ISSN: 3059-9733
DOI: 10.3126/jobh.v1i2.80942

Comparison between Coblation and Bipolar Diathermy Tonsillectomy in Children at a Tertiary Level Hospital of Nepal

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ABSTRACT

Background

The ideal method of tonsillectomy should decrease operative time, blood loss, postoperative pain and postoperative hemorrhage. This study was done to compare operative time and early postoperative pain between coblation and bipolar diathermy tonsillectomy in children.

Methods

A Prospective comparative study was conducted from May 2019 to April 2020 in children up to age 14 years who underwent tonsillectomy either by coblation or bipolar diathermy. For operative time, three parameters were recorded: total time from mouth gag insertion to gag removal, time from incision to hemostasis for right tonsil and time from incision to hemostasis for left tonsil. Post tonsillectomy pain was assessed using FLACC score for children up to five years and Numeric rating scale- Faces rating scale (NRS-FRS) for children older than five years. Analgesics use on fourth and fifth postoperative day were also recorded.

Results

Forty-nine children were enrolled in the study. Total of 25 patients in coblation and 24 patients in bipolar diathermy group. The mean operative time measured was 33.14 min for coblation and 25.04 min for bipolar group. The difference was statistically significant (p-value=0.005). Postoperative pain on third, fourth and fifth days were significantly less in coblation group. However, there was no statistically significant difference in intake of analgesics between the two groups.

Conclusions

Tonsillectomy in children using coblation technique was found to take longer operative time compared to bipolar diathermy tonsillectomy. However, early postoperative pain was significantly lower in coblation group.

Keywords: bipolar diathermy; coblation; tonsillectomy.

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INTRODUCTION

Tonsillectomy is one of the oldest and most commonly performed surgical procedures in otolaryngology.[1] Various techniques have been used for improving safety and reducing complications. Bipolar diathermy is technique that utilizes electric current to cut tissue and coagulate blood vessels simultaneously. This produces rise in local temperatures to 400-600 °C.[2] Coblation uses radiofrequency electrical current that passes through saline medium and dissect tissue at a lower temperature of 60-100°C.[3] Operative duration is an independent and potentially modifiable risk factor for complications.[4] Longer duration of surgery may result in complications such as surgical site infection, venous thromboembolism, increased bleeding, hematoma formation and necrosis.[4] Pain leads to poor intake of food and hence poor nutrition leading to prolonged hospital stay and increased intake of analgesics.[5] This study was aimed to compare operative time and early postoperative pain between coblation tonsillectomy and bipolar electrocautery tonsillectomy. This will help choosing appropriate technique of tonsillectomy having lower morbidity and will also provide platform for further research in this area.

METHODS

A prospective comparative study was conducted in the department of ENT and Head & Neck Surgery, Tribhuvan University Teaching Hospital (TUTH), Institute of Medicine, Kathmandu, Nepal for a period of 12 months starting from May 2019 to April 2020. Male and Female patients of ≤14 years of age undergoing tonsillectomy or adenotonsillectomy were included in this study. Children with craniofacial anomalies, bleeding disorder, long-term medication use for bleeding disorder, or under medication for any other medical condition were excluded from the study as this might affect operation time and pain assessment. In this study ethical approval was taken from Institutional Review Committee of Tribhuvan University Teaching Hospital (TUTH), Institute of Medicine (Ref. No. 430(6-11) E2(075/076)). All the patients and their guardian were counseled regarding the surgery and informed consent was taken for the enrollment in the study. Patients up to 14 years of age were included in the study and the patients underwent either bipolar diathermy or Coblation tonsillectomy according to lottery. Each tonsil was grasped with Luc's forceps and retracted medially. Then the mucosa overlying tonsil capsule was incised and dissection from superior to inferior pole gently in the plane of loose areolar tissue between the tonsil capsule and the pharyngeal muscles using either coblation or bipolar diathermy. Coblation tonsillectomy was performed using handpiece of EVAC 70 XTRA HP on coblate '7' setting and coagulate '3' setting. Operative time was measured by recording following three parameters: (1) Time from insertion to removal of Boyle Davis mouth gag. (2) Time from mucosal incision to the complete achievement of hemostasis for right tonsil. (3) Time from mucosal incision to the complete achievement of hemostasis for left tonsil. The first five postoperative days were taken as 'early postoperative period'. Severity of pain was measured at around 7 AM before using any analgesic for the first five postoperative days. Pain was assessed using Numeric Rating Scale- Faces Rating Scale (NRS-FRS) score for children older than five years by self-evaluation and Face, Legs, Activity, Cry, and Consolability (FLACC) scoring was used for children up to five years of age. FLACC scoring was done by investigator. To measure additional post-operative analgesic use, the cumulative number of analgesics (paracetamol 15mg/kg/dose) requested for pain or refusal of feeding/ inconsolable cry on the fourth and fifth day after the operation was recorded. Total doses of additional analgesics were counted separately for fourth and fifth postoperative day and the result compared. Result of study were analyzed in terms of operative time, early postoperative pain, and analgesics used on the fourth and fifth day. Mean with standard deviation was obtained for continuous variable. Independent t- test and Mann-Whitney U test was used as applicable for comparing the diathermy group and coblation group. Analysis of the data was done using SPSS version 16 and p-value ≤ 0.05 was considered as statistically significant.

