

Original Research Article

Coblation versus bipolar electrocautery tonsillectomy: a comparative study in children

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ABSTRACT

Background: Tonsillectomy is a commonly done surgery by ENT surgeons all over the world. There are many surgical techniques to do this surgery. This study is aimed to compare intraoperative efficiency and postoperative recovery between coblation and bipolar electrocautery tonsillectomy.

Methods: This prospective study was carried out on 60 patients that underwent tonsillectomy over 2 years from February 2019 to January 2021 in Mallareddy Institute of Medical Sciences, Suraram, Hyderabad. The patients were equally divided into two groups; coblation tonsillectomy (30 patients) and bipolar electrocautery tonsillectomy (30 patients). Their age ranged between 4-15 years. The operative time and intraoperative blood loss were recorded for each patient and compared. The parents were given a pain diary to record the level of pain each morning for ten days. Also, they were asked to report any complication like bleeding.

Results: There was no statistically significant difference in the mean operation time and intra operative blood loss between the coblation group and bipolar electrocautery group. There was a statistically significant difference in the daily pain scores between the two groups in which the coblation group was associated with lower mean pain score. 1 episode of secondary hemorrhage was recorded in bipolar electrocautery tonsillectomy.

Conclusions: Bipolar electrocautery tonsillectomy offers the same operative speed, similar intraoperative blood loss, more postoperative pain scores when compared with coblation tonsillectomy.

Keywords: Coblation, Bipolar electrocautery, Tonsillectomy

INTRODUCTION

Tonsillectomy is one of the most common surgical procedures performed in the ear, nose, and throat (ENT) practice.¹ Over the last few years, different techniques for performing tonsillectomy have been proposed as attempts to lower the inherent morbidity of this surgery.² These techniques include blunt cold steel dissection, guillotine excision, monopolar diathermy, bipolar diathermy, laser dissection, bipolar scissor dissection and recently coblation tonsillectomy.³ Any new tonsillectomy procedure needs to be comparable, or even better than present technique in terms of morbidity, mortality, safety

of use, short learning curve, and cost-effectiveness. It should also be associated with less postoperative pain and intraoperative blood loss, and result in a more rapid return to normal diet and activity and carry a lower risk of both reactive and secondary hemorrhage.⁴ Coblation tonsillectomy was initially introduced in 2001 following which a great amount of articles have been published either to confirm its efficacy or to reject that because of unsatisfactory or unproven outcomes with undesirable cost-effectiveness.^{5,6} There is still controversy over which is the optimal technique of tonsillectomy with the lowest morbidity rates.⁷ In contrast to the majority of operative procedures associated with primary wound closure,

tonsillectomy leaves an open wound that undergoes healing by secondary intention, thus opening the possibility of postoperative complication.⁸ Coblation is a bipolar system that involves passing radiofrequency through a medium of normal saline, which results in the production of a plasma field of sodium ions, these ions can break down intercellular bonds and in effect vaporize tissue at a temperature of only 60°-80° C. The presence of irrigating saline helps limit the amount of heat delivered to the surrounding tissues.⁹ Coblation surgery as one of the different types of radiofrequency surgery is a novel surgical technique that was first introduced in ENT practice in late 1990 for the operation of the head and neck soft tissues.¹⁰ However, there is a significant cost implication to use coblator device.¹¹ In bipolar electrocautery tonsillectomy, an electric current passed through the tissue between two electrodes (blades), cuts the tissue and simultaneously seals the blood vessels. This approach is associated with more postoperative pain attributed to the spread of thermal injury due to the high temperatures used.¹² In bipolar electrocautery, direct contact between electrodes and tissue produces local temperatures of 400 C-600 C resulting in heating of intracellular content and subsequent vaporization of the cells.^{13,14} This technique was introduced 40 years ago and commonly used.¹⁵ Electrocautery tonsillectomy typically affords greater operative speed and less operative blood loss.¹⁶ Edema and pain are greatest immediately after surgery, probably as a result of thermal effects and expression of inflammatory mediators that stimulate pharyngeal nociceptors. After tonsillectomy within few hours a fibrin clot formed, epithelial ingrowth beneath a fibrin clot begins shortly after wounding. Separation of the fibrin clot about seven days after surgery exposes vascular stroma. Involution of the vascular stroma and completion of epithelial coverage (wound healing) may take about two weeks, and during this period bleeding can occur.¹⁷ This study is aimed to compare the results of tonsillectomy by coblation with that done by the bipolar electrocautery method in several points.

