ORIGINAL ARTICLE
PEDIATRIC OTOLARYNGOLOGY
DOI: 10.5152/B-ENT.2026.210166

Comparison of Diathermy and Coblation Tonsillectomy in Children

Erkan Aktan[1], Mazhar Çelikoyar[1]

[1]Department of Otolaryngology Head & Neck Surgery, İstanbul Florence Nightingale Hospital, İstanbul, Türkiye

Cite this article as: Aktan E, Çelikoyar M. Comparison of Diathermy and Coblation Tonsillectomy in Children. B-ENT. 2026, 22, 0166. doi: 10.5152/B-ENT.2026.210166.

ABSTRACT

Objective: Tonsillectomy is one of the most common operations in children. Although coblation and diathermy are common, their superiority to the classical cold curettage method is still controversial. In this study, the authors aim to compare coblation and diathermy tonsillectomy with or without adenoidectomy.

Methods: A total of 233 children aged 2-12 were enrolled in this study. For this study, the authors used diathermy in 124 children and coblation in 109 children. All procedures were performed by the same surgeon, and postoperative follow-up was done by the same surgeon for 20 days. Average gender and age distributions were similar between diathermy and coblation groups (P = .052).

Results: Operation times were shorter and intraoperative blood loss was lower in the coblation group. Primary hemorrhage did not occur in either group. Late post-tonsillectomy hemorrhage occurred in 3 cases in the diathermy group and 3 cases in the coblation group.

Conclusion: The authors conclude that there is a learning curve when using the coblator and that coblation intracapsuler total tonsillectomy offers improved intraoperative hemostasis and better operative speed compared to diathermy extracapsuler total tonsillectomy.

Keywords: Coblation total tonsillectomy, diathermy extracapsuler total tonsillectomy, extracapsuler tonsillectomy, intracapsuler tonsillectomy, pediatric tonsillectomy, tonsillectomy, tonsillotomy, tonsil hemorrhage

Introduction

There are many different techniques for tonsillectomy, including microdebrider, plasma knife, laser, and cold curettage.

Based on whether the surrounding capsule has been dissected, tonsillectomy can be divided into extracapsular tonsillectomy (ET) and intracapsular tonsillectomy (IT). Also, depending on whether the tonsils are completely removed or partially removed, tonsillectomy can be divided into total tonsillectomy (TT) and partial tonsillectomy (PT). The use of monopolar or bipolar diathermy, alone or with the classical cold steel method, constitutes the majority of tonsillectomies. Cold curettage and tie-off is still the most preferred technique. Many surgeons have recently started using coblation, which is a relatively novel technique compared to others,[1] because of less postoperative pain,[2-7] easy procedure after the learning curve,[8,9] and almost bloodless operation.[10] Coblation uses a radiofrequency electrical current transmitted through a sodium chloride solution to cause ablation. The advantage of this method is that it removes the tonsils at a lower temperature (<60°C) than diathermy. This can result in less collateral tissue damage and comfortable postoperative recovery. In addition, reduced intraoperative hemorrhage is particularly important in children.[11] However, there is insufficient data to determine whether coblation total tonsillectomy is safer than other techniques for post-tonsillectomy hemorrhage (PTH) in children, as there are insufficient data on pediatric PTH after coblation total tonsillectomy.[12] The selected surgical techniques are considered to be effective on PTH.[13] When the literature is researched, it is seen that the previous studies were generally multicenter studies with surgeons of many different experience levels. Different experience levels, different indications, and different postoperative evaluations will affect the results and could pose as potential limitations.[12-14] However, all operations in this study were performed by a single expert surgeon, which is an important advantange of the current study. Initial cases were conducted using diathermy and then coblation techniques were utilized. Therefore, the authors believe that both selection and operator bias can be avoided because of operative speed, secondary

Corresponding author: Erkan Aktan, e-mail: erkan.dr@gmail.com
Received: March 23, 2021 **Revision Requested:** January 20, 2022 **Last Revision Received:** March 10, 2022 **Accepted:** May 06, 2026
Publication Date: September 1, 2026
Available online at www.b-ent.be

CC BY 4.0: Copyright@Author(s), "Content of this journal is licensed under a Creative Commons Attribution 4.0 International License."

PTH, postoperative pain, and mean blood loss in children with retrospective chart review.

