Section: ENT

Original Research Article

A COMPARATIVE STUDY OF PER AND POST-OPERATIVE OUTCOMES IN COBLATION ADENOIDECTOMY AS AGAINST CONVENTIONAL ADENOIDECTOMY

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ABSTRACT

Background: Adenoidectomy is a common paediatric procedure for managing adenoid hypertrophy. Conventional curettage adenoidectomy is widely practiced but is associated with residual tissue and perioperative complications. Endoscopic-assisted coblation adenoidectomy has emerged as an alternative technique with potential advantages. **Materials and Methods:** This prospective randomized controlled study included 60 children aged 4–14 years with adenoid hypertrophy requiring surgery. Participants were randomized into coblation (n=30) and conventional curettage (n=30) groups. Operative duration, intraoperative blood loss, complications, postoperative pain, bleeding, hospital stay, return to normal activities, completeness of adenoid removal, postoperative otitis media with effusion (OME), and revision surgery were assessed. Statistical analysis was performed using SPSS version 29.0, with $p<0.05$ considered significant. **Result:** Coblation adenoidectomy had a longer operative duration than curettage (16.8±3.4 vs. 9.5±2.8 minutes; $p<0.001$) but significantly lower blood loss (8.3±2.1 vs. 24.7±5.6 mL; $p<0.001$). Postoperative VAS pain scores were lower in the coblation group on the day of surgery (4.2±0.9 vs. 6.1±1.1), Day 3 (2.8±0.7 vs. 5.0±1.2), Day 7 (1.5±0.5 vs. 3.6±1.0), and at 1 month (0.3±0.2 vs. 1.2±0.5) (all $p<0.001$). Coblation was associated with shorter hospital stay (1.2±0.4 vs. 2.5±0.6 days; $p<0.001$), earlier return to normal activities (3.8±1.2 vs. 6.7±1.5 days; $p<0.001$), higher complete adenoid removal (76.7% vs. 20.0%; $p<0.001$), lower postoperative OME (6.7% vs. 23.3%; $p=0.03$), and fewer revision surgeries (3.3% vs. 16.7%; $p=0.02$). **Conclusion:** Endoscopic-assisted coblation adenoidectomy demonstrated superior perioperative and short-term postoperative outcomes compared with conventional curettage adenoidectomy, despite a longer operative duration.

INTRODUCTION

Adenoid hypertrophy is a common condition, affecting approximately 40% of children. It is a primary cause of sleep-disorder, including obstructive sleep apnea (OSA), which causes behavioral problems, cognitive impairment, and cardiac complications.[1] The condition is also associated with chronic middle ear disease and persistent eustachian tube disorder, further justifying the surgical intervention.[2]

Surgical removal of adenoids is the standard treatment for moderate-to-severe adenoid hypertrophy, particularly in children with OSA, chronic sinusitis, and recurrent otitis media. While conventional adenoidectomy remains widely performed, newer techniques such as coblation have gained popularity due to their potential to minimize complications and improve patient recovery.[3]

Adenoidectomy, the surgical removal of hypertrophic adenoids, is a common procedure performed in pediatric patients to manage upper airway obstruction, recurrent infections, and related complications such as otitis media and sinusitis. Various surgical techniques have been developed over the years, with conventional curettage

adenoidectomy being the most widely practiced. However, recent advances in surgical technology have introduced coblation adenoidectomy, which uses radiofrequency energy to ablate tissue at low temperature, reducing thermal damage with better hemostasis.[4]

Conventional curettage adenoidectomy is performed largely as a blind procedure and may result in residual adenoid tissue, Eustachian tube dysfunction, injury to surrounding structures, and postoperative bleeding. Endoscopic-assisted coblation adenoidectomy has been proposed as an alternative technique that may overcome these limitations through improved visualization and precise tissue removal.[5,6]

The selection of an appropriate surgical technique for adenoidectomy has a significant impact on patient outcomes. Conventional curettage adenoidectomy has been associated with increased intraoperative bleeding, delayed recovery, and increased postoperative pain and discomfort. In contrast, coblation adenoidectomy offers several advantages, such as reduced intraoperative bleeding, and fewer postoperative complications.5 Recent studies suggest that coblation adenoidectomy results in better tissue removal with less injury, reducing the need for second surgery.[6]

Despite the increasing adoption of coblation adenoidectomy, there remains a lack of definitive evidence comparing its per and postoperative outcomes to those of conventional adenoidectomy. While some studies suggest that coblation reduces surgical trauma and improves postoperative recovery, others have not found significant differences in long-term outcomes.[7] A major concern in adenoidectomy is the recurrence of adenoid tissue, necessitating second surgery. Some studies indicate that coblation provides better control over adenoid regrowth, while others argue that recurrence rates remain similar across different techniques.[8]

Based on the existing evidence gap and the possible advantages of coblation adenoidectomy, the present study was undertaken to compare the perioperative and postoperative outcomes of endoscopic-assisted coblation adenoidectomy with conventional curettage adenoidectomy in children with adenoid hypertrophy. The study aimed to evaluate operative duration, intraoperative blood loss, postoperative recovery, completeness of adenoid removal, and associated complications to identify the more effective surgical approach.

