

Coblation Tonsil Resection (TR): Our Experience For A Powered Instrument Feasibility With Advantages And Disadvantages

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Abstract: Background: Tonsillectomy is one of most commonly performed surgical procedure in otorhinolaryngology. In past, various surgical techniques for tonsillectomy have been developed. And coblation tonsillectomy is one of the latest techniques developed. We carried this study to check feasibility of powered instrument (coblator) in view of patient and surgeons benefit with advantages and disadvantages for tonsillectomy. Material And Methods: We carried out this study in randomly selected total 125 patients who presented to our ENT department with chief complain of recurrent tonsillitis. All patients underwent coblation techniques and were analysed for total time consumption during operation, amount of blood loss during operation, immediate postoperative pain, postoperative haemorrhage whether primary or secondary, time needed to return back to the normal activity and diet, total percentage of healing post operatively. Each patient had preoperative blood investigation to exclude any coagulation disorder and anemia. Postoperative analgesics and broad spectrum antibiotics were administered. Result: Mean operation time was 12 ± 2.45 minutes in coblation group. Intraoperative blood loss turned out to be 20.00 ± 5.0 ml for the coblation. Mean return to normal diet period was significantly shorter (5.00 ± 1.50). Otherwise, return to normal behaviour was significantly earlier with coblation (10.50 ± 2.00). Postoperative we have not seen any case of primary hemorrhage or secondary hemorrhage in our study. Conclusion: We found that coblation technique for tonsillectomy offers considerable advantages in the operation time and intra operative blood loss. Coblation is related with timely return to routine activities and normal adequate diet. To endorse its significance over conventional tonsillectomy warrants further study. [Patel N Natl J Integr Res Med, 2022; 13(1): 42-48, Published on 26/01/2022]

Key Words: Coblation, Tonsillectomy, Tonsil Resection

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Introduction: Tonsil resection (TR) is one of the most commonly performed surgeries by an otorhinolaryngologist in paediatric as well as adult patients worldwide. It has evolved since past many years. Although improved higher antibiotics and latest guidelines have decreased the number of tonsillectomy performed yet it is most commonly done surgery. Primarily traditional dissection tonsillectomy has remained the gold standard for tonsil removal¹. Other techniques include cold-knife dissection, guillotine excision, electrocautery, cryosurgery, the harmonic scalpel, laser tonsillectomy, bipolar diathermy dissection, radiofrequency and coblation methods². We carried out this study to measure the advantages and disadvantages of coblation method.

History: Philip syngphysick developed the tonsillotome, a device based on the French guillotine for the tonsillectomy and that technique known as guillotine method. It is

obsolete now days. For more than a century, conventional dissection tonsillectomy has been the gold standard for tonsil resection. Coblation method is one of the recent techniques used for tonsil adenoid resection among most of others. It was started in 1997 by Arthocare Corporation. Initially this technique was used in arthroscopic surgeries for injured athletes. Recently the use of this technique in the treatment of snoring, nasal congestion, turbinate reduction and sleep apnoea has received considerable research interest^{3,4}.

Principle: Coblation uses radiofrequency ablation of tissue through plasma mediated medium. With continuous saline delivery coupled to bipolar electrodes at the device tip generates plasma field of 40-70°C temperature. Plasma field breaks down cellular bonds and causes tissue ablation. It also allows for hemostasis during dissection. The presence of irrigating saline helps to limit the amount of heat delivered to the surrounding

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structures and thus reduces the amount of postoperative pain experienced by the patient.

Also there is significant reduction in haemorrhage intra op and post operatively. Many other literatures showed considerably less pain and rapid healing of the tonsillar fossae achieved after a tonsillectomy using this technique.

Coblation is a bipolar system and therefore requires no ground pads⁵. This powered instrument has great efficacy in early wound healing and rapid recovery in view of normal activity and diet intake.

