

ORIGINAL ARTICLE

To Compare the Outcomes of Bipolar Electro Cautery Tonsillectomy Vs Cold Steel Dissection Pediatric Tonsillectomy in Terms of Mean-Operative Time and Intra-Operative Blood Loss

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ABSTRACT

Background: One of the most popular surgical operations performed using a variety of techniques is a tonsillectomy. The two that are used the most frequently are the traditional cold dissection technique (CDT) and electrocautery, the latter of which is carried out using the monopolar and bipolar electrocautery procedures (BET). All techniques used during tonsillectomy are intended to lessen perioperative bleeding, the intensity of felt pain, and postoperative morbidities.

Aim: To compare the outcomes of the bipolar electro cautery tonsillectomy versus cold steel dissection pediatric tonsillectomy in terms of mean-operative time and intra-operative blood loss.

Setting: ENT department of Sir Ganga Ram Hospital, F.J. Medical University Lahore from 11-03-2022 to 10-09-2022

Study design: Randomized Controlled Trial

Study type: Quantitative study type

Methods: The sample size of 110 (55 in group A 55 in group B) was estimated by using 95% confidence level, 90% power of test with an anticipated mean loss of blood during surgery of tonsillectomy i.e. 7.38 ± 2.81 ml with bipolar electro cautery dissection and 11.73 ± 2.86 ml with cold steel dissection.

Results: One hundred and ten patients were included as per calculated sample size with the mean age of 8.96 ± 2.42 years. The lowest age limit of children was 5 years while the maximum age limit of children was 13 years. In group A, the mean age of children was 8.80 ± 2.46 years. In group B, the mean age of children was 9.13 ± 2.38 years. The difference was observed as insignificant i.e. p -value = 0.481. Of 110 patients, 67(60.91%) patients were male whereas in group B 29(52.7%) were males. Similarly in group A 17(30.9%) were females and 26(47.3%) were females. The difference was observed as insignificant i.e. p -value = 0.079. In group A, the mean operative time was 19.76 ± 4.47 minutes.

Conclusion: This study concluded that bipolar electro cautery tonsillectomy showed significantly better outcome as compared to cold steel dissection pediatric tonsillectomy.

Keywords: Cold dissection tonsillectomy, Electrocautery tonsillectomy, Mean operative time, Intra operative blood loss.

INTRODUCTION

One of the most popular surgical operations performed using a variety of techniques is a tonsillectomy¹. The other two that are used the most frequently are the traditional cold dissection technique (CDT) and electrocautery, the latter of which is carried out using the monopolar and bipolar electrocautery procedures (BET)². All techniques used during tonsillectomy are intended to lessen perioperative bleeding, the intensity of felt pain, and postoperative morbidities³.

The post-operative course of a tonsillectomy includes significant morbidity and possible complications. To reduce post-operative morbidity and complications, researchers and surgeons have created novel tonsillectomy techniques over the years. An ideal tonsillectomy would be quick, bloodless, and result in a speedy, painless recovery⁴.

The criteria that determine the optimal tonsillectomy technique are the promptness of the surgical procedure and the reduction of post-operative morbidity⁵. The best technique for tonsillectomy with the least amount of morbidity is still up for dispute. In Pakistan as well as the United States, the bipolar diathermy tonsillectomy technique and cold dissection technique are both commonly discussed in the literature. After the development of non-explosive combinations, bipolar diathermy was frequently used in conjunction with general anaesthesia⁶.

Prompt surgical technique and reduction of post-operative morbidity are the parameters that leads to assessment of best

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tonsillectomy technique. There is still a debate about the optimal method of tonsillectomy with less morbidity. Both Cold Dissection technique and bipolar diathermy tonsillectomy technique are used widely in the United States and even in Pakistan, these techniques are frequently described in the literature also. After the advent of non-explosive mixtures, the use of Bipolar diathermy became common with General inhalation anaesthesia. Diathermy tonsillectomy allows for minimal blood loss, little operative time, and allows the simultaneous control of bleeding and dissection. However bipolar electrocautery does not cause surrounding tissue injury compared to monopolar cautery and is said to be superior in terms of perioperative bleeding and time of surgical procedure⁸.

Little blood is lost during the procedure, less time is required and bleeding along with dissection can be controlled simultaneously with a diathermy tonsillectomy. However bipolar electrocautery is said to be superior in terms of perioperative bleeding and surgical procedure time because it does not harm the surrounding tissue like monopolar cautery does⁷.

The objective of the study was to compare the outcomes of the bipolar electro cautery tonsillectomy versus cold steel dissection pediatric tonsillectomy in terms of mean-operative time and intra-operative blood loss.