Methods

For this study, the first author performed 124 diathermy total tonsillectomies (DETTs) followed by 109 coblation total tonsillectomies (CITTs). Between January 1, 2013, and June 30, 2019, a total of 233 children aged 2-12 underwent surgery (Figure 1). This study (44140529/13338) was approved by the ethics committee of Demiroğlu Bilim University ethics committee with Decision No: 12.11.2019-23/2019. Informed consent for all patients was obtained from their parents. The indications for tonsillectomy in this patient series are given in Table 1. In the diathermy group, 3 of 124 patients required overnight observation, while other patients underwent surgery on the same day. In the coblation group, 4 of 109 patients required overnight observation, while other patients underwent surgery on the same day. All patients were followed up by the surgeon for 20 days postoperatively. Diagnostic nasal endoscopy was done on all patients, and adenoidectomy was performed in cases of adenoidal hypertrophy. Cephalometry or sleep polysomnography was not routinely undertaken. Using oral intubation and general anesthesia for both groups, the surgeon performed DETT and CITT. The Coblator II surgery system (Arthro Care Corp., Austin, TX, USA) was used with an ablation power setting of 7-8 and a coagulation power setting of 3-4. For diathermy tonsillectomy, monopolar and bipolar cautery (Valleylab, Boulder, CO, USA) were used at settings of 20 and 20, respectively. In the tonsillectomy bed, blood stoppers, fibrin glue, or ties were not placed. Primary PTH was defined as hemorrhage occurring within the first 24 hours of surgery[12] and secondary PTH was defined as occurring from 24 hours up to 20 days postoperatively. Patients with secondary PTH were checked at what time the bleeding started when they arrived at the emergency center. Patients' caretakers were asked to report their child's pain score according to the illustrated visual analog scale (VAS) (Figure 2). Their pain levels and the progress of the pain were noted every other day. The data included in the analysis were age, gender, surgeon's experience with coblation technique, grade of tonsillar hypertrophy (grade I-IV on the Brodsky tonsil scale), and scale of tonsillar embedding (Table 2). The tonsils were grasped with Allis forceps and pulled out of the tonsillar bed. If more than 75% of the tonsil was moving beyond the tonsillar fossa, it was graded as mild embedding; if between 25% and 75%, it was graded as moderate embedding, and if moving less than 25% it was graded as severe embedding.[12] In the coblation group, sutures and bipolar diathermy hemostasis were not performed. Hemostasis was done using the plasma surgery system (ArthroCare, Sunnyvale, CA, USA). Hemostasis for secondary PTH was carried out with bipolar diathermy (Valleylab, Boulder, CO, USA).

The data were analyzed using chi-square tests and *t*-tests. When the *P* value was <.05, differences were considered significant.

Main points

- **Disadvantages of CITT**:
  - Long preparation time,
  - The cost of the material used,
  - The need for a learning curve.
- **Advantages of CITT**:
  - Minimal bleeding or absence of bleeding,
  - Applicable to all age groups,
  - Short post-operative diet, less analgesic use, and short return to school time,
  - Absent from school less than diathermy tonsillectomy,
  - Less collateral damage.

Results

In the study, 233 children were operated on with or without adenoidectomy. Of these, 124 underwent DETT and 109 others underwent CITT. The average age was 6.1 years (Table 3). Primary PTH was not observed in either technique. Secondary PTH was observed in 3 (2.4%) of 124 children undergoing DETT and 3 (2.7%) of 109 children undergoing CITT (*P* = .873). Secondary PTH occurred within 7 days post-surgery in the DETT group (days 2, 6, 7) and secondary PTH occurred within 11 days post-surgery (days 9, 10, 11) in the CITT group (Figure 3). Secondary PTH occurred later in the CITT group compared with the DETT group. In both groups, secondary PTH occurred mostly during the night. The authors noticed no primary or secondary hemorrhage in the first 30 DETT cases. This supports the knowledge that there is a learning curve in DETT surgery (Figure 4). After tonsillectomy, postoperative pain was more severe and persisted long-term in almost all DETT patients compared with CITT. Moreover, patients in the CITT group experienced rapid pain relief, and the patients returned to a normal diet more quickly than those patients in the DETT group (Figure 5).