MATERIALS AND METHODS

This prospective randomised controlled study was conducted in the Department of Otorhinolaryngology at Government Kilpauk Medical College and Hospital and Government Royapettah Hospital, Chennai, over a period of 9 months. Ethical approval was obtained from the Institutional Ethics Committee prior to the commencement of the study, and written informed consent was obtained from the parents or legal guardians of all participants before enrolment.

Sample Size Calculation: The sample size was calculated using nMaster Software Version 2.0 based on the study by Salam RTA, Hameed AS, and Rajan M. The proportion of complete adenoid removal was considered as 76% in the coblation group and 20% in the curettage group, with an estimated risk difference of 56%, alpha error of 5%, and a power of 99%.9 After accounting for a 10% non-response rate, the required sample size was determined to be 30 patients in each group. Thus, a total of 60 patients were included in the study.

Inclusion Criteria

Children aged 4–14 years with symptoms suggestive of adenoid hypertrophy, including nasal obstruction, mouth breathing, snoring, recurrent otitis media, and sleep disturbances, with radiological or endoscopic confirmation of adenoid hypertrophy and failure of medical management, who were willing to undergo surgery, were included in the study.

Exclusion Criteria

Patients aged below 4 years or above 14 years, those with a previous history of adenoidectomy, allergic rhinitis, deviated nasal septum, sinonasal polyposis, choanal atresia, nasopharyngeal tumours, cleft palate or previous cleft palate repair, bleeding disorders, craniofacial anomalies, cervical spine abnormalities, Down syndrome, or other syndromic conditions affecting airway anatomy were excluded.

Methods: Patients presenting with symptoms suggestive of adenoid hypertrophy underwent detailed clinical evaluation, including history taking, general physical examination, ENT examination, diagnostic nasal endoscopy, otoscopic examination, and neck examination. Routine preoperative investigations, including complete blood count, bleeding time, clotting time, prothrombin time, activated partial thromboplastin time, international normalised ratio, blood grouping, and other necessary investigations, were performed.

Eligible patients were randomised into two groups using computer-generated random allocation, concealed in sequentially numbered, opaque, sealed envelopes. Group A consisted of 30 patients who underwent endoscopic-assisted coblation adenoidectomy, while Group B included 30 patients who underwent conventional curettage adenoidectomy.

Conventional curettage adenoidectomy was performed under general anaesthesia with the patient in the Rose position using a Boyle–Davis mouth gag. Following digital assessment of the adenoid mass, excision was carried out using a St. Clair Thompson adenoid curette, and haemostasis was achieved by packing or suction cautery.

Endoscopic-assisted coblation adenoidectomy was performed under general anaesthesia with the patient in the supine position using a Boyle–Davis mouth gag. The nasopharynx was visualized using a 0° Hopkins rod endoscope, and adenoid tissue was removed using a coblation wand under endoscopic

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guidance, taking care to avoid injury to the torus tubarius, soft palate, and uvula. Haemostasis was achieved using coblation technology.

Operative duration, intraoperative blood loss, and intraoperative complications were recorded. Postoperative pain was assessed using the Visual Analog Scale (VAS) on the day of surgery, postoperative Day 3, Day 7, and at 1 month. VAS was used in children capable of self-reporting pain, while younger children were assessed with caregiver-assisted interpretation of the scale. Postoperative bleeding, duration of hospital stay, and time taken to resume normal activities were documented. Completeness of adenoid removal was assessed using diagnostic nasal endoscopy at 3 months postoperatively. The incidence of postoperative otitis media with effusion and the need for revision surgery due to residual adenoid tissue were also recorded during follow-up.

Statistical Analysis: Data were entered into Microsoft Excel 2016 and analysed using IBM SPSS Statistics for Windows, Version 29.0 (Armonk, NY: IBM Corp.). Continuous variables were expressed as mean ± standard deviation, while categorical variables were presented as frequencies and percentages. Independent sample t-test or Mann–Whitney U test was used to compare continuous variables between groups. Chi-square test or Fisher's exact test was used to analyse categorical variables, as appropriate. A p-value of <0.05 was considered statistically significant.

RESULTS

Most patients belonged to the 11–14 years age group (70.0% vs 46.7%). Males constituted 63.3% of both groups. Nasal obstruction was the commonest symptom (93.3% vs. 90.0%), and the majority had Grade 3 or 4 adenoid hypertrophy, with no significant differences [Table 1].

