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Original Research Article

Comparison of Post-Operative Pain Following Tonsillectomy by Cold Dissection and Bipolar Electrocautery Assisted Dissection

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Conflict of interest: Nil

Abstract

Background and Objective: Tonsillectomy is one of the most commonly performed surgical procedures in the practice of Otorhinolaryngology. Many methods have been described in the history of medical literature which can be traced back to the time of Celsus (40AD). In modern time it is performed by various methods out of which cold dissection technique (CDT) and bipolar electrocautery are the most commonly taught and practiced methods. Bipolar electrocautery is a method known to be associated with shorter duration of surgery and decreased risk of intra and post-operative hemorrhage. However there is need to study its effect on post-operative pain as it is likely to cause thermal injury to surrounding tissue. Many studies suggest that post tonsillectomy pain following bipolar electrocautery technique (BPE) is more severe and prolonged due to injury to surrounding mucosa and pharyngeal muscle . Therefore this study was designed to compare the post-operative pain between two most commonly performed procedures in our institution i.e. cold dissection technique (mentioned CDT hereafter) and bipolar electrocautery (mentioned BPE hereafter), to assess whether there exist some statistically significant difference between post-operative pain following these two techniques.

Methods: This was a prospective randomized study conducted in the department of ENT, Tinsukia Medical College and Hospital. Study duration was from 1st June 2024 to 31st May 2025. Fifty four patients above the age of 12 years planned for tonsillectomy were included in the study. Inclusion criteria was patient with history of recurrent tonsillitis, sleep disordered breathing, and chronic tonsillitis. Those patients with acute upper respiratory tract infection, bleeding disorders and with unwillingness to participate in the study were excluded. All patients were divided into two groups randomly- CDT and BPE group. All patients were operated by same surgeon using similar anesthetic and analgesic technique. The post-operative pain intensity was estimated using visual analogue scale (VAS) rating from 0 to 10. Pain scoring was done at 6 and 12 hour post operatively then on daily basis till discharge. It was again recorded at 1st follow up on 7th day after discharge.

Results: Out of 54 patients, 27 patients were operated by cold dissection technique (CDT) and 27 patients were operated by bipolar electrocautery assisted dissection (BPE). Mean age in CDT group was 24.29 years whereas it was 20.33 years in BPE group. At 6th hour following surgery, 22 patients (81.4%) in CDT group experienced moderate pain and 5 (18.5%) patients in the same group experienced severe pain. At 12th hour it was 11 (40.7%) and 16 (59.2%) respectively. On the other hand, in the BPE group, 24 patients (88.8%) had moderate pain and 3 patients (11.1%) had severe pain at 6th hour following surgery. At 12th hour, 9 patients (33.3%) experienced moderate pain and 18 patients (66.6%) experienced severe pain in this group. On day 1, 21(77.78%) patients had moderate pain and 6 (22.22%) patients had severe pain in CDT group. The same was 22 (81.4%) and 5 (18.5%) respectively for BPE group. From day 2 onwards patients in both the group had mild pain only. On 1st follow up all patients from both the groups were pain free. The mean pain score for CDT group was 6±1.33 at 6th hour, 7.29±1.84 at 12th hour and 5.74±1.03 at day 1. The same was 5.59±0.95 at 6th hour, 6.74±1.66 at 12th hour and 5.81±1.21 at day 1 for BPE group. There was no statistically significant difference.

Conclusion: Based on observation of the present study, it is concluded that there is no significant difference of post-operative pain between CDT and BPE method. Both CDT and BPE are safe approaches but BPE has added advantage of less surgical time and significant reduction in intra operative bleeding as per results of our study.

Keywords: Bipolar electrocautery, Cold dissection, Post-operative pain, Tonsillectomy.

Introduction

Tonsillectomy is one of the most commonly performed surgical procedures in the practice of Otorhinolaryngology. Many methods have been described in the history of medical literature which

can be traced back to the time of Celsus (40AD). In modern time it is performed by cold dissection technique (CDT) which is one of the most commonly taught and practiced methods, and also by other methods which include bipolar electrocautery, coblation, laser, radiofrequency, cryosurgery etc. However, there is no consensus in the literature about the best method for performing tonsillectomy [1,2,3].