RESULTS

A total of 49 patients were included in the study. The age of the patients included in this study ranged from 1 to 14 years. There were 24 (48.9%) patients who were 5 years of age or younger and 25 (51.1%) patients were older than 5 years. Out of 49 patients there were 35 boys (71.4%) and 14 girls (28.5%). Out of 49 patients enrolled in this study, indication of tonsillectomy in 46 patients (93.9 %) was clinical OSAS (Obstructive sleep apnoea syndrome) due to adenotonsillar hypertrophy. Only the remaining three patients (6.1%) were diagnosed as recurrent acute tonsillitis (Table 1).

Table 1. Indications of tonsillectomy. (n=49)

Diagnosis	Frequency (%)
Adenotonsillar hypertrophy	46 (93.9%)
Recurrent tonsillitis	3 (6.1%)

The number of patients who underwent tonsillectomy using Coblation was 25 (51.1%) and the number of patients who underwent tonsillectomy by bipolar diathermy was 24 (48.9%) (Figure 1).

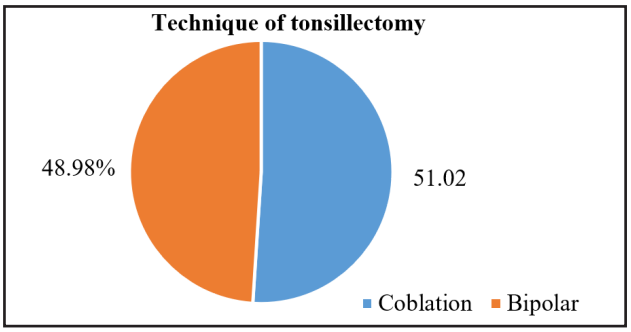

Figure 1. Techniques of Tonsillectomy. (n=49)

Operative time overall for tonsillectomy by coblation was found to be significantly longer than that for tonsillectomy by bipolar (p-value<0.05). The mean time from mouth gag insertion to removal for coblation was 33.14 min and that for bipolar diathermy tonsillectomy was 25.04 min (p-value=0.005). The average time from incision to hemostasis for right tonsil in coblation group was 10.68 min and that for bipolar diathermy group was 7.88 min (p-value=0.012). Similarly, the average time for left tonsillectomy in coblation was 13.02 min and that for bipolar group was 9.04 min (p-value=0.044) (Table 2).

