissection, n=50) and Group B (patients undergoing for cold dissection, n=50). Ethical consideration as per standard guidelines of Helsinki declaration were fulfilled by getting ethical letter from institutional review board and by getting signed prior written informed consent from all the study participants. The sample size was calculated using WHO sample size calculator with expected percentage of postoperative hemorrhage in cold dissection group 18.75% and 0% in hot dissection technique at 90% power of study and 5% level of significance (Stavroulaki et al., 2007). And afterwards randomization was done and participants were segregated into groups based on results of Excel Randomizer. Patients having coagulation disorders, active acute tonsillitis, hypertension and ischemic heart disease were excluded from this study.

The surgical technique of hot tonsillectomy was based on dissection of the tonsils in the nearly bloodless tonsillar plane with the bipolar EMED NON-STICK (605-027). These are multiple use activated, handheld surgical forceps that are relatively easy to handle without special training while cold dissection tonsillectomy was performed in the standard way, bleeding was controlled by pressure pad and ligation. The patient's position was the usual tonsillectomy orientation (ROSE POSITION) with oral intubation

and mouth was kept open using Boyle-Davis gag. The underlying fascial plane was exposed to facilitate the dissection of the tonsil from the surrounding soft tissues toward the inferior pole and tonsils were removed completely. The patients were discharged the day after surgery and were advised antibiotic which cover gram positive and negative bacteria most likely Augmentin.

Detailed social demographic questionnaire was administered to collect the basic information of study participants including age, gender, BMI along the basic pain questions. For assessment of pain visual analog scale (VAS) was used to quantify patients' initial postoperative pain and to follow the changes in pain over time. The VAS is a 10-cm line with the end points labeled "no pain" (0) and "worst possible pain" (10), and the patient marks the line at the distance corresponding to the intensity of the present pain. The degree of postoperative hemorrhage was estimated on a 3-point scale (with 0 representing no bleeding at all, 1 representing minor bleeding requiring medical attention, intravenous fluids, or suction of the clot, and representing major bleeding requiring reoperation or blood transfusion). All patients were also examined on the 10<sup>th</sup> postoperative day by the operating surgeon, and an estimation of healing within the tonsillar fossa was recorded by calculation of the amount of re-epithelialization.

**Statistical Analysis:** All collected data was analyzed using SPSS version 26. Descriptive statistics, mean  $\pm$  S.D was used for quantitative data, like age (years). Frequency and percentage were calculated for qualitative data like gender. Independent sample t-test was applied to compare pain on visual analog scale in both groups. Chi-square test was applied to compare presence of postoperative hemorrhage fever in both groups. P-value  $\leq$  0.05 was considered as significance

## RESULTS

The mean age of patients in cold dissection was 23.26 $\pm$ 9.317 whereas in hot dissection group the mean age of the patients was 25.20 $\pm$ 8.013 with the age range of 18 to 52 years. In cold dissection group there were 36(72.0%) males and 14(28.0%) females while in hot dissection group 38(76.0%) males and 12(24.0%) females. At first day of procedure mild post-operative pain in 28 (28.0%) patients, moderate pain in 39(39.0%) patients and severe pain in 33(33.0%) patients was seen. In cold dissection group 19(38.0%) patients had mild, 26 (52.0%) had moderate and 5(10.0%) had severe postoperative pain while in hot dissection group 9(18.0%) patients developed mild, 13(26.0%) developed moderate and 28(56.0%) developed severe postoperative operative pain at day 1.

47(47.0%) patients had primary hemorrhage while 53(53.0%) patients didn't have post operative primary hemorrhage. In cold dissection group 33(66.0%) had primary haemorrhage and 17 (34.0%) didn't have. In the patients who were treated in hot dissection group primary haemorrhage was seen in 14 (28.0%) patients and 36(72.0%) patients were not affected by primary haemorrhage. The rate of primary Haemorrhage was found to be higher among the patients who were treated in cold dissection. At 5<sup>th</sup> day of the procedure 43(43.0%) patients had mild, 37 (37.0%) had moderate, and (4.00%) patients were suffering from severe pain as explained in table 1.