Table 1: Baseline Characteristics of Study Participants

Category	Variable	Coblation Group	Curettage Group	p-value
Age Distribution (Years)	4–6	0 (0.0%)	3 (10.0%)	0.92
	7–10	9 (30.0%)	13 (43.3%)	
	11–14	21 (70.0%)	14 (46.7%)	
Gender Distribution	Male	19 (63.3%)	19 (63.3%)	—
	Female	11 (36.7%)	11 (36.7%)	
Presenting Symptoms	Nasal obstruction	28 (93.3%)	27 (90.0%)	0.64
	Mouth breathing	24 (80.0%)	26 (86.7%)	0.53
	Snoring	21 (70.0%)	22 (73.3%)	0.78
	Recurrent ear infections (OME)	10 (33.3%)	12 (40.0%)	0.59
	Sleep disturbances	19 (63.3%)	20 (66.7%)	0.81
Radiological Grading of Adenoid Hypertrophy	Grade 1 (<25%)	0 (0.0%)	0 (0.0%)	0.73
	Grade 2 (25–50%)	6 (20.0%)	5 (16.7%)	
	Grade 3 (50–75%)	12 (40.0%)	13 (43.3%)	
	Grade 4 (>75%)	12 (40.0%)	12 (40.0%)	

Coblation adenoidectomy had a significantly longer operative time than curettage adenoidectomy (p<0.001). But it resulted in significantly lower blood loss (8.3 ± 2.1 vs. 24.7 ± 5.6 mL) and less intraoperative bleeding (p=0.04). Eustachian tube and soft palate injuries were seen only in the Curettage group [Table 2].

Table 2: Comparison of Intraoperative Outcomes

Parameter	Coblation Group	Curettage Group	p-value
Operative duration (minutes)	16.8 ± 3.4	9.5 ± 2.8	<0.001
Intraoperative blood loss (mL)	8.3 ± 2.1	24.7 ± 5.6	<0.001
Intraoperative bleeding	1 (3.3%)	5 (16.7%)	0.04
Eustachian tube injury	0 (0.0%)	2 (6.7%)	0.15
Soft palate injury	0 (0.0%)	1 (3.3%)	0.31

Postoperative pain scores were significantly lower in the Coblation group at all time points (p<0.001). Coblation was also associated with shorter hospital stay (p<0.001) and earlier return to normal activities (3.8 ± 1.2 vs. 6.7 ± 1.5 days). Postoperative bleeding was less frequent following Coblation adenoidectomy [Table 3].

Table 3: Comparison of Early Postoperative Outcomes

Category	Variable	Coblation Group	Curettage Group	p-value
Postoperative Pain Scores (VAS)	Day of surgery	4.2 ± 0.9	6.1 ± 1.1	<0.001
	Day 3	2.8 ± 0.7	5.0 ± 1.2	<0.001
	Day 7	1.5 ± 0.5	3.6 ± 1.0	<0.001
	1 Month	0.3 ± 0.2	1.2 ± 0.5	<0.001
Postoperative Bleeding	Mild (self-limiting)	1 (3.3%)	3 (10.0%)	0.28
	Moderate (requiring intervention)	0 (0.0%)	2 (6.7%)	0.15
	Severe (requiring readmission)	0 (0.0%)	0 (0.0%)	—

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Recovery Profile	Hospital stay (days),	1.2 ± 0.4	2.5 ± 0.6	<0.001
	Return to normal activities (days)	3.8 ± 1.2	6.7 ± 1.5	<0.001

At 3 months, Coblation adenoidectomy achieved a higher rate of complete adenoid removal (p<0.001) and lower residual tissue (p<0.001). It was also associated with lower postoperative OME (6.7% vs. 23.3%) and fewer revision surgeries (3.3% vs. 16.7%) [Table 4].

Table 4: Comparison of Follow-up Outcomes at 3 Months

Outcome	Coblation Group	Curettage Group	p-value
Complete adenoid removal	23 (76.7%)	6 (20.0%)	<0.001
Residual adenoid tissue	7 (23.3%)	24 (80.0%)	<0.001
Postoperative OME	2 (6.7%)	7 (23.3%)	0.03
Revision surgery required	1 (3.3%)	5 (16.7%)	0.02

DISCUSSION

Adenoidectomy remains one of the most commonly performed paediatric ENT procedures, and the choice of surgical technique can influence both perioperative and postoperative outcomes. The present study aimed to compare endoscopic coblation adenoidectomy with conventional curettage adenoidectomy. Our findings suggest that coblation offers superior surgical precision, improved recovery, and better short-term follow-up outcomes despite a longer operative duration.

