

Comparison of Complications after Tonsillectomy between Conventional Cold Steel Dissections Method and Electrocautery Tonsillectomy Method. A Randomized Controlled Trial

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ABSTRACT

Aims: To compare the intra-operative bleeding amount during the tonsillectomy operative procedure by using the monopolar electrocautery method versus the cold steel tonsillar dissector method, and to compare postoperative pain for the initial six hours in both groups.

Study design: A randomized controlled trial

Place and Duration: Departments of ORL (Otorhinolaryngology) and HNS, Kulsumbai Valika Social Security SITE Hospital, Karachi, and in Social Security Landhi Hospital Karachi, Pakistan from January 1st, 2021 to December 31st, 2021

Methodology: One hundred and twenty patients were selected for this study from the outpatient department of both hospitals and they were divided into two groups equally i.e. those patients who will be operated with monopolar electrocautery, included in group C and those patients who will be operated on with the cold steel dissection method by tonsillar dissector, was in group-D. After receiving written informed consent from the patients they were operated on as the first and second cases in each OT List. Blood loss was measured during the operative procedure and calculated by the number of blood-soaked gauzes and post-operative pain was measured by the VAS pain scale, the house officer, and resident doctors on the floor.

Results: Females predominance was observed in this study, Female to a male ratio in Group C was 2:1, and in Group D it was 3:1 The Mean \pm Standard Deviation of the ages were 11.75 ± 3.25 yrs. and 14.25 ± 3.70 yrs. in both groups. The mean blood loss during tonsillectomy was 16.70 ± 4.70 ml in Group C and 50.70 ± 30.50 in Group D, a statistically significant difference was observed between the two groups and the p-value was < 0.05 . The mean time duration of tonsillectomy was 14.10 ± 2.5 minutes in Group C and 20.40 ± 3.50 in Group D.

Practical implication: Nowadays monopolar electrocautery is used for tonsillectomy because in this method intraoperative bleeding is minimum and operative time is also short

Conclusion: Intra-operative bleeding was minimum while tonsillectomy was done by monopolar cautery and postoperative pain was more in this method which was controlled by analgesics.

Keywords: tonsillectomy, cold steel dissection, monopolar electrocautery, intraoperative blood loss, postoperative pain, PACU.

INTRODUCTION

Tonsils play a significant role in the defensive mechanism, secreting IgA antibodies. Sometimes defensive system fails and the tonsils become a source of infection causing severe sore throat, fever, and other complications and requiring the removal of tonsils¹. Tonsillectomy and adenoidectomy are very common and routine operations in ENT, up to 20% of all operations are performed by ENT & Head and Neck surgeons.²

Chronic and repeated inflammation of the tonsils is very common among the pediatric age group, as well as in the adult age in the otorhinolaryngology practice. Tonsillectomy is the most common operative procedure performed by ENT surgeons worldwide, and this is the very simplest surgery.³

There are numerous techniques prevailing to accomplish tonsillectomy like the dissection method, the guillotine method, tonsillectomy by cryosurgery, ultrasonic removal of tonsils, tonsillectomy by LASER, and monopolar electrocautery and bipolar electrocautery dissection methods. Very significant numbers of children, suffering from tonsillitis need a tonsillectomy. The two techniques are very common i.e. 1: cold dissection with snare/dissector and 2: electrocautery methods.⁴

First-time tonsillectomy was described by Celsius in the first century A.D. In the dissection method, tonsils are removed mechanically and hemostasis by the ligature (silk 1/0) or minimally used electrocautery to the bleeding points, and still, this method is the most popular method⁵. Tonsillectomy with the cold dissection method is a tradition. The bipolar electrocautery method and cold steel dissection with the tonsillar dissector are very common in different institutions in routine practice⁶.

A significant complication after tonsillectomy is post-

tonsillectomy hemorrhage (PTH) may be associated with morbidity and require blood transfusion or emergency surgical management⁶. Palatine tonsils are oval-shaped lymphoid tissue situated in the oropharynx laterally in the tonsillar fossa⁷.