METHODS

A prospective comparative study was conducted on 60 patients. They were randomized by simple random sampling into two groups, first group (group A) tonsillectomy done by coblation which included 30 patients and second group (group B) tonsillectomy done by bipolar electrocautery which included 30 patients, the period was for 2 years from February 2019 to January 2021 in Mallareddy Institute of Medical Sciences, Suraram, Hyderabad. The patients were blinded to the technique used. Inclusion criteria includes patients 15 years and younger with indications of tonsillectomy. Exclusion criteria includes cases with acute infection, severe systemic illness, bleeding disorders. Following history taking a routine clinical assessment and examination was done. All tonsillectomy techniques were done under general anesthesia, and general anesthetic technique was standardized for all patients. The surgical dissection technique was the same for both coblation (Figure 2) and

bipolar electrocautery (Figure 3) tonsillectomy, and involved a subcapsular dissection of tonsil for complete excision of the tonsil, with the effort made to preserve as much pharyngeal mucosa as possible. Bleeding points usually very few following excision of the tonsil were selectively secured with bipolar diathermy. No snare was used, and further hemostasis was secured by point coagulation, no ligatures were used. Each tonsillectomy technique was intra-operatively assessed for operative time by calculating the time from the first incision to complete hemostasis of the tonsillar bed. The intraoperative blood loss was recorded by measuring the blood collected in the suction bottle after subtracting the volume of saline used for coblation method and it was care was taken not to use gauze pieces as much as possible and if they were used we measured the weight of the gauze pieces pre-operatively and again measured the change of weight in blood soaked gauze pieces post-operatively, and considered change of 1 gm in weight is equal to 1 ml blood loss.

Patients were given verbal as well as written instructions regarding medication at home along with guidance regarding food intake and general care. All study participants were asked to fill out a daily pain diary for ten consecutive days postoperatively. The daily diary included a commonly used standardized pain scale (Wong-Baker FACES pain rating scale) which is a 0 – 10 numerical rating scale with correlating faces (from happy to sad) to allow children to record their pain. The instruction was given to the parents about filling the pain chart. All patients were followed up for ten days by daily contacting their parents by telephone. The degree of pain of the throat marked on a scale first thing each morning, before taking any analgesic medication. Patients were all seen in the outpatient department on the 10th and 14th postoperative days and their throat was examined with a subjective measure about the area of the tonsillar fossa that was healed or covered in the slough, and the questionnaire was completed. Statistical analysis was done using Statistical package for social sciences (SPSS) version 21.0

RESULTS

A total of 60 patients were recruited into this prospective study. Their age ranged from 4–15 years, sex distribution was 33 (55%) males and 27 (45%) females (Table 1).

Duration of operation

The duration of operation was found to be statistically not significant between the two groups, in which the mean operative time in Group A was 10.23 minutes, while the mean operative time in Group B was 9.8 minutes (Table 2).

Intraoperative blood loss

Intraoperative blood loss was found to be statistically not significant between the two groups, in which mean blood

loss in Group A was 6.5 ml, while mean blood loss in Group B was 7.5 ml (Table 3).

Table 1: Sex distribution in Group A and Group B.

	Group A	Group B	Total
Males	19	14	33
Females	11	16	27
Total	30	30	60

Table 2: Mean operative time in Group A and Group B.

Duration	Group A	Group B
Mean operative time	10.23 minutes	9.8 minutes

Table 3: Mean blood loss in Group A and Group B.