Bipolar electrocautery is a method known to be associated with shorter duration of surgery and decreased risk of intra and post-operative hemorrhage [4,5]. Moreover, it is easily available and associated with lesser cost as compared to other technique like coblation and laser. However, there is need to study its effect on post-operative pain as it is likely to cause thermal injury to surrounding tissue.

Post-operative pain is a well-known complication following tonsillectomy. As the tonsillar capsule is dissected from tonsillar bed, it causes disruption of mucosa and irritation of nerve fiber. Trauma to superior constrictor muscle is a major contributor to pain [5]. Injury to palate, uvula, and surrounding soft tissue may also lead to pain. Many studies suggest that post tonsillectomy pain following bipolar electrocautery technique (BPE) is more severe and prolonged due to injury to surrounding mucosa and pharyngeal muscle [16,17,18,19]. Therefore, This study was designed to compare the post-operative pain between two most commonly performed procedures in our institution i.e. cold dissection technique (mentioned CDT hereafter) and bipolar electrocautery (mentioned BPE hereafter), to assess whether there exist some statistically significant difference between post-operative pain following these two techniques.

Material and methods

This was a prospective randomized study conducted in the department of ENT, Tinsukia Medical College and Hospital. Study duration was from 1st June 2024 to 31st May 2025. Fifty-four patients above the age of 12 years planned for tonsillectomy were included in the study. Inclusion criteria was patient with history of recurrent tonsillitis, sleep disordered breathing, and chronic tonsillitis.

Those patients with acute upper respiratory tract infection, bleeding disorders and with unwillingness to participate in the study were excluded**.** Necessary ethical clearance was obtained from concerned institutional ethics committee.

All patients were divided into two groups randomly- CDT and BPE group. Randomization was done by staff nurse of the department, who was unaware about the group allotment. Surgery list was prepared by allotting each alternate patient in either group. Before surgery proper history was taken and thorough clinical examination was done. Written informed consent was obtained and patients and their attendants were taught regarding use of visual analogue scale (VAS) preoperatively. All patients were operated by same surgeon using similar anesthetic and analgesic technique. All patients were positioned in Rose's position and mouth was held open using Boyle's Davis mouth gag.

Tonsillectomy in CDT group began by holding the tonsil at its superior pole by Dennis Browne tonsil holding forceps and pulling it medially. An incision was made using size 12 tonsillar knife at the site of mucosal reflection near upper part of anterior pillar. The incision then continued towards tongue base. The blade was turned to incise the mucosa over the top of upper pole to prevent mucosal tearing on to the uvula during later dissection. Then the tonsil was dissected from the superior pole towards the lower pole by Mollison's tonsillar dissector. It was removed using Eve's snare. Following it the fossa was packed with a cotton ball. After repeating the same procedure on the other side, both tonsillar fossae were inspected, and any observed bleeding point was ligated using absorbable suture.

In the BET group, bipolar electrocautery probe was used, and the machine was set at 20-30w. The cautery probe was not used for making incision; it was made in the same manner as mentioned for CDT group after holding the tonsil and pulling it medially. The plane of loose connective tissue was identified. Tonsillar capsule was followed to get a plane between the capsule and superior constrictor muscle laterally. All fibrous bands attaching the capsule to tonsillar beds were cauterized and then divided.

This step was done by maintaining constant medial traction on tonsil (repositioning the forceps with one blade in the plane between capsule and bed and the other on the medial aspect of tonsil) while counter traction was provided with the help of bipolar cautery probe thus dissecting the tonsil out. Any blood vessel encountered was cauterized. Mucosal folds near superior pole and posterior pillars were cauterized and divided with scissors.

During the whole procedure utmost care was taken not to touch the superior constrictor muscle and cautery probe was kept close to the capsule of the tonsil. At the junction of tongue and lower part of tonsil the pedicle was cauterized and divided using scissors. Any bleeding point was secured using bipolar cautery. In each case we followed certain important steps during surgery, these were-identification of correct plane, traction on tonsil, counter traction, cauterization, cutting and securing the bleeding points respectively. The post-operative pain intensity was estimated using visual analogue

scale (VAS) rating from 0 to 10. Both numerical pain score ladder and face scale was employed for recording. Pain scoring was done at 6 and 12 hour post operatively then on daily basis till discharge. It was again recorded at 1st follow up on 7th day after discharge. The data collection was done by resident doctor of the department who was blinded to which patient had which surgical technique.

