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# Advancements in Adenoid Removal: Evaluating the Efficacy and Outcomes of Endoscopic-Assisted Coblation Adenoidectomy

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## ABSTRACT

**Background:** With the goal of enhancing accuracy and results in pediatric patients, endoscopic-assisted coblation adenoidectomy is an innovative method for removing adenoid tissue. Though successful, traditional adenoidectomy methods may come with varying degrees of healing and complications after the procedure.

**Objective:** The effectiveness, safety, and clinical results of endoscopically assisted coblation adenoidectomy are assessed in this study.

**Methods:** We performed a prospective cohort study on patients undergoing coblation adenoidectomy with endoscopic assistance. Important parameters included length of surgery, problems during surgery, pain after surgery, time to recovery, and rates of adenoid regrowth. With an emphasis on both quantitative measurements and patient-reported outcomes, data were gathered from medical records and patient surveys.

**Results:** There was a statistically significant decrease in both intraoperative blood loss and operating time with the endoscopic-assisted coblation approach. Following surgery, patients reported less pain and a quicker return to their regular activities. The rates of complications, such as bleeding and infection, were quite low. The technique for radiofrequency ablation of adenoid tissue with a coblator is described in this publication. Creating a bloodless field, precisely removing tissue, and causing minimal harm to neighbouring tissues are its main benefits.

**Conclusion:** An efficient and workable substitute for traditional adenoidectomy methods is endoscopic-assisted coblation adenoidectomy. It is a good alternative for both adult and pediatric patients because of its benefits, which include shorter operating times, less bleeding, and better recuperation after surgery. Additional extended research is necessary to validate these results and evaluate the longevity of the effects.

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## Introduction

One of the main causes of nasal blockage in children is adenoid hypertrophy, which has been described as a natural reaction to heightened immunologic activity during early life [1, 2]. Moreover, it's been determined to be a contributing factor in sinusitis, obstructive sleep apnoea (OSA), and recurrent or persistent otitis media. As major upper airway abnormalities can cause additional severe illnesses such altered craniofacial growth and cognitive impairment, it is widely established that the consequences of upper airway dysfunction should not be taken lightly. Children typically suffer from a common condition called obstructive sleep apnoea hypopnea syndrome (OSAHS), which frequently causes mouth breathing, snoring, repeated waking during sleep, enuresis, and hyperhidrosis.

Long-term obstruction in children with OSAHS may also impact their hearing loss, physical and maxillofacial development, neurological cognitive function, and cardiovascular system [3-5]. Surgery is an option for treating Adenoid Hypertrophy if medicinal treatment is ineffective, or nasal corticosteroids [6]. In pediatric patients, an adenoidectomy is one of the most often done surgical procedures, either by itself or in conjunction with other forms of surgeries [7].

According to reports, the prevalence of this surgery is as high as 65 per 10,000 children in England and 50 per 10,000 children in the US [8].

Adenoidectomy is indicated by the American Academy of Otolaryngology & Head and Neck Surgery (AAOHNS) in the event of four or more episodes of recurrent suppurative rhinorrhoea, hypo nasality, sleep disorders involving nasal breathing obstruction, Otitis media with tympanic effusion lasting longer than three months, malocclusion or orofacial growth disorder, cardiopulmonary complications related to upper airway obstruction, and recurrent acute and chronic otitis media with tympanic effusion [9]. Since adenoidectomy is among the most common surgical procedures performed on children, efforts are always being made to enhance patient outcomes and improve the postoperative experience for this demographic.

A variety of adenoidectomy procedures, such as microdebrider, bipolar coagulation, stripping under endoscopic control, and coblation, have been proposed in recent years to lower surgical risk and morbidity [10-12]. Although it is the most often used technique for adenoid surgery, conventional adenoidectomy with curettage has certain disadvantages.

Blind curettage can cause trauma that affects the cervical spine, the septum, and the eustachian tubes. Bleeding, while normally self-limiting, might occasionally become excessive and necessitate the use of a post-nasal pack. Furthermore, blind curettage is unable to completely and safely remove the adenoid tissue from the sidewalls of the eustachian tube orifices, nor can it clear the adenoidal tissue within the posterior choanae, which is occasionally the primary source of airway blockage.

