



Conventional Vs Coblation Tonsillectomy

Dr Rohan K Patel	Senior Resident, Dept. of ENT, B. J. Medical College, Ahmedabad.
Dr Roma Gandhi	Junior Resident, Dept. of ENT, GMERS Medical College, Sola, Ahmedabad.
Dr Monil parsana	2 nd year Resident, Dept. of ENT, B. J. Medical College, Ahmedabad.
Dr Kalpesh Patel	Associate Prof; Dept. of ENT, B. J. Medical College, Ahmedabad.
Dr Rajesh Vishwakarma	Prof & Head, Dept. of ENT, B. J. Medical College, Ahmedabad.

ABSTRACT

A prospective study to compare coblation tonsillectomy and conventional dissection method in terms of postoperative pain, bleeding, and rapidity of healing in adult Indian patients undergoing tonsillectomy between the age group of 8-32 year. Out of 67 adult patients undergoing tonsillectomy for benign indications a study group of 37 patients underwent coblation tonsillectomy under microscopic guidance and 30 patients of control group underwent conventional tonsillectomy. The operative time and blood loss was noted for each group. Patients were evaluated at 6, 12, 24 hours postoperatively and then on 7th and 14th postoperative day for postoperative pain (by visual analog scale), bleeding, and tonsillar fossa healing. Statistical comparison was done using appropriate tests. The two groups were demographically matched. It took longer to perform the conventional procedure (18 vs 13 min). The operative blood loss on the radiofrequency side was 10 ml, vs 29 ml on the conventional side ($P = 0.009$). 81% patients said that the coblation side was less painful for the overall 14-day recovery period. There were significant differences seen at 6, 12 and 24 h in terms of post-operative pain scores. Beyond that, the pain was consistently less on the coblation side, but the difference was not significant. There was one case of reactionary or secondary hemorrhage in the study group. We concluded that the ability to have one tool to ablate, coagulate, suction and irrigate make it an attractive technique to consider for resection of tonsillar tissue. Coblation is easy to learn and extremely fast and efficient. Tonsillectomy that uses Coblation is designed to reduce the post-operative pain without the discomfort and inconvenience associated with traditional surgery.

KEYWORDS : coblation; tonsillectomy; complications.

Introduction:

Tonsillectomy is one of the most common surgical procedures performed in the ENT OT that was first performed 3000 years ago.[1] There are various techniques and instruments for this operation. The major postoperative complaints are pain and secondary hemorrhage. The pain is the result of disruption of mucosa and glossopharyngeal and or vagal nerve fiber irritation followed by inflammation and spasm of the pharyngeal muscles that leads to ischemia and a protracted cycle of pain; it does not completely subside until the muscle becomes covered with mucosa 14–21 days after surgery. The postoperative secondary hemorrhage is due to secondary infection of the tonsillar fossa resulting in disruption of vessels and bleeding [2].

The various methods for tonsillectomy are dissection, guillotine, cryosurgery, Monopolar and bipolar diathermy dissection, suction diathermy dissection, bipolar scissor dissection, ultrasonic removal, radiofrequency surgery and laser surgery.

Coblation is a relatively new surgical technique that uses a radiofrequency electrical current that passes through a saline solution to dissect tissue at much lower temperatures (60°-100°C) than electrocautery (Parsons et al., 2006),³ thereby theoretically reducing damage to healthy tissue and lowering pain (Mowatt et al., 2005).⁴ The first and second generations of coblation were introduced in 1998 and 2003, respectively, by ArthroCare Corporation (Burton and Doree, 2007).⁵ One survey of members of the American Society of Pediatric Otolaryngologists showed a sharp increase in the use of coblation during the last 5 years with 16% of pediatric otolaryngologists using it for tonsillectomy procedures in the fall of 2005 (Walner et al., 2007).⁶

The present prospective study compares the surgical duration, intraoperative blood loss, incidence of haemorrhage and postoperative pain parameters after surgery in patients undergoing coblation tonsillectomy with microscopic guidance with the

conventional tonsillectomy.