The current study is planned to compare the intra-operative bleeding amount during the tonsillectomy operative procedure by using the monopolar electrocautery method versus the cold steel tonsillar dissector method, and to compare postoperative pain for the initial six hours in both groups.

METHODOLOGY

A randomized controlled trial study was conducted by using the non-probability purposive sampling technique. A total of 120 patients were selected randomly and allocated 60 patients in each group. Age ranged from 5 to 18 years of both females and males, had severe throat pain with a history of 7 or more acute tonsillitis attacks/year or 5 acute attacks/year for 2 years or 3 acute attacks/year for 3 years, and agreed for surgery were included in both groups i.e. monopolar cautery versus conventional cold steel dissection method (with tonsillar dissector). Whereas all those patients who have unilateral enlarged tonsils, the deranged value of liver enzymes, any bleeding disorder disease, any congenital anomalies, chronic sinusitis, or allergic asthma were excluded from this study. Patients were enrolled for tonsillectomy and informed written consent was obtained. Described the purpose of the study, risks of surgery, and benefits of the surgery and both procedures in detail. Patients were selected randomly for 2 groups equally, i.e. 1: patients who will be operated on with monopolar electrocautery (Group C) and 2: patients who will be operated on with cold steel dissection procedure (Group D). The patients were operated on as

the first and second cases in every operation theatre list. After general anesthesia, the surgery was performed in both groups by the same surgeon under the same operative room atmosphere. After the tonsillectomy, the patients were monitored in the recovery room (PACU) for two hours and then shifted to the ORL ward. Bleeding was measured during tonsillectomy by blood-soaked gauze, and blood in the suction bottle. The data was recorded in a pre-designed proforma. Amount of blood loss in ml = Blood in suction bottle + (difference in weight of dry and soaked gauze pieces). VAS scale for postoperative pain was set from 1 to 10, mild pain was considered from 1 to 3, moderate pain was set from 4 to 7, and severe pain was considered from 8 to 10. The post-operative intensity of pain was also measured and recorded. The data was then entered into S.P.S.S. software version 20 and analyzed it. The variables analyzed were mean operative blood loss, post-operated pain, duration of surgery, and mean ages. Male and female gender was presented in frequency and percentage. The amount of mean intraoperative bleeding was compared by t-test in both groups, and the p-value ≤ 0.05 was considered to be significant.

RESULTS

A total of 120 patients in this study who were operated on (tonsillectomy) under general anesthesia with monopolar electrocautery and cold steel dissection methods were divided into two groups. The Majority of 40 (66.67%) of the patients of group C, operated by monopolar electrocautery were females, whereas males were 20 (33.33%). Females 45 (75%) were operated on by cold dissection (group C), presenting high female-to-male ratios in both groups i.e.2:1 in group C and 3:1 in Group D. Table 1 shows Gender-wise distribution in Groups C & D. In Group B, 60 patients, and in Group C, 60 patients. Male were 20 in the cold steel dissection group and 15 in the monopolar cautery group. Female patients were 40 in the cold steel tonsillectomy group and 45 were in the monopolar cautery tonsillectomy group. Female to male ratio was 2:1 in Group C and 3:1 in Group D.

Table 2 showing mean ages in Group C and in Group D. Mean age was 11.75 ± 3.25 years in group C and in group D, was 14.25 ±3.70 years.

Table 3 showing means of blood loss in ml in the cold steel dissection tonsillectomy group and in the monopolar cautery tonsillectomy group. Blood loss between 5.5 ml to 40 ml was seen in 50 patients (83.33%) in the conventional cold steel tonsillectomy group while it was seen in 20 patients (33.33%) in the monopolar cautery tonsillectomy group. Blood loss between 41ml to 80 ml was seen only in the monopolar cautery group i.e. in 25 patients (41.67%). Blood loss between 81ml to 130 ml was also seen only in the monopolar cautery tonsillectomy group i.e. in 15 patients (25%). Mean blood loss was 16.70 ± 4.70 ml in Group C and 50.70 ± 30.50 ml in group D, and the p-value was <0.05 which is significant.