MATERIAL AND METHODS

The study was done at ENT department of Sir Ganga Ram Hospital, Fatima Jinnah Medical University Lahore after getting permission from hospital ethical review committee from 11-03-

2022 to 10-09-2022 for a period of 06 months. This study is quantitative type and designed as randomized controlled trial. The sample size of 110 (55 in group A 55 in group B) was estimated by using 95% confidence level, 90% power of test with an anticipated mean loss of blood during surgery of tonsillectomy i.e. 7.38 ± 2.81 ml with bipolar electro cautery dissection and 11.73 ± 2.86 ml with cold steel dissection.

$$n = \frac{\{(d12 + d22) \times (Z1-\alpha/2 + Z1-\beta)\}^2}{|\mu2 - \mu1|^2}$$

Here

n= 110, 55 in each group

$Z_{1-\alpha/2}$ = At 5% significance level = 95% = 1.96

$Z_{1-\beta}$ = Power of study = 80% = 1.28

$\mu_1 \pm \sigma_1^2$ = expected mean loss of blood during surgery of tonsillectomy 7.38 ± 2.81 with bipolar electro cautery dissection

$\mu_2 \pm \sigma_2^2$ = expected mean loss of blood during surgery of tonsillectomy 11.73 ± 2.86 with cold dissection

The patients in this study ranged in age from 5 to 13 years old and were of both sexes. They had a history of tonsillitis episodes that had occurred repeatedly at least once in the previous year and, upon examination, had bilaterally enlarged tonsils without having experienced fever or a sore throat in the preceding 4 weeks. Patients who had trouble communicating their pain levels, had a history of bleeding disorders, or had an INR of 1.5 or higher, as well as those with enlarged tonsils, were excluded.

One hundred and ten individuals who registered for the study and were treated indoors participated. The objective, process, risks, and advantages of surgery were clearly explained to the parents or guardians of the children (i.e., patients), and their informed written consent was obtained for the study. Additionally, it was made clear to them that all the information obtained was private. By using computer-generated block randomization, the patients were evenly split into Group A and Group B. 55 patients made up each group. Bipolar electro cautery dissection was used to remove the tonsils in Group-A, while conventional cold steel dissection was used in Group-B.

Conventional cold steel blunt dissection Tonsillectomy was performed under general anesthesia in rose's position with an endo tracheal intubation. The tonsil was retracted medially with a tonsil holding forceps, in the upper pole the mucosal incision was made. Careful dissection was done to preserve the tonsillar pillars and the bleeding was sucked up with the suction tip. The tonsillar fossa was packed with swab. The other palatine tonsil was then similarly removed. Hemostasis was secured by silk ligation and bipolar electro cautery.

Bipolar electro cautery tonsillectomy procedures were done under general anesthesia and the patient position was the same as in the other method. Bipolar machine was set at 30 Watt, using a single straight or stepped bipolar forceps a mucosal incision was made with cautery. The palatine tonsil was identified and dissected from the superior to the inferior pole with watchful cauterisation of the tissue. It was possible to recognize most of the vessels supplying the tonsil, these were cauterised before separating them from tonsil. Haemostasis was secured by point coagulation.

The collected data was analysed statistically by using SPSS version 22.0. Quantitative variables like mean Infra operative blood loss, operative time and post-operative pain was presented in form of mean t standard deviation. Qualitative variables like gender were presented in frequency and percentages. Operative time, amount of blood loss and post-operative pain was analyzed by independent sample t-test to see the statistical importance in two groups. P--value 0.05 was taken as significant.

RESULTS

One hundred and ten patients were included as per calculated sample size with the mean age of 8.96 ± 2.42 years. The minimum

age of children was 5 years while the maximum age of children was 13 years (Table 1).

In group A, the mean age of children was 8.80 ± 2.46 years. In group B, the mean age of children was 9.13 ± 2.38 years. The difference was observed as insignificant i.e. p--value = 0.481 (Table 2).

Of 110 patients, 67(60.91%) were male children and 43(39.09%) were female children. The male to female ratio was observed as 1.5:1. In group A 38(69.1%) patients were male whereas in group B 29(52.7%) were male. Similarly in group A 17(30.9%) were females (Table 3).

In group A, the mean operative time was 19.76 ± 4.47 minutes. In group B, the mean operative time was 24.09 ± 4.90 minutes. The difference was observed as significant i.e. p--value < 0.001 (Table 4).

