

Comparative Study Between Coblation and Conventional Dissection Technique of Tonsillectomy

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ABSTRACT

Background: Coblation tonsillectomy is a new surgical technique and demands further research to be proven as a suitable and standard method of tonsillectomy.

Aims & Objectives: 1) Assessment, evaluation, and applications of coblation in tonsillectomy. 2) Comparison of the same with the conventional procedures. 3) Comparison, advantages, disadvantages and postoperative complications and efficacy for future use.

Materials and Methods: The present study was conducted in the department of ENT & HNS, RIMS, Ranchi and Other centres amongst the patients attended the outpatient department from February 2018 to October 2019. Total of 60 cases were randomly selected from our outpatient department who failed the medical line of treatment and required surgical intervention for chronic tonsillitis and tonsillar hypertrophy. This was prospective, observational, randomized study.

Results: In this study, there was significant difference in intraoperative time in coblation tonsillectomy compared to cold dissection tonsillectomy - Intraoperative blood loss was significantly less for coblation (18.9 ml) compared to traditional (43.0 ml) with p value 0.002. Average postoperative pain score 6 hours after operation was Chi – Square test = 10.39, df = 2,

p-value = 0.0056 (significant). Average time taken to return to normal diet Chi-square=5.96, df=1 p-value= 0.0146 which is not statistically significant.

Conclusion: Coblation tonsillectomy significantly reduces the intra-operative blood loss, immediate postoperative pain, and patient returns early to regular routine, but with a higher cost and more operation time.


Keywords: Tonsillectomy, Cold Dissection, Coblation, Operation Time, Postoperative Pain.

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INTRODUCTION

Coblation or cold ablation is a technique that utilizes a field of plasma or ionized sodium molecules to ablate tissue. The device works by passing a bipolar radio frequency current through a medium of normal saline. This creates a plasma field of sodium ions. These charged ions are able to break down intercellular bonds and in effect melt tissues at low temperature (40-70 degrees centigrade) in a precise manner with minimal collateral thermal tissue damage.^{1,2}

In recent years population has evolve as a novel technique in many surgical fields as a modality to improve post-operative morbidity and patient care. The tissue ablative properties along with haemostasias with minimal collateral damage is the key for its use. The structure of head and neck appears well suited for the coblation because these areas are readily accessible to the probe without major surgical exploration.

Tonsillectomy is the most common otolaryngologic procedure performed worldwide in pediatric population. Adenoidectomy has been considered as the main surgical management in children

with sleep-related breathing disorders when conservative procedure has failed. For decades guillotine and cold Steel removal of tonsils was sought after technique.^{3,4} Over recent years along with coblation, other techniques in use are harmonic ultrasonic scalpel, laser, thermal welding, radiofrequency, microdebrider have evolved with each proving its advantage over the other.

Coblation has the advantage of haemostasias and less scarring.⁵ Each modality having their own disadvantages including bleeding, scarring, complexity and expense.

Earliest known surgical removal of tonsil was described by AULUS CORNELIUS CELSUS a Roman physician in the year who used his finger to dissect them out.⁶

George Earnest Waugh of England is credited as the first described complete total tonsil excision using careful dissection in 1909.⁷

A hook and knife method were described by Aetius of Amida on the Tigris in the 6th century.⁸

The contributions from Paul of Aegina and Philip Syng Physick added to the techniques available. they used forceps to extirpate the tonsil which eventually transformed into the tonsil guillotine.^{9,10} In 1906, WILLIAM LINCOLN BALLANGER recommended complete removal of tonsil with a knife while leaving the capsule intact.

As an alternative to cold knife blunt dissection method described by Crowe, Watkins and Rottholz from early 1980's, in recent years other modalities that have evolved are harmonic scalpel, coblation, microdebrider, laser, monopolar and bipolar radio frequency in order to reduce the operation time and amount of bleeding without undergoing any changes in the surgical technique.