In this study we have done analysis for efficacy of coblation technique in tonsil resection in both paediatric and adult age group. We used Coblator II system arthrocare (smith & nephew) and Evac70 wand for extra capsular dissection with irrigation and haemostasis. This study is aimed to check feasibility of powered instrument in view of patient and surgeons benefit, to observe its merits and demerits and to expand the use of coblation.

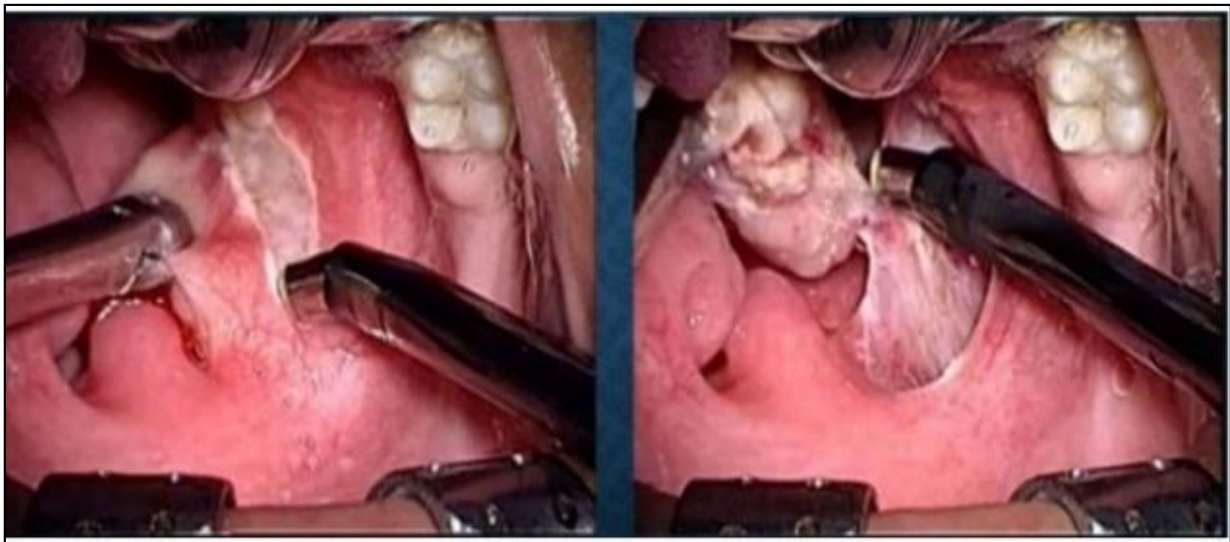
Material & Methods: It is a prospective clinical study conducted in randomly selected 125

patients of paediatric and adult age group attending E.N.T. OPD at Shardaben General Hospital, NHLMMC in Ahmedabad from July 2018 to January 2021. Those patients who came with chronic tonsillitis and recurrent URTI were included in study. All patients were admitted and underwent detailed ENT examination and radiological assessment for diagnosis of adenoid.

Adenoid assessment was also done by nasal endoscopy. After taking proper informed consent all patient underwent TAR by coblation under general anesthesia. In all patients, coblation tonsillectomy was performed using the ArthroCare 2000 ENT Coblator II system and EVac 70 plasma wands. Settings were standardised at seven and three for coblation and coagulation respectively. The device used for dissection was also used for control of bleeding.

After Pre-op medication all patients were taken for surgery under general anaesthesia using oral endotracheal intubation. Anesthesia protocols were standardized for all cases. An operating microscope with 300mm lens helps to visualize structures and vessels well. In addition, it served a useful tool for training and documentation; however a microscope is not mandatory.