At 5<sup>th</sup> day of procedure in cold dissection group mild pain was seen in 25(50.0%) patients, moderate pain in 10 (20.0%) patients, severe pain in 4(8.0%) patients and 11(22.0%) patients didn't have any pain. In hot dissection group 18(36.00%) patients developed mild pain, 27 (54.0%) developed moderate pain and in 5 (10.0%) patients no pain was seen.

Secondary haemorrhage was seen in 21(21.0%) patients at 5<sup>th</sup> day of procedure and 79(79.0%) didn't have secondary haemorrhage following the procedure. Among the patients who were treated in cold dissection 17(34.0%) patients had secondary haemorrhage and 33(66.0%) didn't have the haemorrhage according to observation of 5<sup>th</sup> day of procedure. In hot dissection group secondary haemorrhage was seen in 4(8.0%) patients and 46(92.0%) didn't developed haemorrhage. The rate of secondary

haemorrhage was significantly higher in patients who were treated in cold dissection.

Table-1 Comparison between study groups and pain at day 5

		Study groups		Total
		Cold dissection	Hot dissection	
Pain at day 5	Mild	25	18	43
		50.0%	36.0%	43.0%
	Moderate	10	27	37
		20.0%	54.0%	37.0%
Severe	4	0	4	
	8.0%	.0%	4.0%	
No	11	5	16	
	22.0%	10.0%	16.0%	
Total		50	50	100
		100.0%	100.0%	100.0%

Chi-square = 15.20

p-value < 0.001

Table-2 Comparison between study groups and secondary haemorrhage at day 5

		Study groups		Total
		Cold dissection	Hot dissection	
Secondary haemorrhage (at 5 <sup>th</sup> days days)	Yes	17	4	21
		34.0%	8.0%	21.0%
	No	33	46	79
		66.0%	92.0%	79.0%
Total		50	50	100
		100.0%	100.0%	100.0%

Chi-square = 10.18

p-value = 0.001

At 10<sup>th</sup> day of the procedure 36(36.0%) patients had mild, 8 (8.0%) had moderate, and (56.00%) patients had not any kind of pain.

Table-3 Comparison between study groups and pain at day 10

		Study groups		Total
		Cold dissection	Hot dissection	
Pain at 10 days	Mild	7	29	36
		14.0%	58.0%	36.0%
	Moderate	8	0	8
16.0%		.0%	8.0%	
No	35	21	56	
	70.0%	42.0%	56.0%	
Total		50	50	100
		100.0%	100.0%	100.0%

Chi-square = 24.94

p-value < 0.001

Table-4 Comparison between study groups and secondary haemorrhage at day 10

		Study groups		Total
		Cold dissection	Hot dissection	
Secondary haemorrhage (at 10 <sup>th</sup> days)	Yes	4	0	4
		8.0%	.0%	4.0%
	No	46	50	96
		92.0%	100.0%	96.0%
Total		50	50	100
		100.0%	100.0%	100.0%

Chi-square = 4.16

p-value = 0.041

Among the patients who were treated in cold dissection 7(14.0%) patients had mild pain, 8(16.0%) had moderate and

35(70.0%) had no pain and 33(66.0%) according to observation of 10<sup>th</sup> day of procedure. In hot dissection group only mild pain was seen in 29(8.0%) of the patients and rest of the patients didn't have any kind of pain

The rate of pain was significantly higher in patients who were treated in cold dissection.

There were 4(4.0%) patients who had secondary haemorrhage at day 10 and it was not seen in 96(96.0%) patients.

Among the patients who were treated in cold dissection 4(8.0%) patients had secondary haemorrhage and 46(92.0%) didn't have the haemorrhage at 10<sup>th</sup> day of procedure. In hot dissection group secondary haemorrhage was not seen in any of the patients. The rate of secondary haemorrhage at 10<sup>th</sup> day of procedure was significantly higher in patients who were treated in cold dissection.