Materials & Methods:

This comparative prospective study was conducted in the Department of Otorhinolaryngology, and Head & Neck Surgery, B. J. Medical College and Civil Hospital, Ahmedabad, India on 67 patients between **the age of 8** and 32 years on both male and female patients between August 2013 and March 2017 after ethical and scientific committee clearance. Indications for tonsillectomy in this study were: (1) Chronic tonsillitis, (2) Tonsillar hypertrophy resulting in snoring or obstructive sleep apnea. Patients with a history of unilateral peritonsillar abscess, unilateral tonsil hypertrophy, or a known bleeding disorder were excluded from the study. Out of 67, 30 patients underwent conventional tonsillectomy and 37 patients underwent coblation tonsillectomy. Patients were blinded with regards to the technique used to remove each tonsil. The coblation device was set to a level of 7 on ablation mode during the surgeries and both conventional as well as Coblation tonsillectomies were performed by the microscope. All surgeries were performed by an experienced otolaryngologist, who had performed at least ten coblation tonsillectomies before beginning this study. Outcome measures of time needed to perform surgery for each side, amount of blood loss during the surgery, post operative pain, postoperative hemorrhage, and amount of wound healing at 14 days after surgery were recorded by an independent otolaryngologist blinded to the technique used to remove each tonsil. Postoperative care was same for all patients. Postoperative pain was assessed at 6, 12 and 24 hours and then on 7th and 14th postoperative day. The pain was assessed using visual analog scale (VAS) on a scale of 0–10. The area of slough in each tonsillar fossa was assessed by direct visual examination. The surgeon estimated the amount of healing within the tonsillar fossa by recording the percentage of the fossa that had remucosalized. Also, all episodes of postoperative bleeding from the tonsillar fossae were documented, and the interventions required to stop it.

Equipment Set-up for coblation

The power switch on the controller is turned on. Flow control valve unit is attached to an IV pole by placing the clamp onto the shaft of the pole. Hand a 500-ml or 1000-ml bag of normal saline solution is handed on the IV pole. One end of the flow control cable is plugged into the rear of the flow control valve unit and one end into the front of the controller. Valve switch is pressed up toward the green dot to open the pinch valve. The saline bag is spiked with IV tubing extension and the IV tubing is threaded behind the pinch valve. Activation switch is pressed down to close the valve.

Patient cable to the wand EVac 70 Xtra HP is connected at the end labeled "Connect to ArthroWand", aligning arrow and dot on cable and wand. Patient Cable is connected to Controller, aligning arrow and dot on cable and controller. Suction tubing and IV tubing are connected to the wand. Roller clamp fully opened on the Wand and the giving set. Make sure that you get maximum saline flow when pressing the ablation or coagulation pedal. Additionally, make sure that you have strong and efficient suction. Controller power is set between points 6-9, depending upon surgeon preference and based on rate of tissue ablation. Saline should only flow when pressing the steps on the ablation or coagulation foot pedal.



fig. 1 Arthrocare EVac 70 Xtra HP wand

Surgical Technique

The patient is positioned as for routine tonsillectomy with shoulder roll, neck extension, and head support. Intubation is done using a cuffed oro-tracheal tube. For small children, a non-cuffed tube can be used. Useful tools: Boyle-Davis mouth gag, a pillar retractor and Luc's non-traumatic forceps. Prepare and drape the patient as for routine tonsillectomy. Boyle-Davis mouth gag is used to access the oropharynx and to hide the tracheal tube. To avoid unintended tissue ablation, do not activate the wand while in contact with other structures in the oral cavity.