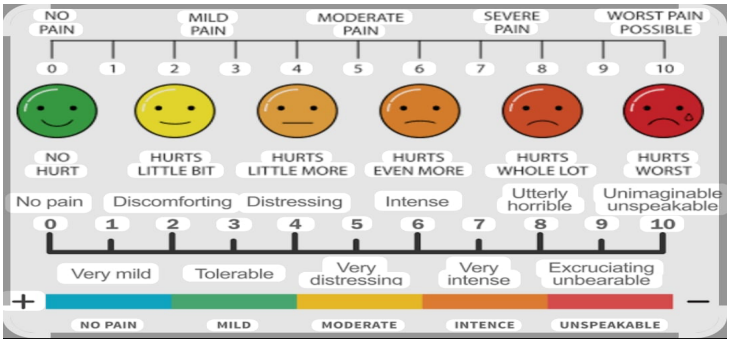

Figure 1:

Visual analogue scale (VAS) is a continuous scale comprised of a horizontal line 10 cm in length with a numerical pain score ladder. VAS score is determined by measuring from the left hand and to the point that the patient marks and high score indicate greater pain. Score 0-no pain, score 1-3-mild pain, score 4-6- moderate pain, score 7-10-severe pain. The VAS tool used in our study was combined with face scale for better understandability. Null hypothesis adopted prior to data collection was that there will be no significant difference in VAS score between CDT and BPE. In this study we also took note of the intra operative blood loss and surgical duration. To estimate intra operative blood loss, blood was collected in the suction canister. Later 30 ml of normal saline was used to flush the suction tube. At the end of the surgery, intra operative blood loss was calculated as the total amount of fluid present in the canister excluding 30 ml that was used for flushing the tube. In addition to this 5ml of blood loss was estimated for one completely soaked (2×2) inch gauze piece. Surgical duration was considered from the time of mucosal incision up to that time when complete haemostasis was achieved up to the satisfaction of operating surgeon. Descriptive statistics was used to analyze the data and was expressed in numbers and percentage. Latest version of SPSS was used to analyze categorical data by unpaired t test and p value less than 0.05 was considered significant.

Results and observation

The results of this study is summarized in the following tables.

Table 1: pain in CDT group

Point of time	Numbers of patient with No pain	Numbers of patients with Mild pain	Numbers of patients with Moderate pain	Numbers of patients with Severe pain
6th hour	0	0	22	5
12th hour	0	0	11	16
Day 1	0	0	21	6
Day 2	0	27	0	0
Day 3	0	27	0	0
Day 4	0	27	0	0
1st follow up	27	0	0	0

Table 2: Pain in BPE group

Point of time	Numbers of patient with No pain	Numbers of patient with Mild pain	Numbers of patients with Moderate pain	Numbers of patients with Severe pain
6th hour	0	0	24	3
12th hour	0	0	9	18
Day 1	0	0	22	5
Day 2	0	27	0	0
Day 3	0	27	0	0
Day 4	0	27	0	0
1st follow up	27	0	0	0

Out of 54 patients, 27 patients were operated by cold dissection technique (CDT) and 27 patients were operated by bipolar electrocautery assisted dissection (BPE). Mean age in CDT group was 24.29 years whereas it was 20.33 years in BPE group. At 6th hour following surgery, 22 patients (81.4%) in CDT group experienced moderate pain and 5 (18.5%) patients in the same group experienced severe pain. At 12th hour it was 11 (40.7%) and 16 (59.2%) respectively. On the other hand, in the BPE group, 24 patients (88.8%) had moderate pain and 3 patients (11.1%) had severe pain at 6th hour following surgery. At 12th hour, 9 (33.3%) experienced moderate pain and 18 patients (66.6%) experienced severe pain in this group. On day 1, 21(77.78%) patients had moderate pain and 6 (22.22%) patients had severe pain in CDT group. The same was 22 (81.4%) and 5 (18.5%) respectively for BPE group. As shown in the table 1 and 2, from day 2 onwards patients in both the group had mild pain only. On 1st follow up all patients from both the groups were pain free.