In group A, the mean blood loss of the patients was 10.95 ± 2.00 ml. In group B, the mean blood loss was 22.87 ± 2.37 ml. The difference was observed as significant i.e. p--value < 0.001 (Table 5).

Data was stratified for age of patients. In patients aged 5-9 years, mean operative time was 20.0004.82 min in group A and 2323.4.87 min in group B (p00.05). In patients aged 010 years, mean operative time was 19.5004.13 min in group A and 25.21,1.82 min in group B (p<0.05) (Table 6).

Data was stratified for age of patients. In patients aged 5-9 years, mean blood loss was 11.0301.88ml in group A and 22.9002.18 ml in group B (p<0.05). In patients aged 010 years, mean blood loss was 10.85 ± 2.15 ml in group A and 22.8302.63 ml in group B (p<0.05) (Table 7).

Data was stratified for age of patients. In patients aged 5-9 years, mean pain score at discharge was 1.2401.02 in group A and 2.1900.65 in group B (p<0.05). In patients aged 010 years, mean pain score was 0.880.95 in group A and 2.2100.58 in group B (p<0.05) (Table 8).

Data was stratified for gender of patients. In male patients, mean operative time was 219.2414.56 min in group A and 24.0005.45 min in group B (p<0.05). In female patients, mean operative time was 20.9404.15 min in group A and 24.1904.32 min in group B (p<0.051) (Table 9).

Data was stratified for gender of patients. In male patients, mean blood loss was 10.6801.99 ml in group A and 22,9702.50 ml in group B (p<0.05). In female patients, mean blood loss was 11.5311.94 ml in group A and 22.7702.25 rill in group B (p<0.05) (Table 10).

Table 1: Summary statistics of age (years) (N=110)

Mean	8.96
Standard Deviation	2.42
Minimum	5
Maximum	13

Table 2: Summary statistics of age (years) in both groups

Age (Years)	Group A	Group B
n	55	55
Mean	8.80	9.13
Standard Deviation	2.46	2.38

P value 0.481

Table 3: Distribution of both genders in study groups

Gender	Group A	Group B	Total
Male	38(69.1%)	29(52.7%)	67(60.9%)
Female	17(30.9%)	26(47.3%)	43(39.1%)
Total	55(100%)	55(100%)	110(100%)

P value 0.079

Table 4: Comparison of operative time (minutes) in both groups

Operative time (min)	Group A	Group B
N	55	55
Mean	19.76	24.09
Standard Deviation	4.47	4.90

Independent samples t-test = 4.836,

P-values <0.001

Table 5: Comparison of blood loss (ml) in both groups

Blood loss (ml)	Group A	Group B
N	55	55
Mean	10.9	22.87
Standard Deviation	2.00	2.37

Independent samples t-test= 28.589, P-value<0.001

Table 6: Comparison of operative time in both groups for age strata (n=110)

Age (years)	Operative Time (minutes)	Group A (n=55)	Group B (n=55)	p-values
5-9	Mean	20.00	23.23	0.013
	St. Deviation	4.82	4.87	
≥10	Mean	19.50	25.21	0.000
	St. Deviation	4.13	4.82	

Table 7: Comparison of blood loss in both groups for age strata

Age (years)	Blood Loss	Group A (n=55)	Group B (n=55)	p-values
5-9	Mean		22.90	0.000
	St. Deviation	1.88	2.18	
≥10	Mean	10.85	22.83	0.000
	St. Deviation	2.15	2.63	

Table 8: Comparison of pain score at discharge in both groups for age strata

Age (years)	Pain score	Group A (n=55)	Group B (n=55)	p-values
5-9	Mean	1.24	2.19	0.000
	St. Deviation	1.02	0.65	
≥10	Mean	0.88	2.21	0.000
	St. Deviation	0.95	0.58	

Table 9: Comparison of operative time in both groups in both gender

Gender	Operative time	Group A (n=55)	Group B (n=55)	p-values
Male	Mean	19.24	24.00	0.000
	St. Deviation	4.56	5.45	
Female	Mean	20.94	24.19	0.000
	St. Deviation	4.15	4.32	

Table 10: Comparison of blood loss in both groups in both gender

Gender	Blood Loss	Group A (n=55)	Group B (n=55)	p-values
Male	Mean	10.68	22.97	0.000
	St. Deviation	1.99	2.50	
Female	Mean	11.53	22.77	0.000
	St. Deviation	1.94	2.25	

DISCUSSION

Tonsillectomy forms the main bulk of surgery in otolaryngology practice. Cold dissection and bipolar diathermy are the two mostly used techniques. After the advent of non-explosive mixtures, the use of bipolar diathermy became common with General inhalation anesthesia. In bipolar electrocautery group, the mean age of the patients was 8.80±2.46 years whereas in cold dissection group, the mean age of patients was 9.13±2.38 years. In bipolar electrocautery group 38(69.1%) patients were male whereas in cold steel dissection group 29(52.7%) were males. Similarly in group A 17(30.9%) were females and 26(47.3%) were females.