Table 4 represent the consumed time duration for tonsillectomy in group C and in group D.

The duration of the meantime was 14.10 ± 2.5 minutes in group C (monopolar cautery) and 20.40 ± 3.50 minutes in group D (cold steel dissection tonsillectomy)

Graph 1 showing VAS pain score after tonsillectomy, in both groups. After 30 minutes of tonsillectomy, mild pain was observed in the cold steel dissection tonsillectomy group while moderate pain was noted among tonsillectomy by the monopolar cautery group. One hour later to the tonsillectomy, moderate pain was noted in the conventional cold steel tonsillectomy group and moderate pain was also observed in the tonsillectomy by the monopolar cautery group. After 2 hours of tonsillectomy, mild pain was felt in the cold steel tonsillectomy group, while severe pain was observed in the monopolar cautery group. After 3 hours, mild pain was noted in the cold steel tonsillectomy group and moderate pain was observed in the monopolar cautery group. After 4 hours, mild pain was noted in the cold steel dissection group while moderate pain was noted in the monopolar cautery group, and

after 5 hours, mild pain was noted in the cold steel dissection tonsillectomy group and moderate pain was observed in the monopolar cautery group. After 6 hours, severe pain was observed in the monopolar cautery group and needed opioid drugs while mild pain was noted in cold steel tonsillectomy group.

Table 1: Gender-wise distribution in the monopolar cautery group and in the cold steel dissector group. n=120

Gender	group C (n=60)		group D (n=60)	
	numbers	%	numbers	%
Female	40	66.67	45	75
Male	20	33.33	15	25
Female/Male ratio	2:1		3:1	

Table 2: Age distribution in the monopolar cautery group and in the cold steel dissector group. n=120

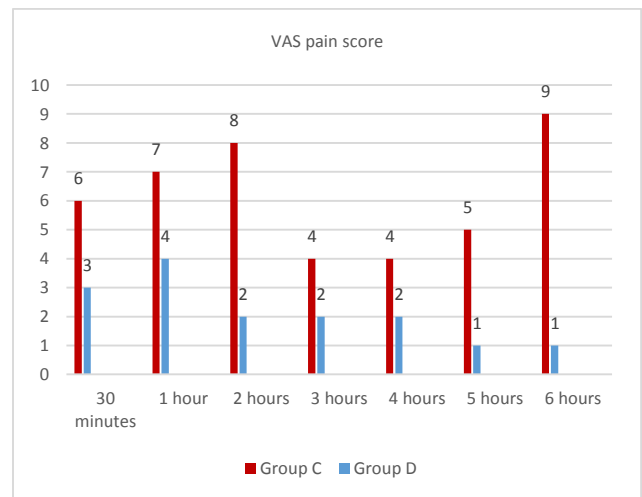
Different Ages of patients (Years)	group C (n=60)		group D (n=60)	
	numbers	%	numbers	%
4 to 9	13	21.67	6	10
10 to 15	30	50	18	30
16 to 18	17	28.33	36	60
Mean ± SD	11.75 ± 3.25		14.25 ± 3.70	

Table 3: Mean operative blood loss in ml in the monopolar cautery group and in the cold steel dissector group. n=120

Mean operative blood loss in ml.	group C (n=60)		group D (n=60)	
	numbers	%	numbers	%
5.5 ml to 40	50	83.33	20	33.33
41 ml to 80			25	41.67
81 ml to 130			15	25
Mean ± SD	16.70 ± 4.70		50.70 ± 30.50	

Table 4: Duration of tonsillectomy in the monopolar cautery group and in the cold steel dissector group. n=120

	group C (n=60)	group D (n=60)	p-value
Duration of surgery in minutes	14.10 ± 2.5	20.40 ± 3.5	0.001



Graph 1: Showing post-operative pain score in the monopolar cautery group and in the cold steel dissector group.