Table 3: Comparison of patients with severe pain between CDT and BPE

Point of time	CDT (numbers of patient)	Mean ± SD	BPE (numbers of patient)	Mean ± SD	t value from unpaired t test	d.f.	Standard error of difference	Two tailed p value
6 hour	5	9.6± 6.08	3	8.67±8.14	0.0568 at C.I. 95%	4	5.869	0.957
12 hour	16		18					
Day 1	6		5					

P value is not statistically significant.

Table 4: Comparison of mean pain score between CDT and BPE.

Point of time	CDT (mean±SD)	BPE (mean±SD)	P value
At 6th hour	6±1.33	5.59±0.95	0.198
At 12th hour	7.29±1.84	6.74±1.66	0.254
At day 1	5.74±1.03	5.81±1.21	0.819

P value is not significant statistically.

Table 5: Comparison of mean intra operative blood loss between CDT and BPE

	CDT	BPE
Intra operative blood loss (Mean±SD) (in ml)	27.22±5.66	11.29±5.01
t value (unpaired t test)	10.951	
Confidence interval	95%	
Degrees of freedom	52	
Standard error	1.455	
P value	Less than 0.0001	

P value is extremely statistically significant.

Table 6: Comparison of mean surgical duration between CDT and BPE

	CDT	BPE
Surgical duration (Mean±SD) (in minutes)	37.18±6.82	26.81±4.02
t value (unpaired t test)	6.806	
Confidence interval	95%	
Degrees of freedom	52	
Standard error	1.524	
p value	Less than 0.0001	

P value is extremely statistically significant.

Discussion

Post-operative pain is one of the most important factors in choosing tonsillectomy technique. By reducing the post-operative pain, we can not only provide comfort to the patient but also reduce the risk of dehydration as it will improve oral intake. As the patient starts oral intake, there will be increased movement of soft palate and pharyngeal muscle, which will help to improve the circulation and will reduce chance of post-operative infection [5,6]. This study was conducted to compare the post-operative pain following tonsillectomy by two techniques. As evident from results there was no significant difference between these two techniques as far as pain is concerned.

Similar results were observed in the study conducted by Puspakumari K P et al in the year 2018 [7], where there was no significant difference

in pain between these two methods. Result of this study was also consistent with study conducted by Moonka et al [8], MacGregor et al [9], Pang Y T [10], Alam et al [11], Vithayathil et al [2] and Hashemi et al [12]. However, some authors reported more pain in BPE group in late post-operative period although there was no difference in 1st post-operative day [13, 14, and 15]. Result of this study was in contrast with that conducted by Bhandari et al in 2021, where they reported relatively more post-operative pain in bipolar electrocautery than cold dissection [6]. Similarly higher pain score in BPE was also reported by Mofatteh M R et al in 2020, [16], Gendy et al in 2004 [17] and Silveira et al in 2003 [18]. The observed difference of pain intensity in different studies may be due to various factors such as length of disease, amount of employed electrical energy during surgery, extent of tissue burning, volume of tissue exposed to electrocoagulation, surgical skill and ability to tolerate pain. In the present study, while operating by BPE method, mucosal incision was not made with cautery probe, and it was set at low power. Moreover, muscle fibers in tonsillar bed were not touched to minimize thermal injury. In the present study we observed statistically significant difference in intra operative haemorrhage and surgical duration between CDT and BPE. Bipolar electrocautery was associated with less bleeding and surgical duration. Our study result was in accordance with studies conducted by Ali M et al, Vithayathil A et al, Guragain R et al., Mac Gregor FB et al, Pang YT et al, Hashemi et al,Silveira et al, Kousha et al and Mirzaie et al [1,2,3,9,10,12,18,19,20]. Cold dissection causes active bleeding that require more time to achieve haemostasis while in bipolar electrocautery method, dissection of tissue and coagulation of small blood vessel gets done simultaneously leading to clear field and faster attainment of complete haemostasis resulting in less operating time.

Conclusion

Based on observation of the present study, it is concluded that there is no significant difference of post-operative pain between CDT and BPE method. Both CDT and BPE are safe approaches, but BPE has added advantage of less surgical time and significant reduction in intra operative bleeding as per results of our study and also as per suggestion of literature. Therefore, BPE may be considered to reduce overall post-operative morbidity following tonsillectomy as the pain will be almost same as experienced in CDT only if some precautions are followed as mentioned in the present study. However the study would have been better with a larger sample, long study duration and more follow ups.

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