Blood loss	Group A	Group B
Mean blood loss	6.5 ml	7.5 ml

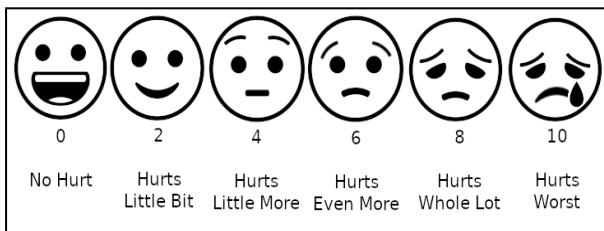


Figure 1: Wong -Baker FACES pain rating scale.

Table 4: Post-operative pain score in Group A and Group B.

Pain score	0	2	4	6	8	10
Group A	0	05	13	10	02	00
Group B	0	0	03	10	14	03

P<0.01 hence significant using unpaired t test using SPSS software 21.0.

Postoperative pain

Mean pain score was computed for each patient over ten days. A significant difference in pain score was revealed between coblation method and bipolar electrocautery method in which the Group A (coblation group) was associated with lower mean pain score than Group B (bipolar electrocautery group) (Table 3).

Hemorrhage

There were no hemorrhagic complications in group A but one case in group B had secondary hemorrhage on day 8 which was managed by clot removal and hydrogen peroxide application to the bleeding point (Table 5).

Table 5: Hemorrhagic complications in Group A and Group B.

Hemorrhage Complications	Group A	Group B
	0	01



Figure 2: Coblation tonsillectomy.



Figure 3: Bipolar electrocautery tonsillectomy.

DISCUSSION

Only one study was done previously comparing coblation tonsillectomy and bipolar electrocautery tonsillectomy in children. It was done by Saeed et al. in 2017. According to this study, for coblation tonsillectomy the mean operating time and blood loss was 6.89 minutes and 15.37ml respectively and the operating time and blood loss for bipolar electrocautery tonsillectomy was 7.83 minutes and 1.43 ml respectively.¹⁸ The mean operating time was statistically insignificant between the techniques which is similar to our study while the blood loss was more in coblation tonsillectomy which differs from our study where it was statistically insignificant. According to the study by Saeed the post operative pain was less in coblation tonsillectomy which is similar to our study.

In one study done by Hoong et al in 2013 comparing coblation tonsillectomy vs electrocautery tonsillectomy in adolescents and adults, the mean operating time was 12.36 minutes and 10.2 minutes respectively and the blood loss was measured in terms of the mean number of cotton balls used which was 1.2 cotton balls and 1.8 cotton balls respectively while the post operative pain was almost similar for the two techniques.¹⁹ The mean operating time and blood loss was similar to our study while the post

operative pain was more for bipolar electrocautery technique in our study.

According to another study done by Fawzy et al in 2012 comparing coblation versus bipolar diathermy for adult tonsillectomy the intraoperative time was 7.97 minutes and 11.67 minutes respectively while blood loss was 29.77 ml and 44.23 ml respectively.²⁰ The mean operating time and blood loss was low and statistically significant for coblation tonsillectomy while in our study it was statistically insignificant. The post operative pain was less for coblation tonsillectomy in the above study and is in concurrence with our study.

The limitations of the study are smaller sample size and nature of pain score is subjective.

CONCLUSION

Bipolar electrocautery tonsillectomy offers the same operative speed, similar intraoperative blood loss, more post-operative pain compared with coblation tonsillectomy. Hence if the patient can afford and there is no problem of availability it is safe to say that coblation tonsillectomy is the superior method as it causes less pain.