Discussion

In general, 70% of tonsillectomies are performed using monopolar or bipolar cautery techniques, either alone or combined with cold curettage. However, the use of coblation is rapidly increasing, but due to high cost and the learning curve, surgeons are still hesitant to choose this technique. The aim of this study is to evaluate the safety and efficacy of CITT.

As the surgeon (first author) who has performed all these surgical procedures, the author was initially performing tonsillotomy with the coblator with an indication of Obstructive Sleep Apnea (OSA). Removing most of the tonsil and ensuring airway patency was sufficient in most cases. Although tonsillar hypertrophy was present in a few cases, it rarely caused complications, except in one case in which the author had to perform total extracapsuler tonsillectomy.

However, when the author could not achieve the desired result in chronic tonsillitis cases (because tonsillitis attacks), the author started to apply the intracapsular total tonsillectomy technique and observed that the results suddenly improved.[15] In this study, all the coblator cases had total IT.

Postoperative pain and hemorrhage in traditional ET are significant concerns for surgeons, which are reported at a rate of 2-4%. During total tonsillectomy, rough handling of the tonsillar bed, adhesions in the tonsillar bed, or deep excision of the pharyngeal muscle due to lack of experience may cause

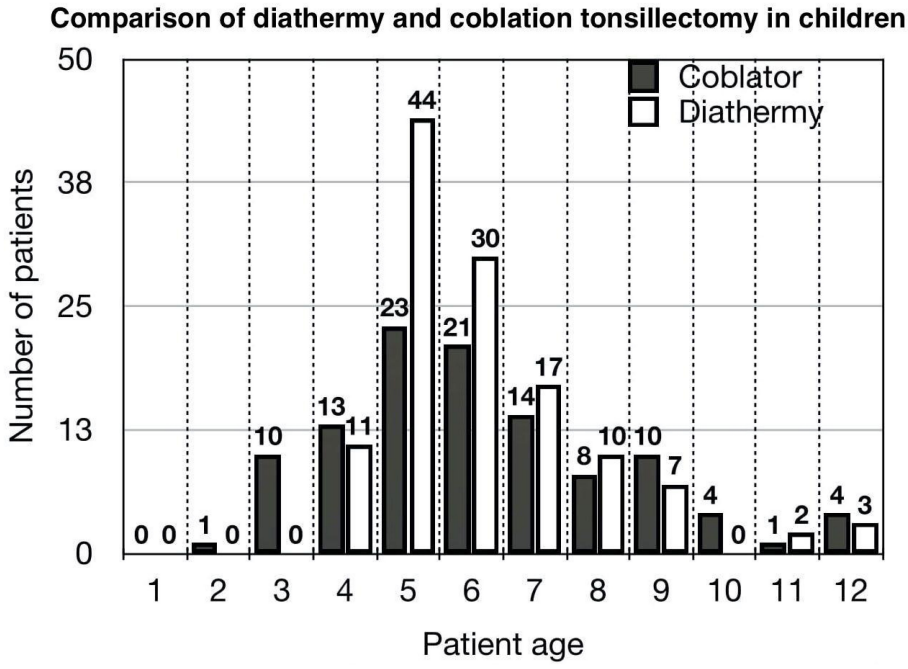

Figure 1. Comparison of devices used for tonsillectomy by patient's age.

complications that result in large vessel injuries and loss of the patient.[16] To avoid these, the author used CITT.

In ET, the tonsil tissue is removed completely; therefore, there is no possibility of recurrence. However, because the muscle tissue, vessels, and nerve in the tonsillar fossa are exposed, total tonsillectomy can lead to serious injuries, postoperative pain, and postoperative hemorrhage, which may rarely lead to death. In IT, the tonsil capsule is preserved. In this way, the nerve endings, vessels, and pharyngeal muscles are not touched, postoperative pain is significantly less, leading to faster and easier recovery, and has a tendency to reduce postoperative hemorrhage.[17] However, there is a possibility of tonsil tissue regrowth in this technique.[18]

Table 1. The Indications for Tonsillectomies

Chronic tonsillitis
PFAPA syndrome
Upper airway obstruction associated with snoring
Mouth breathing or sleep apnea

PFAPA, Periodic Fever, Aphthous Stomatitis, Pharyngitis, Adenitis.

Because the authors have seen hypertrophies in tonsillectomy cases, they compared the results of DETT with the results of the CITT.