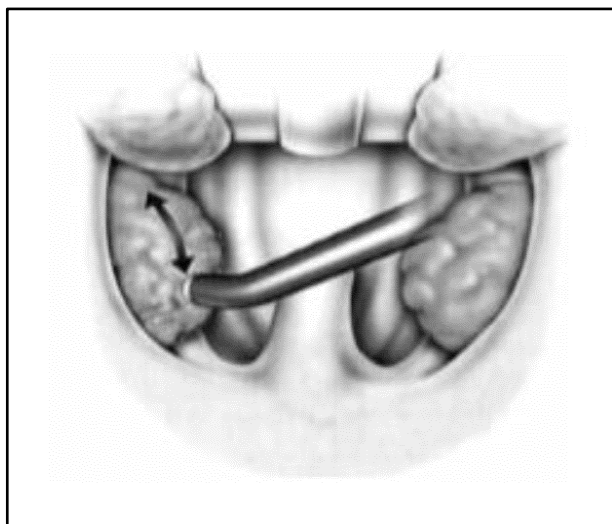


Fig 1: Coblation Tonsillectomy

MATERIALS AND METHODS

The present study was conducted in the department of ENT & Head, Neck Surgery, Rajendra Institute Of Medical Sciences, Ranchi and Others centres at Ranchi amongst the patient attended the outpatient department from February 2018 to October 2019.

Total number of 48557 patients attended in the outpatient department of ENT and out of which 60 cases were randomly selected who failed the medical line of treatment and required surgical intervention for chronic tonsillitis and tonsillar hypertrophy. This was prospective, observational, randomized study.

Inclusion Criteria

All cases of chronic tonsillitis.

Exclusion Criteria

All patients with age more than 60, acute infections, late-stage malignancy associated comorbidities like uncontrolled diabetes, hypertension, heart diseases, with heart pacemakers or other electronic device implants.

Finally, only those patients who were considered fit for surgery by anaesthetic by pre-anaesthetic evaluation considered for surgery under GA/LA.

Patient were randomly allotted into 2-treatment groups, group A and group B.

Group A (conventional procedures)

Group B (using coblation)

All operative procedures of tonsillectomy and adenoidectomy were performed under general anaesthesia using endotracheal

intubation with propofol (2-3 mg /kg) used for Induction with a non-depolarizing muscle relaxant. General anaesthesia was maintained with nitrous oxide and isoflurane. Dose of butorphanol was also administered intra-operative management of pain.

The tonsillectomy surgical dissection technique was the same for all methods used, and involved a subcapsular dissection for complete tonsil excision, with effort made to preserve as much pharyngeal mucosa as possible in case of coblation or steel dissecting instrument for dissection and snare method with Boyle Davis mouth gag in situ. Power setting for the device used followed the manufacturer's recommendations. Coblation tonsillectomy was performed using Coblator II surgery system with EVac 70 plasma wands. Setting was standardized at 7 for coblation and 3 for coagulation. The operative technique of coblation tonsillectomy is based on a standard tonsillectomy with the use of coblation wand to dissect in the peritonsillar plane, with the tip directed towards the body of tonsil. Hemostasis was achieved using the same wand with the coagulation mode on.

All patients were made to fill a questionnaire regarding nasal obstruction and pain and took a format of a visual analogue scale and grading score (0-6) for pain and nasal obstruction at 3rd day, 1st month, 3 months. Operating surgeons were made to fill a questionnaire regarding amount of bleeding and operative time. A third blinded person was made to opine regarding any bleeding which occurred post operatively.

Chi square tests were performed to compare 2-groups with graded scores of mild (0-1), moderate (2-4) and severe (5-6).

Follow-ups also included examination for any development of infection, tissues remnant, slough and wound healing.

OBSERVATIONS AND RESULTS

Our study shows maximum incidence of tonsillitis in age group of (11 – 20) years followed by the 0 - 10 years group, together accounting for it 63 % of the cases. Males at higher incidence when compared to females (53%).