Table 2. Operative time. (n=49)

Technique	Time (min)	No. of patients	Mean (SD, SEM)	p-value
Coblation	Time from gag insertion to gag removal in minute	25	33.14 (10.4, 2.08)	0.005 ¥
Bipolar	Time from gag insertion to gag removal in minute	24	25.04 (8.99, 1.84)	
Coblation	Time from incision to hemostasis of right tonsil in minute	25	10.68 (4.21, 0.84)	0.012 *
Bipolar	Time from incision to hemostasis of right tonsil in minute	24	7.88 (4.05, 0.83)	
Coblation	Time from incision to hemostasis of left tonsil in minute	25	13.02 (6.81, 1.36)	0.044 *
Bipolar	Time from incision to hemostasis of left tonsil in minute	24	9.04 (4.28, 0.87)	

*¥ = p-value calculated using independent t-test, * = p-value calculated using Mann Whitney U test.*

Postoperative pain on third, fourth and fifth days were significantly less in coblation group compared to bipolar diathermy group (p-value<0.05). Postoperative pain was less also on first (p-value = 0.607) and second (p-value=0.081) postoperative day in coblation but was not statistically significant (Figure 2).

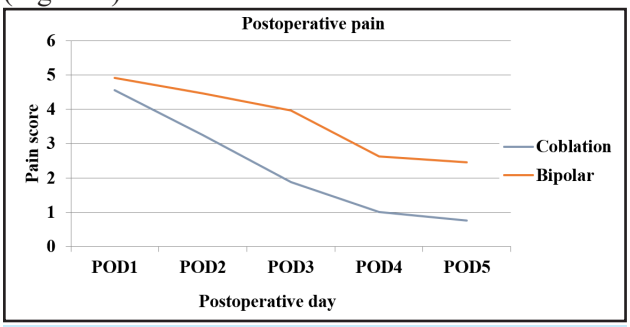

Figure 2. Post-operative pain. (n=49).

Additional analgesic use was found to be less in coblation group on both fourth (p-value=0.197) and fifth (p-value=0.215) postoperative day but the difference didn't reach statistical significance (Table 3).

DISCUSSION

The main aim of this study was to determine and compare the operative time and early postoperative pain between a relatively newer technique (coblation) and a commonly used tonsillectomy technique

Table 3. Additional analgesics use in fourth and fifth postoperative day. (n =49)

Technique	Day	No. of patients #	Mean (SD, SEM)	p-value
Coblation	POD4	10	1.6 (0.7, 0.22)	0.197
Bipolar	POD4	17	2 (0.79, 0.19)	
Coblation	POD5	9	1.22 (1.09, 0.36)	0.215
Bipolar	POD5	16	1.69 (0.95, 0.24)	