In our study, both groups were comparable at baseline with respect to age, gender, presenting symptoms, and adenoid grading. Salam et al. similarly reported comparable age distribution, with mean ages of 6.6 and 6.2 years and male predominance of 52% and 60% in the coblation and curettage groups, along with similar adenoid grading.[9] Shilpa et al. evaluated children aged 3–11 years presenting predominantly with snoring and mouth breathing.[10] Hapalia et al. reported a male predominance (60.0%), with nasal obstruction/discharge and mouth breathing being the commonest symptoms (80.0% each) and most patients exhibiting Grade II and III adenoid hypertrophy.[11] These findings align with our study and suggest that the differences in outcomes were more likely attributable to the surgical technique rather than baseline patient characteristics.

We observed that coblation adenoidectomy required a longer operative time but was associated with better intraoperative haemostasis and fewer complications. Similar findings were reported by Islam et al., who demonstrated longer operative duration with coblation (20.78±7.49 vs. 16.00±8.81 minutes) and lower blood loss (7.58±3.28 vs. 32.60±14.89 mL).[12] Likewise, Şeneldir and Doğan reported increased operative time (26.6±5.3 vs. 20.6±3.8 minutes) with reduced blood loss (12.4±2.1 vs. 24.2±3.3 mL), and noted that minor tissue injuries occurred only in the curettage group.[13] Veronica and Jambunathan also observed similar results, with coblation showing longer operative duration (14.6±2.33 vs. 10.4±3.23 minutes) and significantly less blood loss (10.75±2.93 vs. 30±5.60 mL).[14] These findings support the superior haemostatic control and surgical precision offered by endoscopic coblation adenoidectomy.

The present study showed that coblation adenoidectomy provided a smoother postoperative recovery, with less pain, shorter hospital stay, earlier return to normal activities, and fewer bleeding episodes. Similar findings were reported by Şeneldir and Doğan, who observed lower VAS scores at 24 hours (2.09±0.90 vs. 5.50±1.01) and 72 hours (1.03±0.18 vs. 2.08±0.86), with no postoperative bleeding in the coblation group.[13] Veronica and Jambunathan also reported lower postoperative pain scores (3.0±0.36 vs. 4.0±0.44) and shorter recovery time (2.64±0.64 vs. 3.14±0.62 days) following coblation adenoidectomy.[14] Likewise, Islam et al. demonstrated lower postoperative bleeding (0% vs. 8%), shorter recovery time (4.68±2.17 vs. 7.60±4.17 days), and fewer days of analgesic requirement (10.42±3.60 vs. 12.18±2.49 days) in the coblation group, although Day 1 pain scores were comparable between the groups (9.18±3.11 vs. 9.42±4.41).12 These findings largely support our observation that coblation is associated with improved early postoperative recovery.

Our findings suggest that coblation adenoidectomy achieved more complete tissue removal and was associated with fewer postoperative complications and revision procedures, indicating better follow-up outcomes. Similar findings were reported by Veronica and Jambunathan, who demonstrated complete adenoid removal in 75% of the coblation group compared with 15% in the conventional group (p=0.0003).[14] Likewise, Malas et al., in a systematic review and network meta-analysis of 17 randomized controlled trials, reported that children undergoing techniques other than conventional curettage were 97% less likely to have residual adenoid tissue (OR=0.03, 95% CI: 0.01–0.15).[15] Islam et al. also observed a lower incidence of residual lymphoid tissue in the coblation group (8% vs. 40%), lower postoperative adenoid grading (0.0±0.0 vs. 5.86±1.39), and reduced recurrence rates (20% vs. 64%) compared with conventional adenoidectomy.[12] These findings align with our study and supports efficacy of coblation in achieving complete adenoid clearance and reducing disease persistence.

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The findings of our study suggest that the advantages observed with coblation adenoidectomy extend beyond the immediate intraoperative period to influence postoperative recovery and follow-up outcomes. The concordance of our results with existing literature highlights the impact of surgical technique on treatment outcomes in children undergoing adenoidectomy.

Limitations: The present study had a relatively small sample size and was conducted at two tertiary care centres over a limited study period. The follow-up duration of three months may not adequately assess long-term recurrence and functional outcomes. In addition, blinding of the operating surgeon was not feasible due to the nature of the surgical techniques.

CONCLUSION

Endoscopic-assisted coblation adenoidectomy demonstrated superior perioperative, postoperative, and short-term follow-up outcomes compared with conventional curettage adenoidectomy. Although coblation required a longer operative duration, it was associated with reduced intraoperative blood loss, lower postoperative pain, faster recovery, more complete adenoid removal, and lower rates of residual disease, postoperative otitis media with effusion, and revision surgery.

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