Throat pain was seen as the predominant symptom in about 70% of the cases, the duration of symptoms ranging from 6 month to 3 years. The initial episodes, the onset was usually accurate from severe pain in throat to discomfort, usually associated with malaise, body ache, abdominal pain and fever occasionally associated with chills and rigors.

It lasted for period of 2-3 days requiring treatment in the form antibiotics and painkillers with or without use of mouth gargles. History concluded with at least 90% of cases in age group of 0-10 and 11-20 presenting with at least 6 attacks on an average in the last year.

The next common complaint was difficulty in swallowing in 70% of the cases which ranged from dysphagia to solids and liquids often leading to fetid breath and coated tongue and dry mouth.

Mouth breathing or snoring was seen in cases of adeno-tonsillitis (40%) and adenoid hypertrophy of which many patients was presented with typical adenoid facies including high arched palate, protruding teeth, pinched nostrils, rhinolalia clausa, open mouth, dull look and narrow maxillary arch.

45% of cases also presented with difficulty in breathing who on examination had kissing tonsil or tonsils occupying the entire oropharynx touching each other.

On examination, finding reveal that 58 % of cases had a congestion of posterior pharyngeal wall, uvula, soft palate and

anterior and posterior pillars with 2 cases associated with granular pharyngitis.

All cases presented with tonsillar enlargement mostly bilateral with only 3 cases in age group of 21-30 presented with unilateral grade 3 enlargement. Majority (47%) presented with Grade 4 or tonsils occupying 75 to 100 % of oropharynx and only 8 cases presented with grade 2 i.e. less than 50 % of oropharynx. 90% of cases tonsils were uniformly enlarge and congested similar to parenchymatous tonsillitis and the rest showed white spots on surface as a follicular tonsillitis. Cases with white membrane were not included in the study. At least 10% presented with white cheesy ooze on squeezing of tonsillar surface i.e. positive Ervine Moore sign.

At least 62% of the cases on examination had enlargement of jugulo digastric lymph nodes bilateral with average of 2 cms dimension, tender.

All patients were requested to complete a questionnaire regarding

pain and took the format of a visual analogue score (VAS) and grading score (0-6) for pain, otalgia, earlier return to liquid and solid diet, swallowing at 6-8 hrs, 24 hrs, after 3 days, after 7 days and after 2 weeks.

Only 2 cases present with secondary hemorrhage. Most probably due to infection.

Operating surgeons were made to fill a questionnaire regarding amount of bleeding, operative time and if at all any post op hemorrhage. A third blind person was made to opine regarding healing of tonsillar fossa.

All the data obtained were subjected to statistical analysis using Chi-square analysis, and the following results were obtained.

The results with regards to post-op throat pain in the coblation group showed lesser degree of pain when compared to dissection and snare method.

Earlier return to liquids and solids did not show much difference between the two groups with an average period of 6hrs in both.

Table 1: Comparison of throat pain in coblation tonsillectomy and conventional tonsillectomy

Precedure/Throat Pain	Mild	Moderate	Severe	Total
Coblation	22	4	4	30
Conventional	2	3	25	30
Total	24	7	29	60

Chi – Square test = 32.02, df = 2, p-value = 0.00001 (significant)

Table 2: Return to diet in coblation tonsillectomy and conventional tonsillectomy.

Return to Diet	<6 hrs	>6 Hrs	Total
Coblation	27	3	30
Conventional	19	11	30
Total	46	14	60

Chi-square=5.96, df=1 p-value= 0.0146 (not significant)

Table 3: Comparison of throat pain on swallowing at 6hrs in coblation and conventional tonsillectomy

Pain on Swallowing at 6 Hrs	Mild	Moderate	Severe	Total
Coblation	10	15	5	30
Conventional	5	8	17	30
Total	15	23	22	60

Chi – Square test = 10.39, df = 2, p-value = 0.0056 (significant)