(bipolar). Otolaryngologists consider many factors while choosing a surgical technique for tonsillectomy, but operation time and the patient's postoperative pain is of primary concern.[6] In this study, operative time for tonsillectomy by coblation technique was on average 14.9 minutes longer than the bipolar diathermy group. Past findings have been mixed with some showing significantly longer time for coblation and other showing longer time for the bipolar group with varying levels of statistical significance. In a prospective, single blinded, randomized controlled trial of 40 children aged 4–12 years, done by Mitic et al.,[7] that compared bipolar electrocautery and coblation tonsillectomy found operative time for coblation was marginally longer but the difference was not statistically significant (25.6 min vs. 26.6 min). Chang[8] demonstrated operative time to be similar in two groups. In contrast, a study done by Fawzi et al.[9], which was also a prospective, randomized, controlled study but conducted in 30 adult patients, found that operative time for coblation tonsillectomy was significantly less than in the bipolar group (7.97 min vs 11.67 min). Similarly, Lin et al.,[6] and Saeed et al.,[10] also found that tonsillectomy by coblation took less time than that by bipolar diathermy but the difference was statistically insignificant (p-value=0.3 and 0.11 respectively). Significantly longer operative time in coblation group in present study was probably due to a learning curve for coblation tonsillectomy among the surgeons. In addition, same wand was used in four patients after sterilization due to financial concerns related to expensive nature of the wand used in coblation surgery which could have contributed to longer duration of surgery. Considering pain, coblation was found to be superior, causing less pain to the children in our study. Similar to our study, Saeed et al.,[10] found coblation group associated with significantly lower mean pain score than bipolar electrocautery group in all 10 postoperative days. Wiltshire et al.,[11] in a prospective study done in sample with both pediatric and adult also found that pain score was lower in coblation group in the first, second and third postoperative day. Another prospective randomized controlled trial conducted by Bhardwaj et al.,[12] in India, which included 100 children of 4-15 years, also found that pain was significantly lower in coblation group six hour postoperatively and first POD. Polites et al.[13] also demonstrated significant less post operative pain in first three POD. Karam et al.[14] did a systematic review and meta-analysis of 7 studies done in pediatric tonsillectomy patients and found that there was a significant difference between coblation and bipolar groups in terms of post operative pain (standardized mean difference [MD] = -2.13, P = 0.0007). In contrast to our study, Lin et al.,[6] concluded that the differences in pain scores between electrocautery and coblation groups were not statistically significant at any time point in the post anesthetic care unit and three postoperative days. A systematic review and meta-analysis done by Alsaif et al.,[15] also concluded no significant difference in post operative pain but found general trend favoring coblation. In the current study, mean postoperative pain on first and second postoperative day was less in coblation group compared to bipolar diathermy group but the difference was not statistically significant. However, statistically significant less postoperative pain was found in the third, fourth and fifth postoperative day. Looking at the trend of significant decrease in postoperative pain after second postoperative day, when postoperative oedema starts waning; this supports the view that healing process might be faster and better in cases operated by coblation technique. Use of additional analgesics was seen to be lesser in coblation group on both fourth and fifth postoperative day. Though less use of analgesic was found to be needed in coblation group, overall, the difference was not statistically significant. Studies that compared the use of analgesics between bipolar diathermy and coblation were scarce. Wiltshire et al[11] found regular analgesics required for fewer days

in coblation group (8.24 days in coblation group vs. 9.19 days in bipolar group), however, these findings too did not reach statistical significance. Lin et al.,[6] and Mitic et al.,[7] also found less use of analgesia in coblation groups, however its statistical significance was not calculated. This finding thus supports that coblation may be superior to bipolar with regards to pain experienced by the patients.

Limitations

This study was not devoid of drawbacks. There were potential limitations. Firstly, though tonsillectomy performed by only experienced faculties were included in this study, there were four faculty surgeons involved, each individual surgeon with variable experience on performing operation (especially using coblation) with variable learning curve which probably have affected the operative time. Secondly, a larger sample would have been more representative and applicable. Another limitation was the intelligence of patient to use the NRS-FRS scale, this drawback was tried to overcome by familiarizing and teaching how to score pain in the scale to all the patients and their guardians one day prior to surgery and the score was taken every morning before the patients took any analgesics. The score was taken by same person (principal investigator). Additionally, pain scoring system is subjective and dependent on patient level of pain threshold. Also, postoperative pain was assessed only up to fifth postoperative day, and we could have seen bigger difference in pain scoring if pain had been assessed for longer period. Finally, the investigator not being blind was also one of the limitations.

CONCLUSIONS

This study showed statistically significant less postoperative pain on third, fourth and fifth days (p-value <0.05) in coblation group as compared to bipolar diathermy group. Postoperative pain was also less on first and second postoperative day in coblation but it was not statistically significant (p-value = 0.607 and 0.081 respectively). This study showed statistically significant longer operative time for tonsillectomy by coblation method than that by bipolar diathermy method in terms of total operative time from mouth gag insertion to removal (p-value =0.005), for right tonsillectomy (p-value=0.012) and also for left tonsillectomy (p-value=0.044). Similar studies with larger sample size would be more representative to establish a superior method of tonsillectomy between two methods in children. Single surgeon involvement will reduce bias for further studies. Future studies with these surgical modalities will broaden our knowledge in this field.