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Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Özler GS, Tatar EC. Comparing traditional cold knife tonsillectomy with a new technique plasma knife tonsillectomy. *Turk Arch Otolaryngology.* 2013;51:114-7.
2. Businco LDR, Tirelli GC. Pediatric tonsillectomy: Radiofrequency-based plasma dissection compared to cold dissection with sutures. Available at: <http://www.businco.it/studio>. Accessed on 19th January, 2011.
3. Shah SA, Ghani R. Evaluation of safety of bipolar diathermy tonsillectomy. *J Ayub Med Coll Abbottabad.* 2007;19(4):94-7.
4. Oko MO, Ganly I, Loughran S, Clement WA, Young D, Geddes NK. A prospective randomized single-blind trial comparing ultrasonic scalpel tonsillectomy with tonsillectomy by blunt dissection in a pediatric age group. *Otolaryngol Head Neck Surg.* 2005;133(4):579-84.
5. Burton MJ, Doree C. Coblation versus other surgical techniques for tonsillectomy. *Cochrane Database Syst Rev.* 2007;(3):CD004619.
6. Polites N, Joniau S, Wabnitz D, Fassina R, Smythe C. Postoperative pain following coblation tonsillectomy: randomized clinical trial. *ANZ J Surg.* 2006;76(4):226-9.
7. Back L, Paloheimo M, Ylikoski J. Traditional tonsillectomy compared with bipolar radiofrequency thermal ablation tonsillectomy in adults. *Arch Otolaryngol Head Neck Surg.* 2001;127(9):1106-10.
8. Roje Z, Racic G, Dogas Z, Pisac VP, Timms M. Postoperative morbidity and histopathologic characteristics of tonsillar tissue following coblation tonsillectomy in children: A prospective randomized single-blind study. *Coll Antropol.* 2009;33(1):293-8.
9. Mitic S, Tvinnereim M, Lie E, Saltyte BL. A pilot randomized controlled trial of coblation tonsillectomy versus dissection tonsillectomy with bipolar diathermy haemostasis. *Clin Otolaryngol.* 2007;32:261-7.
10. Philpott CM, Wild DC, Mehta D, Daniel M, Banerjee AR. A double-blinded randomized controlled trial of coblation versus conventional dissection tonsillectomy on postoperative symptoms. *Clin Otolaryngol.* 2005;30:143-8.
11. Parker D, Howe L, Unsworth V, Hilliam R. A randomised controlled trial to compare postoperative pain in children undergoing tonsillectomy using cold steel dissection with bipolar haemostasis versus coblation technique. *Clin Otolaryngol.* 2009;34:225-31.
12. Xuanqian X, Nandini D. Comparison of coblation tonsillectomy and electrocautery tonsillectomy in pediatric patients. *Technology Assessment Unit of the McGill University Health Centre.* 2008;7(34):47-53.
13. Matin MA. Coblation tonsillectomy versus blunt dissection tonsillectomy. *The ORION Medical J.* 2006;23:330-1.
14. Belloso A, Chidambaram A, Morar P, Timms MS. Coblation tonsillectomy versus dissection tonsillectomy: Postoperative hemorrhage. *Laryngoscope.* 2003;113:2010-3.
15. Javed F, Sadri M, Uddin J, Mortimore S, Parker D. A completed audit cycle on post-tonsillectomy haemorrhage rate: Coblation versus standard tonsillectomy. *Acta Otolaryngol.* 2007;127(3):300-4.
16. Shapiro NL, Bhattacharyya N. Cold dissection versus coblation-assisted adenotonsillectomy in children. *Laryngoscope.* 2007;117:406-10.
17. Isaacson G. Tonsillectomy healing. *Ann Otol Rhinol Laryngol.* 2012;121(10):645-9.
18. Hemin Ibrahim Saeed, Abdulkhaliq Emin, Moyaser A. Yaseen, Ammar M. Sale A comparative study between coblation and bipolar electrocautery tonsillectomy in children. *Zanco J Med. Sci.* 2019;23(1):3:91-95
19. Fawzy AH, Hussien A, Hussein A, Ashour B. Coblation versus Bipolar Diathermy for Adult Tonsillectomy. *Med J Cairo Uni.* 2012;80(1):491-4.
20. Hong SM, Cho JG, Chae SW, Lee HM, Woo JS. Coblation VS. Electrocautery Tonsillectomy: A Prospective Randomized Study Comparing Clinical Outcomes in Adolescents and Adults. *Clinical and Experimental Otorhinolaryngol.* 2013;6(2):90-3.

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