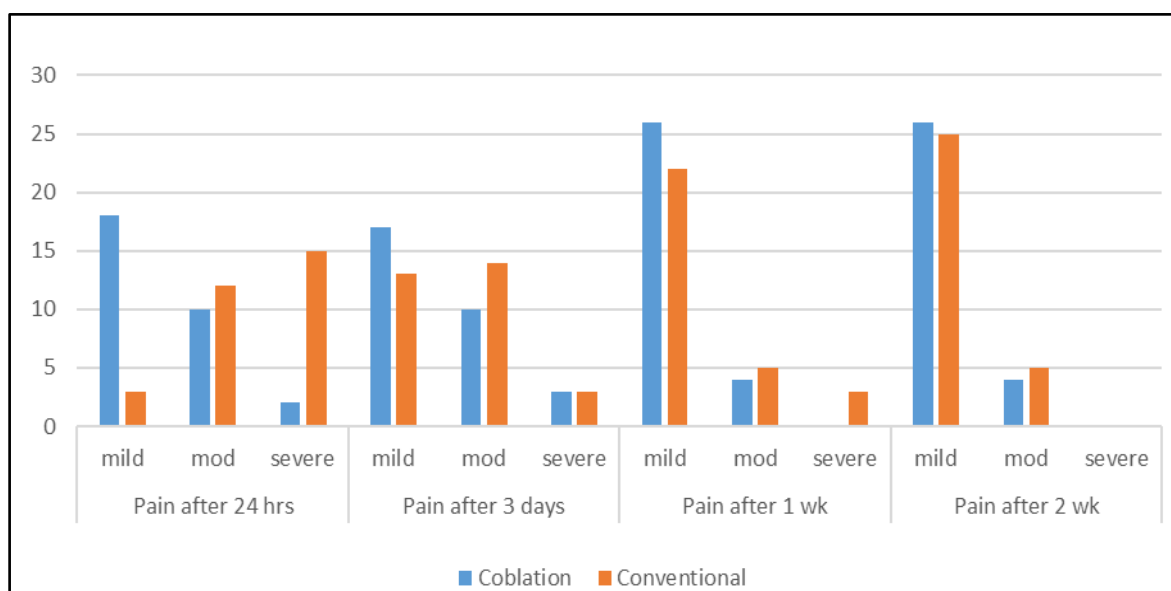


Fig 2: Comparison of throat pain on swallowing in coblation and conventional tonsillectomy