An operating microscope with 250 mm lens helps to visualize structures and vessels well and in addition a useful tool for training and documentation, however a microscope, is not mandatory. The tonsil is grasped using a non-traumatic (e.g. Luc's) forceps and pulled towards the midline and up. Holding of the wand is done perpendicular to the anterior tonsil parenchyma. While retracting the tonsil medially, begin dissection is begun by depressing the left (yellow) foot pedal in short bursts. If you have good visibility of the lower lobe, start the dissection at the lower lobe. Otherwise, start dissection at the upper lobe. Paint the tissue with very light pressure as applying too much pressure may cause too deep penetration resulting in bleeding and clogging of the suction channel. Keep the dissection to the peritonsillar space and avoid penetrating the tonsil capsule. Penetration capsule or the muscle layer may cause excessive bleeding.

If a bleeding vessel is encountered, wand is placed directly on the vessel and depress the coagulation foot pedal for approximately 1 second to achieve haemostasis (prolonged coagulation is not effective). Deal with bleeders as they are encountered rather than waiting as this makes a clean field and more accurate haemostasis. The suction/irrigation system keeps the area free of blood to allow accurate application of coagulation. Remember to use maximum flow rate (roller clamp fully open) controlled by the flow control unit.



fig. 2 preoperative microscopic view

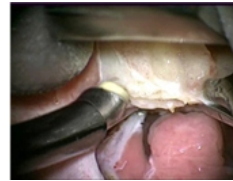


fig. 3 during surgery



fig. 4 tonsillar fossa after 6 months postoperatively

Results

Demographic Data

Total of 67 patients were included in the study out of which 37 were males and 30 were females between age of 8 and 32 years, averaging 18.36 years. The two groups were matched in terms of sex and age distribution.

Surgical Time

The mean operation time from giving incision on the tonsil to achieving complete hemostasis for conventional technique was 18 min and that for the radiofrequency technique was 13 min (Table 1) per tonsil. Thus it took an average of 5 minutes longer to perform the conventional procedure compared to the coblation technique, but this difference did not reach statistical significance ($P < 0.05$).

Intraoperative Blood Loss

The total blood loss during the procedure was measured by weighing the swabs before and after the procedure separately on each side, and that in the suction apparatus. The amount of blood lost on an average on the coblation side was 10 ml, and on the conventional side was 29 ml. This difference was found to be statistically significant ($P = 0.009$, independent t-test).

Postoperative Pain

Pain was observed by VAS score. On overall 14-day post operative recovery period 81 % of patients that underwent coblation reported less pain on VAS score than the patients undergoing dissection tonsillectomy. The other 19% had pain same or more as conventional technique and this was statistically significant ($P = 0.01$). The data recorded from various groups was put to statistical analysis and 'P' value was calculated using independent t-test. The mean pain score for coblation averaged over 14 days was 2.98 and was 4.96 for conventional technique. When pain scores were compared between the two techniques, there were significant differences seen at 6, 12, and 24 hours. Beyond that, the pain was consistently less for the coblation group, but the difference was small and not significant.

Postoperative Bleeding

There was a single case of reactionary or secondary hemorrhage in coblation group and no case of hemorrhage in conventional group.

Discussion

In our study we compared the advantages and disadvantages of radiofrequency coblation technique for tonsillectomy versus cold dissection and snare tonsillectomy. Several investigators have

explored the intraoperative and postoperative complications including pain, slough and hemorrhage. In our study secondary haemorrhage rate for coblation was 2.7% compared to conventional which had no case of secondary hemorrhage, is significant. First studies on coblation tonsillectomy have shown a significant decrease in postoperative pain scores comparing with traditional method with no more complications.⁷ These promising results based up different studies revealed similar outcomes when comparing coblation and electrosurgery or ultrasonic tonsillectomy.^{8,9} On the other hand, there are some studies which reported no significant reductions in pain with coblation surgery comparing with cold dissection or electrosurgery.^{10,11}

Noon, et al. demonstrated a significantly higher hemorrhage rate in the coblation group comparing with diathermy (22.2% versus 3.4%) from a study arranged for 64 patients. Our data opposed this study as we found only 6.6% hemorrhage rate. Our study showed significant difference in post-operative morbidities in favor of coblation assisted method.

