Section: ENT

Original Research Article

COLD DISSECTION, WARM OUTCOMES: COBLATION TONSILLECTOMY REVIEW FROM A TERTIARY CARE HOSPITAL

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ABSTRACT

Background: Tonsillectomy is a common ENT procedure for recurrent tonsillitis, sleep-disordered breathing, and obstructive sleep apnoea. Coblation tonsillectomy uses controlled radiofrequency energy at relatively low temperatures, potentially reducing thermal tissue damage and postoperative morbidity. This study evaluated postoperative outcomes following coblation-assisted tonsillectomy.

Materials and Methods: This retrospective study was conducted at the Department of ENT, SVIMS–Sri Padmavathi Medical College for Women, Tirupati, between January 2018 and March 2022. Forty-five patients aged 5–35 years undergoing coblation tonsillectomy were included. Postoperative pain was assessed using the Wong-Baker FACES Pain Rating Scale, and quality of life using the Tonsillectomy Outcome Inventory-14 (TOI-14). Patients were followed for six months. Data were analysed using SPSS version 20.

Results: Among 45 patients, 57.7% were males and 77.8% were paediatric. Mean operative time was 15.8 ± 4.5 minutes. Mean pain score reduced from 5.58 ± 1.2 on postoperative day one to 2.73 ± 0.8 at one week. No primary, reactionary, or secondary haemorrhage occurred. Mean time to resume normal diet and routine activities was 5.44 ± 1.5 and 6.1 ± 1.7 days. TOI-14 scores improved significantly at 1, 3, and 6 months ($p < 0.0001$).

Conclusion: Coblation tonsillectomy is safe, effective, and provides faster recovery, less postoperative pain, and significant quality-of-life improvement overall.

Keywords: Coblation, tonsillitis, tonsillectomy, adenotonsillectomy

INTRODUCTION

Palatine tonsils are lymphoid tissues located at the oropharynx within the tonsillar fossa. In pediatric age palatine tonsils plays a role in immunity as they secrete antibodies such as IgA, which play an important role in the mucosal defence mechanism. With repeated infections, the protective mechanisms of tonsil fail and cause sore throat, fever, and other complications like peritonsillar abscess, obstructive sleep apnoea, rheumatic fever and glomerulonephritis. When there are recurrent episodes of tonsillitis or patient developing complications, which are not responding to the medical management, tonsillectomy is the treatment of choice.

Tonsillectomy is one of the most routinely performed surgical procedures in Otorhinolaryngology practice, with a majority being performed for cases of recurrent tonsillitis, sleep disordered breathing (SDB) and obstructive sleep apnoea (OSA).[1] Major complications of Tonsillectomy include postoperative pain, hemorrhage. Celsus is the one, who documented the first surgical procedure of tonsillectomy during 40AD.[2] Since then, it has undergone rapid evolution. Innovations that took place like the use of diathermy, harmonic scalpel, microdebrider and coblation were meant to reduce

the operating time, bleeding during the procedure and also postoperative complications.

Currently coblation is becoming more popular worldwide,[3] as it ablates at lower temperature which purportedly causes less damage to the surrounding tissues and less post-operative pain.[4] This technique was invented by Philip E Eggers and Hira V Thapliyal in 1999. Coblation tonsillectomy received FDA approval in 2001.[5]

Coblation (controlled or cold ablation) is a technique that utilizes radiofrequency bipolar diathermy at a lower frequency for soft tissue dissolution. Two electrodes are immersed in a medium of normal saline, which produces a plasma field of sodium ions. Many highly charged ionized particles are contained in this plasma field, causing coagulation of vessels and vaporization of tissues. In contrast to electrocautery, which works at higher temperature of up to 400°C, coblation device works at a lower temperature of 60°C.[6]

This study endeavors to evaluate the postoperative outcomes associated with coblation-assisted tonsillectomy within our institution.

MATERIALS AND METHODS

This study was conducted in the department of ENT, SVIMS-Sri Padmavathi Medical College for Women, a tertiary care referral center, Tirupati, Andhra Pradesh from January 2018 to March 2022 after ethical and scientific committee clearance of our institute (IEC no 1278).

A total of 45 patients aged 5-35 years with recurrent tonsillitis or chronic adenotonsillitis, sleep disordered breathing and obstructive sleep apnoea and who underwent coblation adenotonsillectomy or tonsillectomy were included in the study.