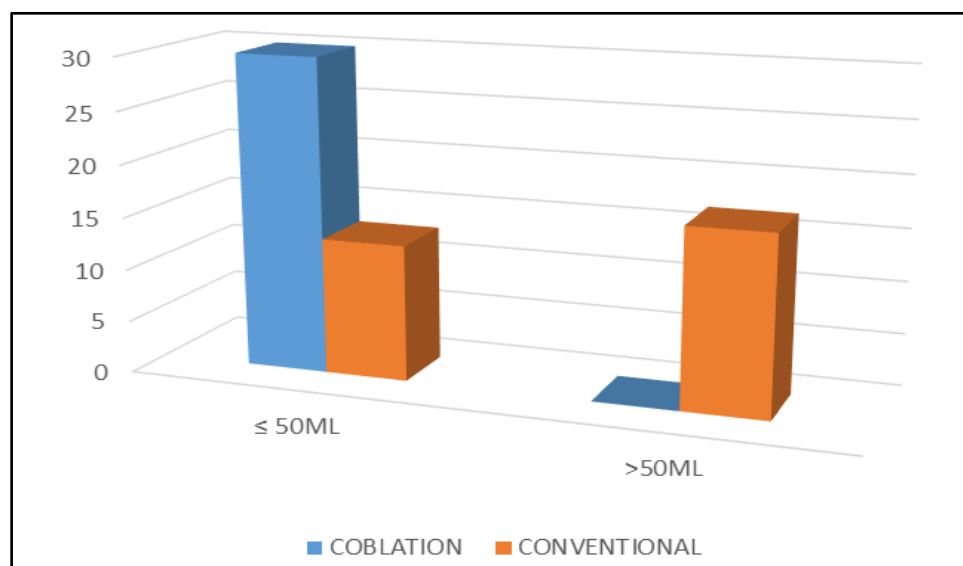


Fig 3: Comparison of bleeding in coblation and conventional tonsillectomy

DISCUSSION

Otorhinolaryngology has been an evolving field with new advances and technologies making its way day in and day out. There has always been research towards improving the patient care introduction of novel modalities as we step in the era of the Day Care Surgery. There has always been a debate with regards to challenges thrown at the existing conventional surgeries over newer therapies each claiming to better the other. There has always been a quest towards something which has a definite ease of use with lesser learning curve with a simplistic approach along with improved patient care. Radiofrequency is one such intervention which has found its place in various surgical fields like Gynecology, ophthalmology, urology, thoracic surgery.

Coblation is one such novel modality of a high frequency cold plasma ablation with minimal tissue damage and ease of use with just a wand. Coblation process was invented by Philip E Eggers and Hera V Thapliyal in 1993. The technology was acquired by Arthrocare, a California based medical device company which trademark the technology under the term Coblation - control ablation. First Coblation tonsillectomy was performed in January 2000, since then many surgeons have come forward to try the novel modality in their ENT practice. Later it was also tried for adenoidectomy, uvulopalatoplasty and volumetric reduction of tongues base for obstructive sleep apnea syndrome, hypertrophied turbinate reduction, excision of laryngeal lesions as well as in epistaxis.

The results were regards to post op throat pain in the Coblation group showed lesser degree of pain when compared to Dissection and Snare method. One of the earliest studies on Coblation tonsillectomy reported by Timms and Temple¹¹ in 2001 also and marked difference in post op pain and speed of return to normal diet, in favor of Coblation. Their study was done in 38 pts of which 18 was Coblation and 20 was bipolar. Day 1 was the most painful in Coblation group and day 4 in bipolar.

Results for otalgia were also statically significant and showed considerable difference showing less pain in Coblation group than the conventional procedure.

Philpott et al.¹² conducted a study in 92 pts of which Coblation was 43 and dissection was 49, no difference was seen with post op pain, otalgia, swallowing.

Earlier return to liquids and solids did not show much difference between the two group with an average period of 6 hours in both. Tan et al.¹³ in a double-blind prospective study of 38 children showed that Coblation tonsillectomy, patients showed a faster return to normal diet. Timms et al.¹⁴ reported return of diet was 2.4 day in Coblation and 7.6 day in bipolar.

Throat pain on swallowing was evaluated at 6 hrs, after 24 hrs, after 3 days, after 1 week and after 2 weeks which showed a significant result in the Coblation group with patient complaining of less or minimal amount of pain on swallowing than those of conventional group.

Coblation is presumably associated with least histological tissue damage than dissection and Snare method. Pain is very difficult response to study, as it is highly subjective symptoms with significant person to person variability. Our study design enabled and effective comparative assessment of pain and post op healing regarding Coblation vs conventional by using the patient as his or her own control thus eliminating interpersonal pain threshold. Drawback of our study was use of visual analogue scoring system which might not be accurate.

Bleeding in both groups did not show much of difference with most of cases showing intra operative bleeding of less than 50 ml. One of the salient features of the Coblation devices that the wand allows for simultaneous tonsil removal, hemostasis and suction thus eliminating the need to switch devices in mid procedure in order to stop bleeding or perform suction.

The operation time in the Coblation group was more than 10 min with an average of 25 minute may be due to the learning curve, adequate training, familiarity with technology and use of the wand than the conventional dissection and snare method where the surgeon was experienced with the technique. Our study is in comparison to the that of Chang et al.¹⁵ also reported average time of 28.5 ± 19 min with no statistical difference. Noordzil and Affleck et al.¹⁷ study commented on the fact that Coblation took longer than electro cautery (8.22 v/s 6.33 min/tonsil), less intra-operative bleeding (2.44 vs 5.39 ml per tonsil).