## DISCUSSION

Tonsillectomy is one of the most frequently performed ear, nose, and throat procedures in the United Kingdom and worldwide. In our study the mean age of patients in cold dissection was 23.26±9.317 whereas in hot dissection group the mean age of the patients was 25.20±8.013. In both groups the minimum and maximum ages were 18 and 52 respectively.<sup>10</sup> There were 74 (74.00%) male patients and 26(26.00%) female patients with male to female ratio 2.8:1. In one study, a total of 43 tonsillectomies were carried out of which 38 patients were drafted into the study aged between 10 years and 31 years. There were 21 (55.3%) males and 17 (44.7%) females giving a male to female ratio of 1.2:1. Eleven (28.9%) patients were in the age range 10 to 15 years. In another study, 349 patients underwent tonsillectomy among them, contrary to our results, 134 were males and 215 were females. The mean age was in this study was found to be 16.7 years which was higher than observed in our study. Of these, 337 were bilateral procedures, 145 patients had tonsillectomy using cold dissection, and 192 patients had bipolar diathermy, whereas in our study 50 patients underwent cold dissection and 50 underwent hot dissection.<sup>11,12</sup>

In our study, in cold dissection group 33(66.0%) patients and in hot dissection group 14 (28.0%) patients and 36 (72.0%) patients had primary haemorrhage. Also, 4(8.0%) patients in cold dissection and none in hot dissection group had secondary haemorrhage. The rate of Haemorrhage was found to be higher among the patients who were treated in cold dissection. In a prospective study including a total of 545 children (Age: 3-16 years) undergoing tonsillectomy at Ireland the incidence of primary, secondary haemorrhage and postoperative pain was compared between both techniques.<sup>13</sup> The overall rate of haemorrhage was 3.6% (20 patients) which included primary haemorrhage in 0.3% (2 patients) and secondary haemorrhage in 3.3% (18 patients). Primary haemorrhage occurred only in the electrodissection technique. As regards to secondary haemorrhage it was higher in the electrodissection technique 2.3% (12 patients) compared to 1% (6 patients) of the cold dissection technique.<sup>14</sup>

In our study severe pain was found in 33.0% of the patients and it was seen in more patients in hot dissection than cold dissection (56% vs 10%) at day 1 but after the followup of 10 days the rate of moderate and severe pain in hot dissection group was reduced to zero whereas 58.0% patients had mild pain. In the study of Gendy et al. patients rated pain to be more severe in the electrodissection technique compared to the cold dissection technique.<sup>15</sup> They suggested that cold dissection tonsillectomy technique is a safe and effective method with less postoperative morbidity complications as evidenced from our study. Whereas in another study, thirty two (84.2%) patients affirmed that pain was consistently worse on the diathermy side compared with the side on which cold dissection was used right from the day of surgery.

A local study was designed to compare harmonic scalpel (HS) tonsillectomy with electrocautery (EC) tonsillectomy in terms of operating time, intra-operative blood loss, post-operative pain and secondary hemorrhage. They reported that the mean

operative time was less in electrocautery group (EC 3.57 ± 0.85 minutes Vs HS 4.20 ± 1.37 minutes; p< 0.05). From 3<sup>rd</sup> postoperative day onwards, although harmonic scalpel group was slightly better in terms of pain on visual analog scale but it was not statistically significant. Secondary hemorrhage after tonsillectomy was less in HS (EC 10% Vs HS 3%; p=0.61).<sup>16</sup>

The rate of pain in our study was higher among the patients who were treated with cold dissection but hemorrhage was better dealt by hot dissection. O'carroll et al reported, on the other hand, that hot dissection techniques offer significant advantages in intraoperative time and decrease intraoperative bleeding overall. Cold dissection was favored by surgeons due to decreased postoperative pain and bleeding; however, no studies supported this with significant statistical findings.<sup>17</sup>

Tonsillectomy remains to be the most common surgical procedure performed in the ear, nose, and throat practice. It is most frequently performed via cold dissection both in the pediatric and adult age group worldwide. All techniques have advantages and disadvantages, and the minimally painful, maximally safe and effective tonsillectomy technique still remains elusive despite decades of investigation.

## CONCLUSION

In our study too, the cold dissection was observed to be better in terms of low pain however, in terms of hemorrhage the hot dissection was found to be better. More studies are thus warranted to establish the status of each technique and explore further in this regard.

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