After a comprehensive history taking and meticulous clinical examination, baseline investigations were conducted, and fitness was obtained from the anaesthesia team prior to proceeding with surgery under general anaesthesia. Following intubation with an appropriately sized flexometallic tube, the patient was positioned in an extended neck (Rose's) posture, and a Boyle-Davis mouth gag was applied (fig 1a). The Bonns Plasma Surgical System ARS 700, equipped with tonsil blator plasma wands, were utilized. Power settings were standardized at seven for ablation and three for coagulation. Coblation tonsillectomies were performed under a focused headlight.The tonsil is grasped at its upper pole using tonsil-holding forceps and gently medialized to identify the plane between the tonsillar capsule and the tonsillar bed and is dissected along the capsular plane using the coblation wand, proceeding from superior to inferior pole with controlled ablation and minimal traction (fig 1b, 1c).The tonsil is completely freed from the tonsillar bed and removed (fig 1d) and then the tonsillar fossa is inspected for residual tonsillar tissue and active bleeding.Any oozing, if present is controlled using coagulation mode of the coblation device.

All these patients were meticulously monitored postoperatively for a duration of six months at regular intervals, specifically every week during the initial month(fig2a,2b) and subsequently on a monthly basis for the following five months. Data pertaining to the duration of surgical procedures, postoperative discomfort, occurrences of hemorrhage-whether primary or secondary, the rate of healing of the tonsillar fossa upon follow-up, and the time required to resume customary activities and dietary practices were scrupulously analyzed.

Figure 1a: intraoperative endoscopic picture showing grade III tonsillar hypertrophy

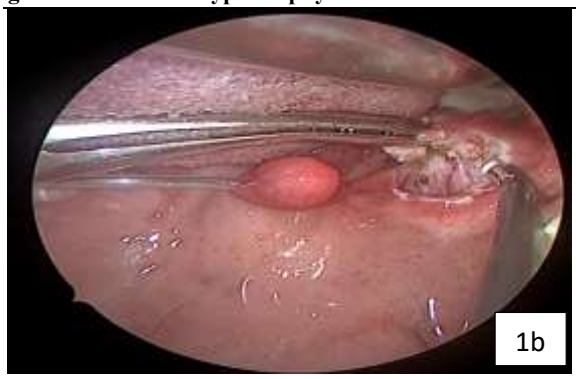

Figure 1b and 1c: intraoperative endoscopic picture showing tonsillar dissection

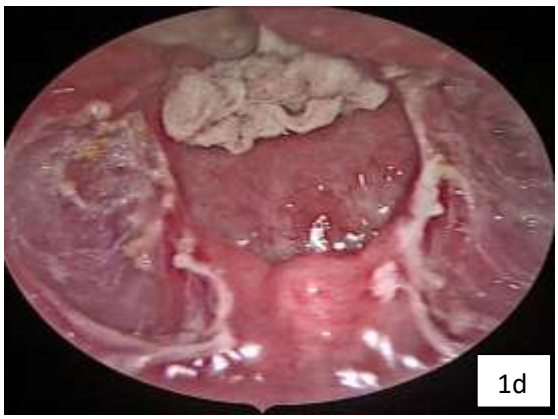

Figure 1d: immediate postoperative endoscopic picture showing bilateral tonsillar fossa

Fig 2a and 2b: postop picture on 1st week and 2nd week follow-up showing bilateral tonsillar fossa

For all these patients, postoperative pain score was documented using Wong-Baker FACES Pain Rating scale,[7] (figure 3), during immediate postop period and on subsequent followups. For secondary outcomes, Tonsillectomy Outcome Inventor 14 (TOI-14) was used. TOI-14 is a patient reported, disease-specific, quality of life questionnaire. Each item was rated on likert scale from 0-5.[8]

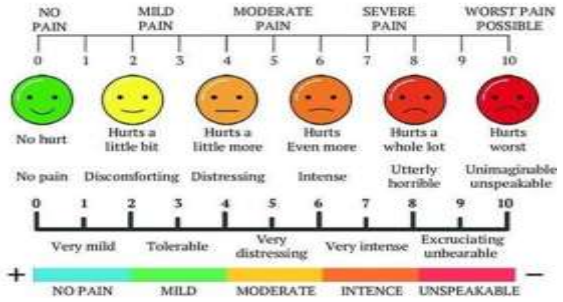

Figure 3: Wong-Baker FACES Pain Rating scale

Data were analyzed using Statistical Package for Social Sciences (SPSS), software program (version 20). Qualitative variable was recorded as frequencies and percentages and was compared by chisquare test. Quantitative measure was presented as means ± standard deviation (SD) and was compared by Student's t test. P value < 0.05 will be significant.