A study by Adeel Niaz et al⁸ showed that 22(62.86%) patients were male in conventional cold steel tonsillectomy group and 20(57.14%) patients were male in diathermy tonsillectomy group. Similarly 13(37.14%) patients were females in conventional cold steel tonsillectomy group and 15(42.86%) patients were females in diathermy tonsillectomy group. Another study, done by Adoga et al.,⁹ who compared the cold dissection with hot dissection method for tonsillectomy there were 55.3% males and 44.7% females with the male to female ratio of 111. In another study, in bipolar electrocautery group (total 51) there were 24 females and 27 males while group B (total 51) had 23 males and 28 females. Average age of patients was 9.4 ± 2.67 years¹⁰.

In bipolar electrocautery group the mean operative time of the patients was 19.76±4.47 minutes while in cold steel dissection group the mean operative time of the patients was 24.09±4.90 minutes (p-value<0.001).

Adeel Niaz et al⁸ showed that the mean operative time (minutes) was recorded as 24.94±2.26 minutes in Group-A and 13.09±1.66 minutes in diathermy tonsillectomy Group, p value was 0.0001. Another study showed that the average operating time of the cold dissection method was 23.50±7.10 minutes compared to bipolar diathermy was 13.50±3.0 minutes which is clearly showing that the Bipolar diathermy tonsillectomy is better in term of perioperative blood loss and short procedure time during tonsillectomy than cold dissection method.

Bipolar diathermy tonsillectomy was studied by Shah et al., for its safety and, postoperative morbidity, and the surgery took 10 to 20 minutes¹¹. When compared to cold dissection, bipolar electro-dissection takes much less time to perform in children, according to Silveira et al¹². Literature has reported similar conclusions^{13,14}. There were 14.88±3.29 minutes of surgery and 7.38±2.81ml of blood loss in the bipolar electro cautery dissection group, while there were 23.03±5.06 minutes of operation and 11.73±2.86ml in the cold dissection group (p-value 0.001)²⁶.

In bipolar electrocautery group the mean blood loss of the patients was 10.95±2.00 ml while in cold steel dissection group, the mean blood loss was observed as 22.87±2.37 ml. (p-value<0.001).

Adeel Niaz et al⁸ done a study on comparison between conventional cold steel tonsillectomy versus bipolar diathermy tonsillectomy shows 24.57,1.42ml blood loss in conventional cold steel tonsillectomy Group and 11.17±1.67ml blood loss in diathermy tonsillectomy Group, p value was 0.001. In another study, the average amount of blood loss with electro cautery method was 4.07ml and with cold steel dissection method was about 14.58 ml.¹⁵

Shah SA et al¹² demonstrated that Intraoperative blood loss ranged between 2 to 5 ml. Another study¹⁶ evaluated the use of Bipolar diathermy for tonsillectomy and revealed that the average blood loss was less than 4 ml in 100 patients. Other studies have also noted less intraoperative blood loss with bipolar diathermy tonsillectomy technique.²⁰

As a result of Mofatteh et al¹⁷ research, the intraoperative blood loss was much lower for bipolar electro-cautery tonsillectomy patients than for cold steel dissection tonsillectomy patients. This finding coincides with the findings of rers'nr (ler4 studies and proved the findings of several authors^{18,19,20,21,22}. Bleeding is a critical factor to consider while doing surgery on children. Their blood volume is limited and bleeding can lead to mental and physical exhaustion and bad outcomes.^{16,24}

Bipolar diathermy tonsillectomy and standard cold-steel tonsillectomy were compared by other studies, but no significant differences were found. This might be due to a variety of factors like duration of disease, quantity and power of energy utilized during procedure, the produced energy that leads to the burn of the tissues, extent of cutting region and capacity to bear pain^{19,20,21}.

CONCLUSION

This study concluded that bipolar electro cautery tonsillectomy showed significantly better outcome as compared to cold steel dissection pediatric tonsillectomy. So in future, we can now recommend and prefer the use of bipolar electro cautery tonsillectomy instead of going for other less successful methods in the better benefit of patients in term of less per operative blood loss, post-operative pain and general anesthesia time.

Conflict of interest: Nil

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