There have been several studies about coblation tonsillectomy, but most of them have selection bias, reporting bias, or surgeon bias.[11] Therefore, this study was designed to minimize these biases and get as much objective data as possible by concentrating on a single surgeon who followed all patients in 1 hospital.[12] This study focused particularly on pediatric coblation total tonsillectomies, because there have been few studies in this domain. In other studies, PTH occurred in between 2.7% and 15.9% of cases, depending on the study. A meta-analysis of coblation total tonsillectomy found the total bleeding rate to be 4.1%, whereas the bleeding rate in children was 2.9%. This study showed that secondary PTH in children under 12 years of age was 2.4% for DETT and 2.7% for CITT, with no primary PTH. Cold steel dissection with tie has been considered the safest tonsillectomy technique.[13,19] In an analysis of pediatric tonsillectomies, cold steel dissection was shown to be safer than coblation.[14,20] However, a study in which tonsillectomy was performed by a single surgeon showed that the PTH rate was 5.0% for cold steel dissection and 5.8% for coblation tonsillectomy, showing similar PTH rates.[21,22] Several

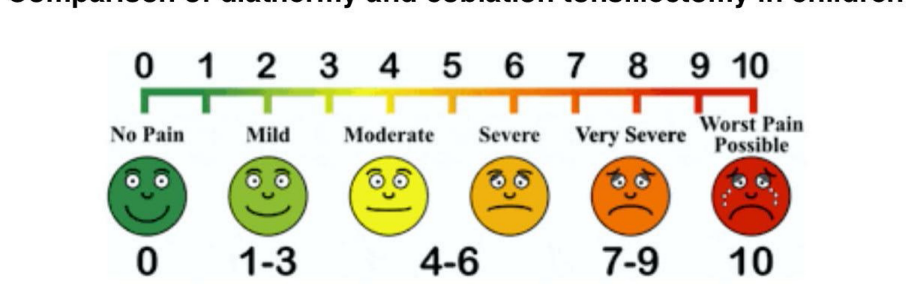

Figure 2. Visual analog scale system being used for this series of patients.

Table 2. Brodsky Grading Scale (Brodsky)

Grade	Airway %
1	<25
2	26-50
3	51-75
4	>75

other studies did not show the advantage of cold steel tonsillectomy over CITT in terms of PTH.[23] Moreover, in a study of 800 patients, it was shown that the secondary PTH coblation rate was similar to bipolar diathermy.[24] Furthermore, because a single surgeon performed the procedure, surgeon bias, selection bias, and reporting bias were effectively excluded from this study, which gives more accurate results.[14,25] Also, because the definition of hemorrhage can be different depending on the surgeon, this study could remove that bias, as the same surgeon operated on and followed up with all cases. Early presence of PTH in DETT and late in CITT may be due to a healing process specific to coblation.[23] It was observed that surgeons who performed a greater number of tonsillectomies had lower bleeding rates than surgeons who performed fewer, and the fact that there was no primary bleeding after the first 30 cases in other studies supports this.[3,25] Most of the surgeons learned the technique by watching a CD or DVD or referring to online resources. Courses related to coblation tonsillectomy should be frequently available to prevent primary or secondary bleeding. Given that secondary bleeding did not occur after the first 20 cases of CITT, the authors believe this may be related to a learning curve for the technique. Despite extensive experience with DETT, the surgeon in this study rarely encountered late PTH (Figure 5).

In this study, there was no significant difference in PTH rate between DETT and CITT techniques in children, when performed by a single surgeon in 1 center ($P = .873$). The authors thought that the later onset of bleeding in CITT compared with DETT is due to a healing process specific to coblation. The fact that hemorrhage was observed in the surgeon's initial cases reinforces the view that there is a learning curve to this technique.[17,25] In this study, the authors noted less postoperative pain ($P < .01$), faster return to a normal diet, a similar rate of PTH ($P = .873$), better operative speed ($P < .01$), and less bleeding ($P < .01$) with CITT. These reasons support the surgeon's use of the coblation method as an alternative to diathermy. Training in the use of the coblator, and the handling of secondary bleeding are essential, as insufficient technique may cause the abandonment of the procedure and neglect the postoperative pain advantages it provides. A larger series performed at a single center by a single surgeon