Two cases of secondary hemorrhage were seen in Coblation group in our study. Timms et al.¹⁶, Low et al.¹⁷, and Windfuhrs et al.¹⁸ have reported increased incidence of secondary hemorrhage following coblation tonsillectomy. May be the study group was too

small for comparison. Christian et al.¹⁹ conducted a retrospective cohort study with 430 pts in Denmark, of which 52 pts had post tonsillectomy hemorrhage. Of the 180 Coblation pts, 41 had post tonsillectomy hemorrhage. Carney et al.²⁰ showed significant learning curve with introduction of coblation. Experienced surgeons had fewer post tonsillectomy hemorrhage and incidents post tonsillectomy hemorrhage occurred in 1st 30 procedures.

There was no significant difference between tonsillar fossa healing between the two groups with slough covering entire tonsillar areas in both cases. Magdy et al.²¹ compared coblation with other

techniques like this dissection, monopolar CO2 laser in total of 60 pts with 20pts each, sample was fixed with 10% buffered Formalin, 5 micrometer sections were made, stained with H&E stain and examine under light microscope.

Maximum depth of tonsillar tissue injury was calculated. Measurement was made using and ocular micrometer. Coblation showed 0.13 mm depth of injury v/s 0.63 mm with electrocautery and concluded that it produced least histopathological tissue damage, the drawback of our study was we could not assess the depth of tissue damage.

Table 4: Showing results of different studies

Authors	No.of pts	Throat Pain	Otalgia	Return to diet	Intra-op Bleed	Pri. hmg	Sec. hmg	Operative Time	Tonsillar Fossa
Timms et al	10	Sig	-	Sig	-	-	-	-	Good Healing
Magdy et al	60	No diff	-	-	Sig	No	No	No diff	Good Healing
Philpott et al	92	No diff	No diff	Sig	No	No	No	-	-
Parker et al	70	No diff	-	No diff	No diff	Sig	Sig	-	-
Our Study	60	sig	No diff	No diff	No diff	No	Sig	Sig	Good Healing

Sig: Significant; No diff: No Difference

CONCLUSIONS

Coblation is an upcoming novel mode of therapy used as curative, adjunctive and palliative modality in the management of various otorhinolaryngological disease as well as in other fields of medicine.

1) It is an easy instrument with a probe which is suited well for the head and neck due to its ease of access.

2) Associated with less bleeding, less pain, faster return to normal diet, hence improved patient comfort and safe as no toxic byproducts of ablation are released.

3) Coblation was used in randomly allotted cases in our study in a total no of 30 cases of chronic tonsillitis and chronic adenotonsillar hypertrophy in only those cases which required surgical mode of treatment. The rest were treated with conventional treatment like routine tonsillectomy using dissection and snare method with steel instruments.

4) Maximum incidence of tonsillitis in the age group of 11-20 years followed by the 0-10 years group, together accounting for 60 % of cases. Males had higher incidence when compared to females (53%).

5) Throat pain was seen as the predominant symptom in about 70 % of cases, followed by difficulty in swallowing and snoring. Congestion of oropharynx was the commonest finding with most case showing grade 4 tonsillar enlargement with at least 62 % had bilateral jugulodigastric lymph nodal enlargement.

6) The results with regards to post op throat pain and otalgia in the coblation group showed lesser degree of pain when compared to dissection and snare method. Return to liquids and solids did not show much difference between 2 groups with an average period of 6hrs in both. Throat pain on swallowing was evaluated at 6 hrs, after 24hrs, after 3 days, after 1 week and after 2 weeks which showed a significant difference with patients in coblation group complaining of minimal or less amount of pain on swallowing than those of conventional group. Bleeding was not significant with both groups showing intra operative bleed of less than 50ml. The operative time in coblation group was more than 10 min may be

due to learning curve of surgeon and use of the wand than the conventional dissection and snare method where surgeon was well versed with the technique.