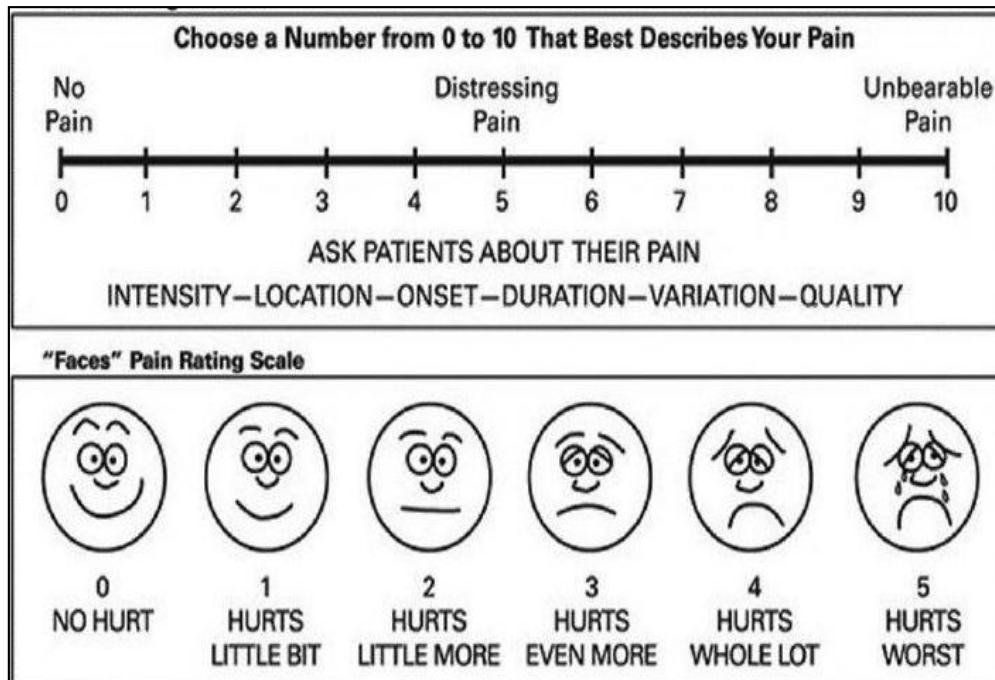
Figure 1: Intra-Operative Removal of Tonsil



Complete tonsil excision performed involving Subcapsular dissection with preserving pharyngeal mucosa as possible. Intra operatively, technique was assessed by senior surgeon who recorded operative time, amount of total blood loss and any difficulties observed during operative procedure. Postoperative analgesics and broad spectrum antibiotics were administered in all patients. Patients were

discharged after 24 hours of surgery without any complications. Post operatively pain is assessed by four point picture face visual analog scale (VAS) also called Wong-Baker Faces Pain Rating Scale (Figure-2).

Patients were asked to indicate the pain they experienced at 6 hours and 24 hours postoperatively (POD-1).

Figure 2: Visual Analog Score (VAS) For Pain Assessment²¹

Analysis was done regarding Total Time taken during operation, Amount of blood loss during operation, immediate postoperative pain, Postoperative haemorrhage whether primary or secondary, rate of healing in tonsillar fossa on followup and time needed to return back to the normal activity and diet.

Patients were followed up post operatively at 3,7,14 days. All patients were assessed for pain with VAS score. The rate of healing was measured by size of the post-tonsillectomy slough.

As previously described by other authors, five grades were considered: 0, 25, 50, 75 and 100 per cent, according to the size of the slough in comparison with the aerial size of the post-operative tonsillar bed^{5,6}.

There was no such complication like primary or secondary haemorrhage, sepsis or surrounding structure injury in our study.

Recovery was also recorded in term of adequate hydration and proper diet intake.

Results: A total of 125 patients were included in study randomly. All had a history of recurrent episodes of tonsillitis. Out of which 75 were male and 50 were female from both age group.

In our study, we have included patients from 5 years to 35 years with maximum patients were within 5-12 years of age (Table-1).