Table 3. Pre- and Postoperative Informations

	Diathermy	Coblation	*P*
Case	124	109	
Male	57	53	.392
Female	67	56	.456
Mean age	6.1	6.2	.634
Primary bleeding	0	0	
Secondary bleeding (PTH)	3 (2.41%)	3 (2.75%)	.873
Mean blood loss (mL)	5.84	3.46	<.01
Operation time (min)	19.45	16.8	<.01
Pain (VAS) (mean score)	First day 6.12	First day 5.03	
	Third day 6.58	Third day 5.18	
	Fifth day 6.36	Fifth day 4.53	
	Seventh day 5.83	Seventh day 3.53	
	Ninth day 5.38	Ninth day 2.71	
Pain average (average of total pain scores)	6.05	4.19	<.01
Tonsil embedding T1-3, number of cases, % of the particular group	T1 14, 11%	T1 29, 27%	
	T2 101, 81%	T2 69, 63%	
	T3 9, 3%	T3 11, 3%	
Brodsky grading scale			
Grade 1	11%	16%	
Grade 2	60%	55%	
Grade 3	22%	24%	
Grade 4	7%	5%	

PTH, post-tonsillectomy hemorrhage; T-Tonsil embedding score system staging; VAS, visual analog scale.

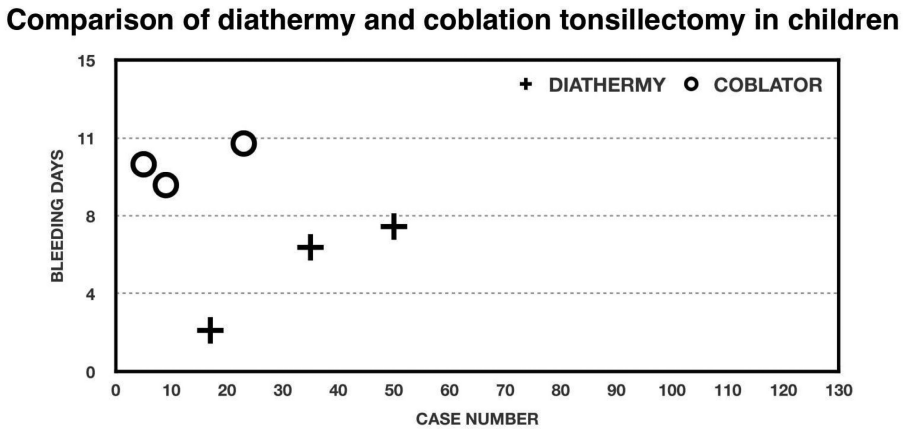

Figure 3. Successive case number and post-tonsillectomy hemorrhage day of that particular case.

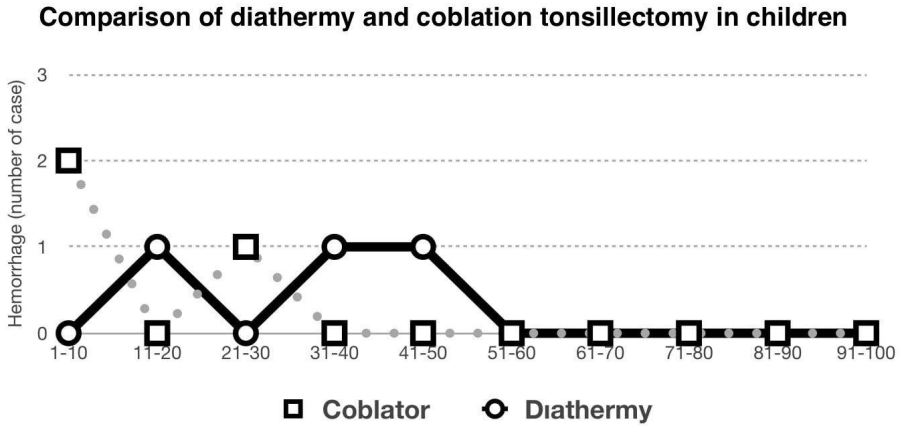

Figure 4. Comparison of post-tonsillectomy bleeding frequency among the two techniques according to the surgeon's experience with coblator vs. diathermy tonsillectomy.