Need for analgesics, perhaps due to a significantly longer operating time, was significantly higher in the control group. The pain on the day of the operation was significantly different between groups. Removal of the tonsils and achievement of good homeostasis was more difficult in traditional group. A statistically significant difference was found in postoperative hemorrhage rate in favor of coblation. The incidence of postoperative hemorrhage matched favorably with the published rates of 0-20% for other series,¹²⁻¹⁴ which confirmed our findings. We found that the postoperative hemorrhage including primary and secondary hemorrhages was generally more frequent in the control group; the difference was not statistically significant though.

In order to evaluate the return to normal activities, the patients were asked the postoperative day they would be able to return to work. Another factor which assessed the clinical recovery was retrieving normal diet. The results were significantly different. In our study, the intraoperative blood loss and operation time were significantly less in the coblation group. The reduction of intraoperative blood loss and operation time in coblation tonsillectomy was obvious and reduction of the postoperative pain and early return to normal diet and activities without increasing the postoperative complications were clinically and statistically significant. Therefore, we believe that the coblation tonsillectomy is an effective and cost-effective method.

Compared with CDA, CAA offers a significant reduction in surgical time and blood loss, with similar recovery results as measured by return to diet, return to activity, and postoperative pain scores. Thus, CAA offers a more efficient intraoperative adenotonsillectomy without compromising patients' postoperative recoveries. Further study of CAA with respect to cost analysis and larger scale comparisons with other tonsillectomy methods is warranted¹⁵ less postoperative pain and otalgia in the coblation group than the electrocautery group.

Coblation tonsillectomy was introduced in 1998.¹⁶ Coblation was thought to reduce postoperative pain and improve recovery time compared to existing techniques.¹⁶⁻¹⁸ In reality, whether or not coblation tonsillectomy alleviates postoperative pain compared to other surgical techniques is undetermined. In one study, pediatric patients undergoing tonsillectomy with the coblator device reported less pain over a 10-day period than patients undergoing tonsillectomy with electrocautery or an ultrasonic scalpel.¹⁷ Another study demonstrated that coblation tonsillectomy for recurrent tonsillitis was significantly less painful than dissection tonsillectomy on days 1 ($P < 0.001$), 2 ($P = 0.003$), and 3 ($P = 0.018$),¹⁸ however, opposing results have been reported with no reduction in pain scores with coblation compared to cold dissection or electrosurgery.¹⁹ A 2005 study concluded that the use of coblation to perform tonsillectomy does not confer any symptomatic benefits to the patient over conventional cold dissection tonsillectomy.¹⁹

These studies were all performed in pediatric patients except only one study.

In our study we found that pain was significantly less at 6, 12 and 24 h with P values of 0.004, 0.0003, and 0.005, respectively. However, on the 7th day postoperative P value was just statistically insignificant, although the VAS scores were consistently lower in the coblation arm. Although the pain was significantly less in our study, but the tonsillar fossae healing was delayed on the radiofrequency side as evidenced by the presence of slough in the fossae on day 7 with P value of 0.05 which is statistically significant.

Conclusion

- The ability to have one tool to ablate, coagulate, suction and irrigate make it an attractive technique to consider for resection of tissue.
- Coblation is easy to learn and extremely fast and efficient. Tonsillectomy that uses Coblation are designed to reduce the post-operative pain without the discomfort and inconvenience associated with traditional surgery.
- With the limitations of this study, we can conclude that coblation decreases the chances of complications including intra operative bleeding, also total surgical time and post-operative pain. However there was increased incidence of secondary hemorrhage though single case but statistically significant.

To conclude, coblation tonsillectomy is an easy to learn, safe procedure, with significant advantages in terms of reducing postoperative morbidity, and thus should be routinely used in all cases. Larger randomized studies would be required to confirm or refute the same.