Table 1: Age Distribution Of Patients With Coblation Tonsillectomy

Age In Years	No. Of Patients
5-15	95
15-25	23
25-35	7
Total	125

Our study shows significant reduction in blood loss intra-operatively with use of coblation. Maximum patients have average 20-30 ml of blood loss with mean blood loss of 20.00 ± 5.0 ml. (Table-2)

Table 2: Intraoperative Blood Loss In Coblation Tonsillectomy

Intra-Operative Blood Loss (In Ml)	No. Of Patients
0-10	37
11-20	30
21-30	29
31-40	21
41-50	5
51-60	3
Total	125

The Operation time was calculated from keeping mucosal incision for tonsillectomy to complete removal of tonsil from fossa including hemostasis. With coblation the Mean operation time in present study was a 12 ± 2.45 minute which is considerably less but to prove its significance we need comparative study with other tonsillectomy methods (Table-3).

Table 3: Intraoperative Average Time Taken In Coblation Tonsillectomy

Range Of Average Time (In Minutes)	No. Of Patients
10-15	64
15-20	41
20-25	11
25-30	9
Total	125

Post operative pain assessment by using VAS after coblation tonsillectomy shows rapid decrease in pain from Day-1 to Day-14. According to our study on Day-1 there have been maximum no of patients with pain score of 8 that decreased to 2 or 0 on Day-7 or Day-14. Pain reduction helps in early oral intake of fluids and diet which results in early come back to routine activities (Table-4).

Table 4: Post Operative Pain Assessment With VAS Score In Coblation Tonsillectomy

Post-Operative Pain Score Using Vas	Day-1 (No. Of Patients)	Day-3 (No. Of Patients)	Day-7 (No. Of Patients)	Day-14 (No. Of Patients)
0	0	0	36	94
2	0	16	71	21
4	14	60	14	10
6	37	38	4	0
8	65	11	0	0
10	9	0	0	0

With coblation, mean return period to normal diet was significantly shorter (5.00 ± 1.50 days). Also period for return to normal activity was earlier (10.50 ± 2.00 days). But we need a comparative study for coblation with other methods to conclude this significance. The rate of healing was measured by percentage of the post-tonsillectomy slough in bilateral tonsillar fossa on the 7th and 14th post-operative days.

Figure 3 shows percentage of patients in various healing category at post operative day 7 and 14 respectively (Table-5). We noticed a slower healing in paediatric age group compared to adults due to noncompliance with local oral gargles; otherwise maximum patients achieved total healing on 14th day irrespective of age group.