DISCUSSION

The duration of surgery was 15.40 minutes in the plasma blade (electrocautery tonsillectomy) and whereas it was 18.95 minutes in the cold steel dissection tonsillectomy method. Blood loss was significantly less in an amount in electrocautery tonsillectomy as compared with cold steel dissection tonsillectomy i.e.15.0 ml versus 74.9 ml and the p-value was <0.001 (significant).

Postoperative pain scores were 3.10 in the electrocautery method and 2.94 in the cold steel method. P-value was 0.753 (insignificant)⁸.

In a study, it was reported that in the monopolar cautery group, the mean age of the patients was 14.2 ± 4.8 years and 13.9 ± 5.0 years in the cold steel tonsillectomy group, a statistically significant difference was observed in both groups and the p-value was less than 0.05. Duration of surgery was 10.6 ± 0.4 minutes in group A and 17.0 ± 0.7 minutes in group B and the p-value was significant i.e. $p < 0.05$ ⁹. No significant difference was observed for postoperative pain between cold steel dissection and monopolar cautery method¹⁰. In a study, it was proved that there were no significant differences between conventional tonsillectomy and coagulation method regarding their age, mean operative duration was higher value (55.74 ± 14.05 minutes) in the conventional method tonsillectomy as compared with coagulation method tonsillectomy i.e. 40.24 ± 10.79 minutes. The amount of blood loss was higher in the cold steel conventional tonsillectomy at 124.15 ± 40.5 ml while it was 70.24 ± 18.78 ml in the cautery group.

Pain scores were 9.29 ± 0.97 in the conventional tonsillectomy group on 1st post-operative day while it was 9.53 ± 0.86 in the cautery group, and no significant differences was noted between the two groups¹¹.

Another study revealed that no significant differences were found in age between the two groups. The amount of bleeding during the operation was 33.7 ml in the cold steel dissection tonsillectomy patients while in hot tonsillectomy (monopolar electrocautery) it was 15.1 ml and the p-value was < 0.001 ¹². mean operative time was 3.38 minutes in coblation tonsillectomy and 5.67 minutes in cold steel dissection tonsillectomy method and the p-value was significant i.e. $p < 0.001$ ¹³.

Pain score between the cold steel tonsillectomy group and diathermy group (monopolar cautery) was not significant on the 1st post-operative day but it became significant from the 2nd post-operative day to onward¹⁴. Male predominance was noted in a study between the bipolar tonsillectomy group and in the cold steel tonsillectomy group i.e. 60% and 62% respectively. Blood loss between 5.23 ml to 40 ml was seen in 100% of patients in group B while it was 46% in group C, statistically significant differences were noted between the groups regarding blood loss and the p-value was significant i.e. $p < 0.05$ ¹⁵. The mean duration (time) of surgery was higher in the BET (Bipolar Electrocautery Tonsillectomy) group i.e. 12 ± 4.7 minutes as compared with CDT (Cold steel dissection tonsillectomy) group which was 11.14 ± 3 minutes, the difference was not significant and the p-value was < 0.32 . Amount of intraoperative bleeding was significantly higher in quantity in CDT method as compared with BET group and the p-value was < 0.001 . Intensity of localized VAS pain score after 4 and 24 hours were significantly higher in the BET group as compared with CDT group and the p-value was < 0.001 ¹⁶.

CONCLUSION

Intraoperative bleeding amount was less in the electrocautery method tonsillectomy while post-operative pain was less in the cold steel dissection method tonsillectomy. Monopolar electrocautery is safe and effective for tonsillectomy.