RESULTS

This is a retrospective study in which 45 patients underwent coblation tonsillectomy. Out of these 45 patients 26 were males and 19 were females (Table 1) and age range 5years to 35 years with a mean age of 13.4±7.2 years.

Table 1: Clinical profile of the patients who underwent coblation tonsillectomy

	No of patients	percentage
Gender		
Male	26	57.7%
Female	19	42.3%
Age group		
5-10 years	16	35.6%
11-15 years	19	42.2%
16-20 years	5	11.1%
25-30 years	2	4.4%
31-35 years	3	6.7%

In the present study, with coblation the Mean operation time was 14.8± 4.7min on right side, where as it was 16.8± 4.3 minutes on left side. The Operation time was calculated from the time of giving mucosal incision (with wand) to complete removal of tonsil from fossa including hemostasis.

Postoperative pain score (Table 2) was documented at 6 hours, 24 hours, 48 hours, on 1st week, 2nd week and 3rd week. Average postoperative pain score during first 2 days was 5.58± 1.2 which was decreased to 2.7± 0.8 by the end of first week.

Table 2: Postoperative pain score

Postoperative period	Average pain score
6hrs	6.58± 1.5
24hrs	5.58± 1.2
48hrs	4.78± 1.2
1 week	2.73± 0.8
2 weeks	1.29± 0.6
3 weeks	0.53± 0.5

In our experience, no patient had primary, reactionary or secondary haemorrhage.

In our study, average time to return to normal diet was 5.44± 1.5 days and return to normal daily routine was 6.1± 1.7 days.

In the present study, there was significant postoperative improvement in different symptoms as per the TOI score as compared to the preoperative scores. [Table 3]

Table 3: Preop and postoperative comparision of TOI-14 scores

Symptom	preop	Postop 1 month	Postop 3and 6 months	Pvalues	
				Preop vs postop 1month	Preop vs postop 3 and 6months
Loud snoring during sleep	2.9± 1.2	1.4± 0.6	0.5± 0.4	0.000	0.000
Irregular breathing or apnoea during sleep	2.8± 1.1	1.5± 0.7	0.5± 0.3	0.000	0.000
Daytime sleepiness	2.6± 1.1	1.4± 0.5	0.4± 0.3	0.000	0.000
Noisy breathing during day	2.5± 0.8	1.3± 0.5	0.4± 0.2	0.000	0.000
Mouthbreathing during day time	2.5± 0.9	1.3± 0.5	0.5± 0.3	0.000	0.000
Poor appetite or poor eating habits	2.7± 1.0	1.4± 0.6	0.7± 0.4	0.000	0.000
Frequent ear ache/infection	0.9± 0.8	0.6± 0.4	0.5± 0.3	0.000	0.000
Repeated throat infections(lasts for < 2weeks)	2.9± 1.2	0.4± 0.2	0.4± 0.2	0.000	0.000
constant throat infections(lasts for > 2weeks)	2.9± 1.1	0.4± 0.2	0.3± 0.2	0.000	0.000
Many telephonic consultations	2.8± 1.1	0.6± 0.3	0.3± 0.1	0.000	0.000
Many doctor visits	2.9± 1.2	0.5± 0.4	0.3± 0.1	0.000	0.000
Repeated antibiotic usage for less than 2weeks	2.7± 1.0	0.8± 0.6	0.4± 0.2	0.000	0.000
Repeated antibiotic usage for more than 2weeks straight	0.9± 0.6	0.4± 0.1	0.3± 0.1	0.000	0.000
Missing school	2.5± 1.3	0.8± 0.4	0.3± 0.2	0.000	0.000

Values are median (interquartile range) of symptom scores. P values are calculated using wilcoxon signed ranks test based on positive ranks.

DISCUSSION

In the present study, out of 45 patients, male predominance is seen, which is similar to that of the studies done by Nath K et al,[6] Patel N et al,[9] Lou Z et al,[10] showing 50.8%, 60% and 54.6% male predominance respectively but Abdelmaksoud et al,[11] and Yufeng Pang et al,[12] showed 54% and 51.2% respectively of female predominance in their studies.