Figure 3: Rate Of Healing In Terms Of Post Tonsillectomy Fossa Slough

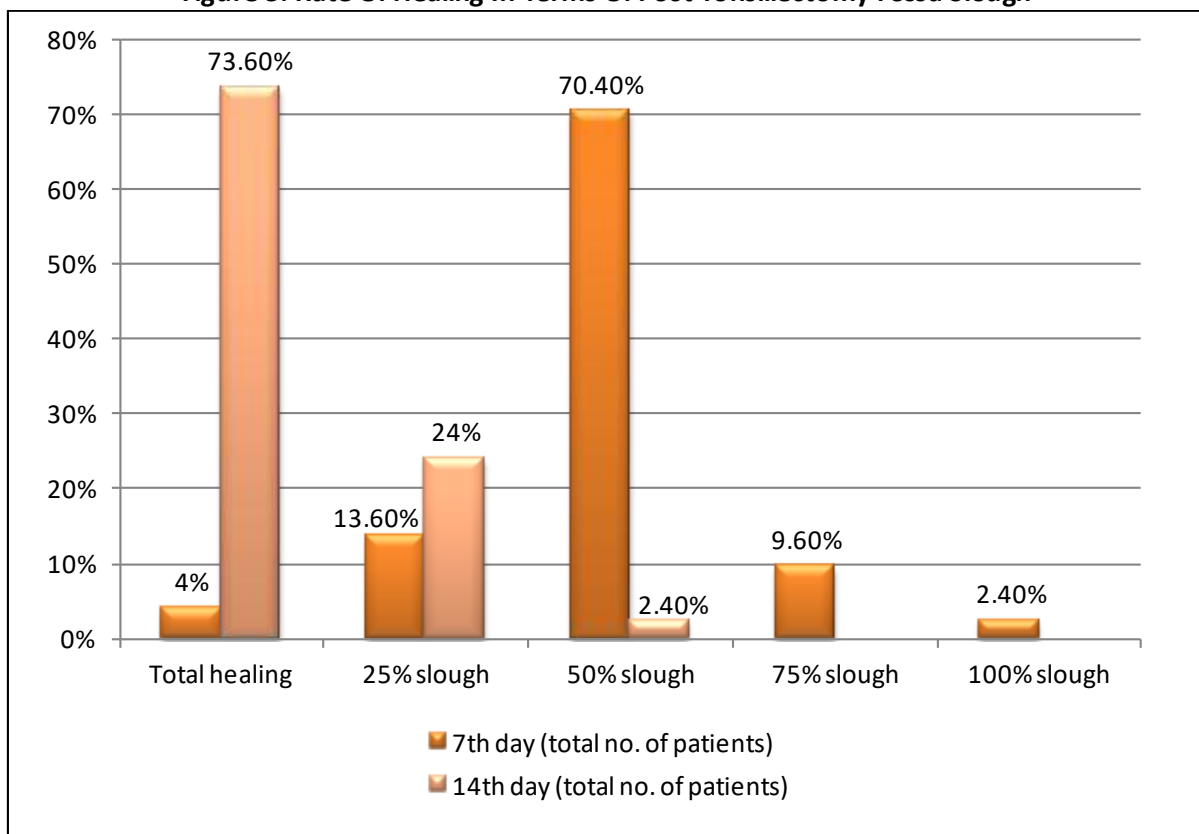


Table 5: Rate Of Healing In Terms Of Slough In Tonsillar Fossa Post Tonsillectomy

Percentage Of Slough	Total No. Of Patients On POD 7 th (% Tage)	Total No. Of Patients On POD 14 th (% Tage)
Total Healing (0% Slough)	5 (4%)	92 (73.60%)
25% Slough	17 (13.60%)	30 (24%)
50% Slough	88 (70.40%)	3 (2.40%)
75% Slough	12 (9.60%)	0 (0)
100% Slough	3 (2.40%)	0 (0)

In present study no case with primary or secondary hemorrhage were reported. During follow up period, no other complications either major or minor occurred in our study.

Discussion: Tonsillectomy is one of the most common procedures performed globally by an ENT surgeon. Various surgical techniques for tonsil resection are now available. Over the decades various techniques for tonsillectomy have been developed to reduce morbidity and increase surgical efficiency. Available techniques include cold-knife dissection, guillotine excision, electrocautery, cryosurgery, the harmonic scalpel, laser tonsillectomy, bipolar diathermy dissection, radiofrequency and coblation methods^{2,7}.

Coblation is a newer technique in this decade and has huge acceptance in surgeons worldwide. In this study, we studied coblation technique for tonsillectomy to evaluate its efficacy and demonstrate its advantages and disadvantages.

Coblation is a method of rapid and controlled removal of tissue at lower temperature while maintaining the integrity of surrounding tissue.

Coblation means “cold” and “ablation”. With use of radio-frequency in bipolar mode with a conductive solution like saline, plasma field is formed by energizing the ions in saline by coblation. Plasma field has energized particles like OH⁻, H⁺, Na⁺, free radicals and electron those have sufficient energy to break molecular bond in tissue and dissolves tissue with minimal damage in surroundings as compare this electro-cautery.

Some study showed the median estimated blood loss was less using coblation, compared with the other tonsillectomy techniques 8. While other studies^{9, 10} reported that there is no significant difference in the intra-operative blood loss between any methods. In our study, the estimated mean bloodloss was 20.00±5.0 ml in

coblation. The coblation manufacturers also suggest there is less pain with tonsillotomy as the capsule is not breached. It has been postulated that after traditional tonsillectomy pain-free recovery only occurs when the exposed pharyngeal musculature is remucosalized¹¹.

Present study on postop Day-1 showed maximum patients with VAS score of 8 that decreased to 2 or 0 on Day-7 or Day-14.