7) Only 2 cases present with secondary hemorrhage in coblation group. Most probably due to infection.

8) All cases were followed up for complication which included none.

REFERENCES

1. J. Woloszko and C. Gilbride, Coblation Technology: Plasma Mediation Ablation for Otolaryngology Applications, Rep. Arthro Care Corp., Sunnyvale (2001): 102-14.
2. J. Woloszko, R Kenneth, and G. brown, IEE Trans. Plasma Sci, 30, 2001, 376-1383.
3. S. Ya Doletskii, R.P Drabkin, High frequency electrosurgery {in Russian}, Meditsina, Moscow (1980).
4. E A Magdy, S Elwany, A S El-Daly, M Abdel-Hadi, M A Morshedy. Coblation tonsillectomy: a prospective, double blind, randomized, clinical and histopathological comparison with dissection-ligation, monopolar electrocautery and laser tonsillectomies. The journal of Laryngology and Otology. 2008;122:282-290.
5. Temple RH, Timms MS. Paediatric coblation tonsillectomy. International journal of paediatric otorhinolaryngology 2001; 61: 195-8.
6. Lamprell, L; Ahluwalia, S (April 2015). "Who has been hiding in your tonsillectomy tray? Eponymous instruments in tonsillectomy surgery". The Journal of Laryngology and Otology. 129 (4): 307-13.
7. Waugh GE. A simple operation for the complete removal of tonsils, with notes on 900 cases. Lancet. 1909;1:1314-15.
8. Curten JM: The history of tonsil and adenoid surgery. Otology Clinics North America 1987;20:415.
9. Campel JA. On the origin of tonsillectomy and dissection method, Laryngoscope 2002;112: 1583-6.

10. McGuire N. A method of guillotine tonsillectomy with an historical review. J Laryngol Otol. 1967;81:187-95.
11. Temple RH, Timms: Paediatric Coblation Tonsillectomy, International Journal paediatric Otorhinolaryngol 2001;61:195-8.
12. Philpott C M, Wild D C: A double blinded randomised control trial of coblation versus conventional dissection tonsillectomy on post operative symptoms. Clin Otolaryngology 2005;30:143-8.
13. Tan SM: Coblation vs electrocautery Tonsillectomy: post operative recovery in adults: Otolaryngology Head and Neck Surgery 2006;135:699-703.
14. Chang K.W: Randomised Controlled Trial of Coblation vs Electrocautery Tonsillectomy; Otolaryngology Head and Neck Surgery;132;273-80.
15. Noordzij J P, Affleck B D. Coblation versus unipolar electrocautery tonsillectomy: A Prospective, randomized, single blind study in adult patients. Laryngoscope 2006;116:1303-9.
16. Timms M S, Belloso A, Morar: Increased Post Op Haemorrhage seen in Adult Coblation Tonsillectomy: Journal of Laryngology Otolaryngology 2004; 118:247.
17. Lowe D: Tonsillectomy Technique as a Risk Factor for Post op Haemorrhage; Lancet 2004;364:697-702.
18. Windfuhr J P, Deck J C, Remmert S: Haemorrhage following Coblation Tonsillectomy, Annals Otolaryngology Rhinology Laryngology 2005;114:749-56.
19. Christian H Heideman, Mia Wallen: Post tonsillectomy haemorrhage: Assessment of risk factors with special attention to coblation technique, Eur arch Otorhinolaryngol 2009;266:1011-15.
20. Carney A S, Timms M S: Radiofrequency coblation for resection of head and neck malignancies, Otolaryngol Head and Neck surgery 2008;138:81-5.
21. E A Magdy, S Elwany, A S El-Daly, M Abdel-Hadi, M A Morshedy. Coblation tonsillectomy: a prospective, double blind, randomized, clinical and histopathological comparison with dissection-ligation, monopolar electrocautery and laser tonsillectomies. The journal of Laryngology and Otolaryngology. 2008;122:282-90.

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