In our study, out of 45 patients, 35(77.8%) were pediatric patients and 10(22.2%) were adults, which is similar to Patel N et al,[9] study with 76% pediatric and 24% adult patients, whereas, in Nath et al,[6] study 72.8% were adults and 27.2% were pediatric patients who underwent coblation assisted tonsillectomy.

In this study, the Mean operation time was 15.8±4.5minutes, whereas in Swain S et al,[13] study it was 24.2± 3min, Lou Z et al,[10] study it was 17.12 ± 4.29min, Patel N et al,[9] study 12±2.45 min and Elfatah, A et al,[14] study they showed 7.6± 1.75min as mean surgery time.

In our study, postoperative pain score was 5.58± 1.2 on 1st postoperative day and it was reduced to 2.7± 0.8, whereas in Elfatah A et al,[14] study, it was 7.5±1.5 on 1st POD and 4±2 at the end of 1 week. In Abdelmaksoud et al,[11] study Mean pain score during 1st 2 days was 4.36 which decreases to 3.68 during fifth and sixth days, Lou Z et al,[10] study, the pain scores were 0 3.54 ± 1.47, 3.64 ± 2.01, 4.15 ± 1.73, 3.91 ± 2.12, 3.09 ± 1.21 on 0, 1,2,3 and 7 postoperative days respectively. Nath K et al,[6] study Average pain score on day 1 to 3 was 3 which increased to 6 on day 7.

In the current study, average time to return to normal diet was 5.44± 1.5 days and return to normal daily routine was 6.1± 1.7 days. In Elfatah A et al,[14] study percentage of patients, who returned to their normal life style were 48.53 ± 5.16 by the end of 4 days and by the end of 5-7 days, 62.3 ± 8.2 returned to normal daily routine. In Abdelmaksoud et al,[11] study, 47.2% and 63.4% patients returned to normal diet and lifestyle respectively by 5th-6th day. Whereas in Patel N et al,[9] study, it was 5.00±1.50 days and 10.50±2.00 days mean period to return to normal diet and activity.

Coblation tonsillectomy has been shown to result in less intraoperative blood loss than conventional

tonsillectomy.[15] Pinder et al,[16] stated that the rate of reactionary or secondary haemorrhages are not affected by the surgical technique. But it has been observed that the incidence of secondary haemorrhage after coblation tonsillectomy was higher than that after conventional tonsillectomy.[17-19] The denatured collagen formed because of thermal damage can result in formation of a thin protective layer over the tonsillar fossa.[19] This layer is much thicker than that formed after conventional tonsillectomy, which slows down the infiltration of inflammatory cells and formation of fibrous tissue, and resulting in an increase in the incidence of secondary haemorrhage.[20] In our study, we have not encountered any reactionary or secondary haemorrhage, which is supported by Patel N et al,[9] and Eltelety A.M et al,[7] studies and is in contrast to other studies like swain S et al,[13] secondary haemorrhage was seen in 4.9% patients, in Lou Z et al,[10] study, it was 5.43%, Nath K et al,[6] study, it was 0.8 % , Söderman et al,[21] reported an overall haemorrhage rate of 13.8% , Kim et al,[22] reported an overall haemorrhage rate of 2.9%

In our study the mean difference between preoperative and postoperative (at the end of 3-6 months)TOI-14 scores was 28.7 , which indicates, notable postoperative improvement in quality of life with significant p value of <0.005, which is similar to that of Konieczny k study,[23] which shows,mean difference between the preoperative and six-month TOI-14 score was 31.8 ($p<0.0001$) and at three months were also significantly improved compared with those taken preoperatively (mean difference: 29.9, $p<0.0001$) the In K varadarajan et al study,[24] the mean over-all total T14 score was 32.7 preoperatively and 2.7 postoperatively.

CONCLUSION

This study posits that coblation tonsillectomy is a secure and efficacious technique, presenting potential advantages over conventional methods, particularly regarding reduced postoperative discomfort and expedited recovery.

Limitations: This study contains several limitations. To begin with, it is characterized as a retrospective examination. Additionally, the sample size is relatively small, which may restrict the statistical power of the analysis and lessen the generalizability of the findings, making it challenging to reach definitive conclusions. Moreover, a primary drawback is related to the expenses and availability of the requisite equipment, along with a considerable learning curve. It is advisable for future prospective studies with larger cohorts to be conducted in order to authenticate these findings.

Conflicts of interest: Authors declare no conflicts of interest

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