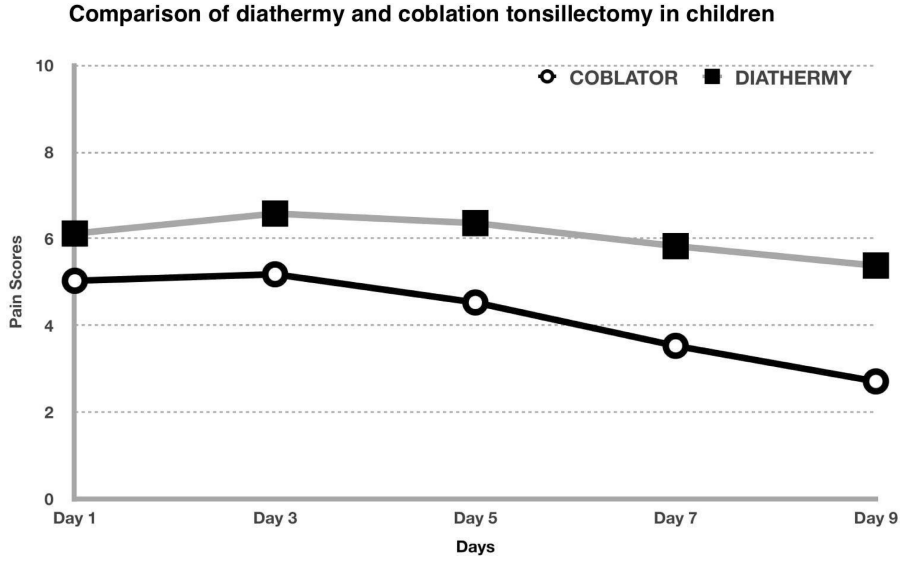

Figure 5. Pain scores.

will provide more information about the use of coblators in tonsillectomy. Secondary bleeding rates for coblation are similar to other techniques, proving that it is safe to use and offers significant advantages.

Data Availability Statement: The data that support the findings of this study are available on request from the corresponding author.

Artificial Intelligence Usage Statement: The authors declared that no artificial intelligence tool was used in the preparation of the manuscript.

Ethics Committee Approval: Ethical committee approval was received from the Ethics Committee of Demiroğlu Bilim University (Approval no: 44140529/13338, Date: November 13, 2019).

Informed Consent: Written informed consent was obtained from the patients who agreed to take part in the study.

Peer-review: Externally peer-reviewed.

Acknowledgments: The authors feel immensely grateful to Ege Can Güden, MD for his kind support in the preparation of this article.

Author Contributions: Concept – E.A.; Design – E.A.; Supervision – E.A., M.M.C.; Resources – E.A., M.M.C.; Materials – E.A.; Data Collection and/or Processing – E.A.; Analysis and/or Interpretation – E.A., M.M.C.; Literature Search – E.A.; Writing – E.A., M.M.C.; Critical Review – E.A., M.M.C.

Declaration of Interests: The authors have no conflict of interest to declare.

Funding: The authors declared that this study has received no financial support.