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Conflict: No conflict of interest

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REFERENCES

1. Sasindran V, Mathew N, Shabna AK, Harikrishan B. Comparison of coblation tonsillectomy vs dissection tonsillectomy. *International Journal of Otolaryngology and Head & Neck Surgery*. 2018 Nov 28; 8(1):49-60.
2. Lee MS, Montague ML, Musheer Hussain SS. Post-tonsillectomy hemorrhage: cold versus hot dissection. *Otolaryngology—Head and Neck Surgery*. 2004 Dec; 131(6):833-836.
3. Muthubabu K, Rekha A, Thejas SR, Vinayak R, Srinivasan MK, Alagammai S, Thushita Nivasini S, Gayathri S. Tonsillectomy by cold dissection and coblation techniques: a prospective comparative study. *Indian Journal of Otolaryngology and Head & Neck Surgery*. 2019 Oct; 71(1):665-670.
4. Salam MA, Alam MM, Ahmed R, Mahmud MS. Monopolar Diathermy Tonsillectomy versus Dissection Method Tonsillectomy. *KYAMC Journal*. 2019 May 22; 10(1):21-24.
5. Ahmed M, Khan AA, Siddiqi T, Ikram M, Mian MY. A comparison of dissection-method and diathermy tonsillectomies. *Journal of the Pakistan Medical Association*. 2000; 97(7):215-216.
6. Bhandari C, Sharma B, Pokharel A, Mayya NJ. Intraoperative Blood Loss, Surgical Duration and Postoperative Pain following Cold Dissection Tonsillectomy and Bipolar Electrocautery Tonsillectomy. *Journal of College of Medical Sciences-Nepal*. 2021 Dec 31; 17(4):341-346.
7. Kwok MM, Subramaniyan M, Rimmer J, Karahalios A. Post-tonsillectomy haemorrhage in Australia—a multivariable analysis of risk factors. *Australian Journal of Otolaryngology*. 2018 Jan 15; 1(1):1-8
8. Yilmazer R, Yazici ZM, Balta M, Erdim I, Erdur O, Kayhan FT. PlasmaBlade vs. cold dissection tonsillectomy: A prospective, randomized, double-blind, controlled study in adults. *Ear, Nose & Throat Journal*. 2017 Jul; 96(7):250-256.
9. Salam MA, Alam MM, Ahmed R, Mahmud MS. Monopolar Diathermy Tonsillectomy versus Dissection Method Tonsillectomy. *KYAMC Journal*. 2019 May 22; 10(1):21-24.
10. Arbin L, Enlund M, Knutsson J. Post-tonsillectomy pain after using bipolar diathermy scissors or the harmonic scalpel: a randomised blinded study. *European Archives of Oto-Rhino-Laryngology*. 2017 May; 274(5):2281-2285.
11. Kumar A, Kumar S, Krishnan A, Verma M, Garg U, Sharma N. A comparative analysis of outcomes of conventional cold dissection versus laser tonsillectomy in pediatric cases in a tertiary care hospital in Haryana. *Indian Journal of Otolaryngology and Head & Neck Surgery*. 2021 Jan 7:1-8.
12. Nunez DA, Provan J, Crawford M. Postoperative tonsillectomy pain in pediatric patients: electrocautery (hot) vs cold dissection and snare tonsillectomy—a randomized trial. *Archives of Otolaryngology—Head & Neck Surgery*. 2000 Jul 1; 126(7):837-841.
13. Tahyr SE, Yaseen MA. Coblation versus dissection tonsillectomy in children. *Zanco Journal of Medical Sciences (Zanco J Med Sci)*. 2018 Apr 1; 22(1):25-31.
14. Alkhalil AR, Mohammad SM, Allela OQ. Post tonsillectomy pain of bipolar electrocautery and coldsteel dissection: A randomized prospective comparative study. *J Pharm Pract Community Med*. 2018; 4(2):121-123.
15. Saeed I, Samee MA, Ali R. Bipolar Diathermy versus Conventional Cold Dissection Method A Comparison of Mean Operative Blood Loss. *PAKISTAN JOURNAL OF MEDICAL & HEALTH SCIENCES*. 2018 Jul 1; 12(3):953-956.
16. Mofatteh MR, Salehi F, Hosseini M, Hassanzadeh-Taheri M, Sharifzadeh G, Hassanzadeh-Taheri M. Comparison of postoperative morbidity between conventional cold dissection and bipolar electrocautery tonsillectomy: which technique is better? *Brazilian Journal of Otorhinolaryngology*. 2020 Aug 28; 86:427-433.