References

1. McNeill RA. A history of tonsillectomy: two millennia of trauma, haemorrhage and controversy. *Ulster Med J* 1960; 29:59-63.
2. Dempster JH (1988) Post-tonsillectomy analgesia: the use of benzocaine lozenges. *J Laryngol Otol* 102:813-814
3. Parsons SP, Cordes SR, and Comer B. (2006). Comparison of posttonsillectomy pain using the ultrasonic scalpel, coblator, and electrocautery. *Otolaryngology-Head and Neck Surgery* 134, 106-113.
4. Mowatt G, Cook J, Fraser C, and Burr J. Systematic review of the safety and efficacy of electrosurgery for tonsillectomy. 2005.
5. Burton MJ, and Doree C. (2007). Coblation versus other surgical techniques for tonsillectomy. *Cochrane Database of Systematic Reviews*.
6. Walner DL, Parker NP, and Miller RP. (2007). Past and present instrument use in pediatric adenotonsillectomy. *Otolaryngology-Head and Neck Surgery* 137, 49-53.
7. Timms MS, Temple RH. Coblation tonsillectomy: a double blind randomized controlled study. *J Laryngol Otol*. 2002; 116(6):450-2.
8. Stoker KE, Don DM, Kang DR, Haupt MS, Magit A, Madgy DN. Pediatric total tonsillectomy using coblation compared to conventional electrosurgery: a prospective, controlled single-blind study. *Otolaryngol Head Neck Surg*. 2004; 130(6):666-75.
9. Parsons SP, Cordes SR, Comer B. Comparison of posttonsillectomy pain using the ultrasonic scalpel, coblator, and electrocautery. *Otolaryngol Head Neck Surg*. 2006; 134(1):106-13.
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(2):143-8.
11. Shah UK, Galinkin J, Chiavacci R, Briggs M. Tonsillectomy by means of plasma-mediated ablation: prospective, randomized, blinded comparison with monopolar electrosurgery. *Arch Otolaryngol Head Neck Surg*. 2002; 128(6):672-6.
12. Siodlak MZ, Gleeson MJ, Wengraf CL. Post-tonsillectomy secondary haemorrhage. *Ann R Coll Surg Engl*. 1985; 67(3):167-8.
13. Tami TA, Parker GS, Taylor RE. Post-tonsillectomy bleeding: an evaluation of risk factors. *Laryngoscope*. 1987; 97(11):1307-11. [PubMed]
14. Capper JW, Randall C. Post-operative haemorrhage in tonsillectomy and adenoidectomy in children. *J Laryngol Otol*. 1984; 98(4):363-5.
15. Shapiro NL, Bhattacharyya N. Cold Dissection Versus Coblation-Assisted Adenotonsillectomy in Children. *The American Laryngological, Rhinological and Otolological Society, Inc. The Laryngoscope Lippincott Williams & Wilkins, Inc.* 2007.
16. Shah UK, Dunham B. Coblation for tonsillectomy: an evidence-based review. *ORL J Otorhinolaryngol Relat Spec*. 2007; 69(6):349-357.
17. Parsons SP, Cordes SR, Comer B. Comparison of posttonsillectomy pain using the ultrasonic scalpel, coblator, and electrocautery. *Otolaryngol Head Neck Surg*. 2006 Jan; 134(1):106-113.
18. Polites N, Joniau S, Wabnitz D, Fassina R, Smythe C, Varley P, et al. Postoperative pain following coblation tonsillectomy: randomized clinical trial. *ANZ J Surg*. 2006 Apr; 76(4):226-229.
19. Philpott CM, Wild DC, Mehta D, Daniel M, Banerjee AR. A double-blinded randomized controlled trial of coblation versus conventional dissection tonsillectomy on post-operative symptoms. *Clin Otolaryngol*. 2005 Apr; 30(2):143-148.