Conflict of interest: None

Funding: None

REFERENCES

1. Younis RT, Lazar RH. History and current practice of tonsillectomy. Laryngoscope. 2002;112 :3-5. [DOI]
2. Matin MA, Chowdhury MA, Haque ME, Islam MN, Shamim T, Muqeet MA, et al. Coblation tonsillectomy versus blunt dissectomy tonsillectomy in children. Anwer Khan Modern Medical College Journal 2013;4(1):25-29. [DOI]
3. Xie X, Dendukuri N, McGregor M. Comparison of Coblation Tonsillectomy and Electrocautery Tonsillectomy in Pediatric Patients.Technology Assessment Unit (TAU) of the McGill University Health Centre (MUHC); 2008. Report no. 34. 28p. [Link]
4. Cheng H, Clymer JW, Po-Han Chen B, Ferko NC, Cameron CG, Hinoul P et al. Prolonged operative duration is associated with complications: a systematic review and meta-analysis. J Surg Res. 2018;229:134-144. [DOI]
5. Stewart DW, Ragg RG, Sheppard S, Chaikiadis GA. The severity and duration of postoperative pain and analgesia requirements in children after tonsillectomy, orchidopexy, or inguinal hernia repair. Paediatr Aneaesth 2012;22(2):136-143. [DOI]
6. Lin C, Thung AK, Jatana KR, Cooper JN, Barron LC, Elmaraghy CA. Impact of

coblation versus electrocautery on acute post-operative outcomes in pediatric tonsillectomy. Laryngoscope Investig Otolaryngol. 2019;4(1):154-159. [DOI]

7. Mitic S, Tvinnereim M, Lie E, Saltyt BJ. A pilot randomized controlled trial of coblation tonsillectomy versus dissection tonsillectomy with bipolar diathermy haemostasis. Clin Otolaryngol. 2007;32(4):261-267. [DOI]
8. Chang K.W. (2005) Randomized controlled trial of Coblation versus electrocautery tonsillectomy. Otolaryngol. Head Neck Surg. 132, 273-280. [DOI]
9. F. H. Ahmed, H. Ayman, H. Ahmed, A. Baher. Coblation Versus Bipolar Diathermy for Adult Tonsillectomy. Med. J. Cairo Univ. 2012 September (80) : 491-49. Med J Cairo Univ. 2012;80(1):491-494. [Link]
10. Saeed HI, Emin A, Yaseen MA, Saleh AM. A comparative study between coblation and bipolar electrocautery tonsillectomy in children. Zanco J Med Sci. 2019;23(1):81-89. [DOI]
11. Wiltshire D, Cronin M, Lintern N, et al. The debate continues: a prospective, randomised, single-blind study comparing Coblation and bipolar tonsillectomy techniques. J Laryngol Otol. 2018;132(3):240-245. [DOI]
12. Bhardwaj B, Singh J. Comparative Post-operative pain analysis between coblator assisted and bipolar diathermy tonsillectomy in paediatric patients. Indian Journal of Otolaryngology and Head & Neck Surgery. 2019 Mar 4;71(1):90-94. [DOI]
13. Polites N, Joniau S, Wabnitz D, Fassina R, Smythe C, Varley P et al. Postoperative pain following coblation tonsillectomy: randomized clinical trial. Aust N Z J Surg 2006;76:226-9. [DOI]
14. Karam M, Abul A, Althuwaini A, Almuhanna A, Alenezi T, Aljadi A et al. Coblation Versus Bipolar Diathermy Hemostasis in Pediatric Tonsillectomy Patients: Systematic Review and Meta-Analysis. Cureus, 2022; 14(3): e23066. [DOI]
15. Alsaif A, Alazemi M, Kahlar N, Karam M, Abul A, Al-Naseem A, et al. Tonsillectomy Outcomes for Coblation Versus Bipolar Diathermy Techniques in Adult Patients: A Systematic Review and Meta-Analysis. Ear Nose Throat J. 2023 Apr 1;102(4):NP183-91. [DOI]

Citation: Bajracharya R, Bhandari R, Neupane Y, Guragain RPS. Comparison between Coblation and Bipolar Diathermy Tonsillectomy in Children at a Tertiary Level Hospital of Nepal. JoBH, Nepal. 2025; 1(2): 98-103.