In regard of operative time, tonsillectomy being one of the most common surgical procedures performed in ent and with fairly experienced hands, the conventional (cold) tonsillectomy takes considerably short operative time. Several studies show Tonsillectomy with steel forceps (as traditional) consumes longer time than coblation tonsillectomy^{12,13}. Our study concluded mean operation time approx 12 mins with coblation technique.

However, study report by T.S Anand and George Payal (2011) who performed a study on 60 patients showed mean operation time of 11 minutes (traditional method) and 15 min (coblation method). Hence that study showed it takes average of four minutes longer to perform coblation procedure compared to the conventional technique, but this difference did not reach statistical significance (P > 0.05).

In our study, the intraoperative blood loss and operation time noted with coblation tonsillectomy was significantly comparable with other studies. Though we need a comparative study between different methods of tonsillectomy to conclude the efficacy of coblation method over other techniques.

Generally complications like primary or secondary hemorrhage are seen with traditional tonsillectomy procedures but in our study there were no episodes of reactionary, primary or secondary haemorrhage in any patient. However

literature shows apparently higher incidence of post tonsillectomy hemorrhage among adults operated using the coblation technique¹⁴.

Van der Meulen and Lowe¹⁵ reported higher incidence of postoperative hemorrhage when coblation is used. They confirmed need for appropriate caution and proper training on the coblation method¹⁵.

The wound remains open to heal by secondary intention in conventional tonsillectomy, thus Pain and Bleeding are the two common postoperative complications. While in coblator, there is simultaneous Control of bleeding vessel with dissection which gives clear field and more accurate hemostasis. The suction and irrigation system keeps blood free bleed which reduces average surgical time.

Temple RH et al¹⁶ study shows a significant reduction in post-operative pain and faster healing of tonsillar fossae with coblation tonsillectomy with early return to normal diet and drastically reduction in use of analgesics. Parker NP et al¹⁷ study shows significant decrease in average number of days of severe pain post-operatively.

The postoperative recovery was evaluated by days taken to return to normal activities. Another factor assessed for clinical recovery was retrieving adequate hydration and proper diet intake.

Shah UK et al¹⁸ study shows lesser tissue injury with coblation and faster recovery to normal activity and diet. And timms et al 5 observed rapid healing of the tonsillar fossae in the tonsil removed by tissue coblation. In our study early return to normal diet and activities were clinically and statistically significant. Over all we have experience a better patient outcome and early recovery.

The procedure is safe and efficacious which favours its use in paediatric patients. Pain and haemorrhage are most common factors in paediatric age group for post operative morbidity. Both are significantly reduced by coblation and it is also effective in reduction in post-operative use of analgesics 19. Around 94% patients had 0 pain score at Day-7 and 10. No other complication like sepsis and secondary haemorrhage encountered in present study.

We also observed in our study that with coblation, dominance of the surgeon's hand does not statistically affect the outcome but it needs prior knowledge of instrument.

The standard coblator norms suggests on the use of totally disposable instrumentation.

Hence in view of cost of disposable wands compared to conventional dissection tonsillectomy equipment, later one is favoured.

From the literature and present study, we found following merits and demerits of coblation method^{17, 19, 20}.

Table 6: Advantages And Disadvantages Of Coblation Method

Advantages	Disadvantages
It is significantly faster to perform.	Comparatively costly equipment and disposable wands.
Significantly less intra-operative blood loss.	Needs prior surgical training with new machine.
Subjective visual analogue scale comparisons showed a non-significant pain score in post-operative days.	Rarely may have primary haemorrhage.
Early tonsillar fossa healing with adequate recovery.	

Conclusion: The coblation technique for tonsillectomy offers significant advantages in the operation time and intra operative blood loss. Coblation is related with timely return to routine activities and normal adequate diet. In view of hemorrhage, coblation tonsillectomy might have lower incidence of secondary hemorrhage depending upon surgeons hand and training.

Although we believe that the traditional method of tonsillectomy to be gold standard method, but with evolving times coblation method may be considered effective with higher advantages.

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