References

1. Shah UK, Dunham B. Coblation for tonsillectomy: an evidence-based review. *ORL J Otorhinolaryngol Relat Spec*. 2007;69(6):349-357. [CrossRef]
2. Stoker KE, Don DM, Kang DR, et al. Pediatric total tonsillectomy using coblation compared to conventional electrosurgery: a prospective, controlled single-blind study. *Otolaryngol Head Neck Surg*. 2004;130(6):666-675. [CrossRef]
3. Rachmanidou A, Robb PJ, Timms M. A double-blinded randomized controlled trial of coblation versus conventional dissection tonsillectomy on postoperative symptoms. *Clin Otolaryngol*. 2005;30(5):477-8; author reply 478. [CrossRef]
4. Glade RS, Pearson SE, Zalzal GH, et al. Coblation adenotonsillectomy: an improvement over electrocautery technique? *Otolaryngol Head Neck Surg*. 2006;134(5):852-855. [CrossRef]
5. Chang KW. Randomized controlled trial of coblation versus electrocautery tonsillectomy. *Otolaryngol Head Neck Surg*. 2005;132(2):273-280. [CrossRef]
6. Temple RH, Timms MS. Paediatric coblation tonsillectomy. *Int J Pediatr Otorhinolaryngol*. 2001;61(3):195-198. [CrossRef]
7. Timms MS, Temple RH. Coblation tonsillectomy: a double blind randomized controlled study. *J Laryngol Otol*. 2002;116(6):450-452. [CrossRef]
8. Wilson YL, Merer DM, Moscatello AL. Comparison of three common tonsillectomy techniques: a prospective randomized, double-blinded clinical study. *Laryngoscope*. 2009;119(1):162-170. [CrossRef]
9. Shapiro NL, Bhattacharyya N. Cold dissection versus coblation-assisted adenotonsillectomy in children. *Laryngoscope*. 2007;117(3):406-410. [CrossRef]
10. Noordzij JP, Affleck BD. Coblation versus unipolar electrocautery tonsillectomy: a prospective, randomized, single-blind study in adult patients. *Laryngoscope*. 2006;116(8):1303-1309. [CrossRef]
11. Clark MP, Smithard A, Jervis P. How we do it: coblation tonsillectomy complication rates from a single ENT department compared with the National Prospective tonsillectomy Audit. *Clin Otolaryngol*. 2006;31(2):156-159. [CrossRef]
12. Kim JW, Mun SJ, Lee WH, et al. Post-tonsillectomy hemorrhage in children: a single surgeon's experience with coblation compared to diathermy. *Eur Arch Otorhinolaryngol*. 2012;270(1):339-344. [CrossRef]
13. Tomkinson A, Harrison W, Owens D, et al. Risk factors for postoperative hemorrhage following tonsillectomy. *Laryngoscope*. 2011;121(2):279-288. [CrossRef]
14. Heidemann CH, Wallén M, Aakesson M, et al. Post-tonsillectomy hemorrhage: assessment of risk factors with special attention to introduction of coblation technique. *Eur Arch Otorhinolaryngol*. 2009;266(7):1011-1015. [CrossRef]
15. Windfuhr JP, Savva K, Dahm JD, et al. Tonsillotomy: facts and fiction. *Eur Arch Otorhinolaryngol*. 2014;272(4):949-969.[CrossRef]
16. Lu YX, Gu QL, Wang Z, et al. Pediatric coblation total tonsillectomy: intracapsular or extracapsular? *Acta Oto-laryngol*. 2017;137(11):1188-1193. [CrossRef]
17. Walton J, Ebner Y, Stewart MG, et al. Systematic review of randomized controlled trials comparing intracapsular tonsillectomy with total tonsillectomy in a pediatric population. *Arch Otolaryngol Head Neck Surg*. 2012;138(3):243-249. [CrossRef]
18. Di Rienzo Businco L, Coen Tirelli G. Paediatric tonsillectomy: radiofrequency-based plasma dissection compared to cold dissection with sutures. *Acta Otorhinolaryngol Ital*. 2008;28(2):67-72.
19. Windfuhr JP, Deck JC, Remmert S. Hemorrhage following coblation tonsillectomy. *Ann Otol Rhinol Laryngol*. 2005;114(10):749-756. [CrossRef]
20. Javed F, Sadri M, Uddin J, et al. A completed audit cycle on post-tonsillectomy haemorrhage rate: coblation versus standard tonsillectomy. *Acta Otolaryngol*. 2007;127(3):300-304. [CrossRef]
21. Khan I, Abelardo E, Scott NW, et al. Coblation tonsillectomy: is it inherently bloody? *Eur Arch Otorhinolaryngol*. 2012;269(2):579-583. [CrossRef]
22. Divi V, Benninger M. Postoperative tonsillectomy bleed: coblation versus noncoblation. *Laryngoscope*. 2005;115(1):31-33. [CrossRef]
23. Amir I, Belloso A, Broomfield SJ, et al. Return to theatre in secondary post-tonsillectomy haemorrhage: a comparison of coblation and dissection techniques. *Eur Arch Otorhinolaryngol*. 2012;269(2):667-671. [CrossRef]
24. Mösges R, Hellmich M, Allekotte S, et al. Hemorrhage rate after coblation tonsillectomy: a meta-analysis of published trials. *Eur Arch Otorhinolaryngol*. 2011;268(6):807-816. [CrossRef]
25. Carney AS, Harris PK, MacFarlane PL, et al. The coblation tonsillectomy learning curve. *Otolaryngol Head Neck Surg*. 2008;138(2):149-152. [CrossRef]