This research explains the method of removing the adenoids, including the tissue in the posterior choanae and covering the eustachian tube cushions, under vision and without detectable blood loss using coblator wand equipment. Anyone with a basic acquaintance with the Coblator system may execute it with ease.

The term "controlled ablation," or "coblation," was initially used in 2001, although adenoidectomy was the first procedure to employ it in 2005 [13, 10]. Otolaryngologists are paying more and more attention to coblation adenoidectomy since it only reaches a temperature of 60 °C, which results in less tissue damage.

## Materials and Method

### Clinical Data

Pediatric patients with bilateral nasal blockage and enlarged adenoids, ages four to twelve, were included in the prospective study. At our Apollo ENT hospital, Jodhpur, Rajasthan, India, 109 cases of enlarged adenoids were found over the course of 43 months, from January 2021 to August 2024. Forty-seven male and sixty-two female attended. Patients in the age range of 4 to 12 years who had endoscopically and radiologically verified evidence of adenoid hypertrophy met the inclusion criteria (Figure 1-3).

Patients with nasopharyngeal lesions, both benign and malignant, and those unwilling to undergo an endoscopic adenoidectomy were among the exclusion criteria.

Pure tone average and impedance audiometry were also performed on patients exhibiting auditory complaints.

The nasopharyngeal tissue was identified using a 2.7 mm oto endoscope with an angle of 0 degrees. The adenoid tissue had either a smooth or an uneven surface. The adenoid tissue originated from the vault and/or posterior wall of the nasopharynx (Figure 12). In forty-nine cases, residual secretions (post nasal discharge) were detected in front of the adenoid tissue, posterior to the inferior meatus and nasal cavity (Figure 13). Near about all patients had history of nasal obstruction. Nighty seven patients had rhinorrhoea, nighty five had snoring, eighty-three had nasal twang of voice, twenty-three had secretory otitis media, and three had bilateral chronic suppurative otitis media (Figure 1 and Table 3). All parents provided informed consent before participating in the study. The clinical signs were nasal blockage causing sleep apnoea, mouth breathing, and snoring. All patients were checked with a rigid otoendoscope for nasopharyngoscopy, which has replaced mirror nasopharyngeal exams, reduced patient discomfort, and is now a standard procedure in our institution. The adenoid's size, association to the choanae, and eustachian tube were documented. Parikh's adenoid grading scale rated all included cases as Grade III or IV (Figure 7-10 and Table 1, 2).

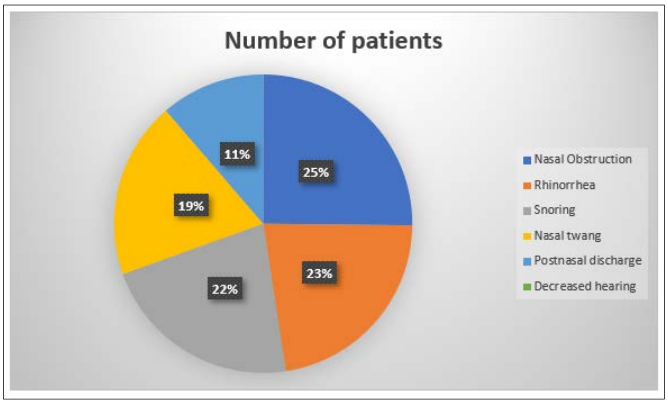


**Figure 1:** Symptoms in patients.

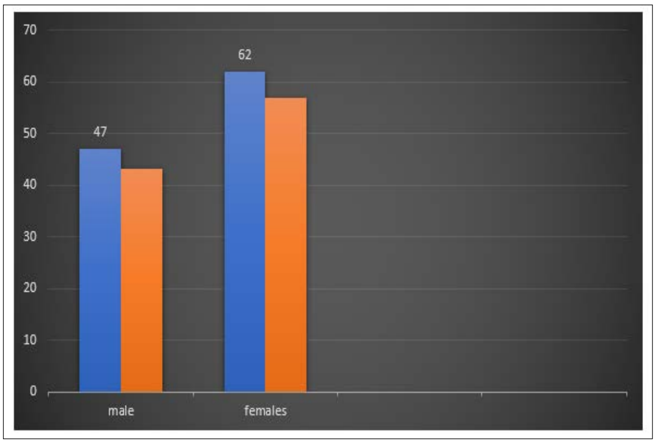


**Figure 2:** Sex predilection in our patients.

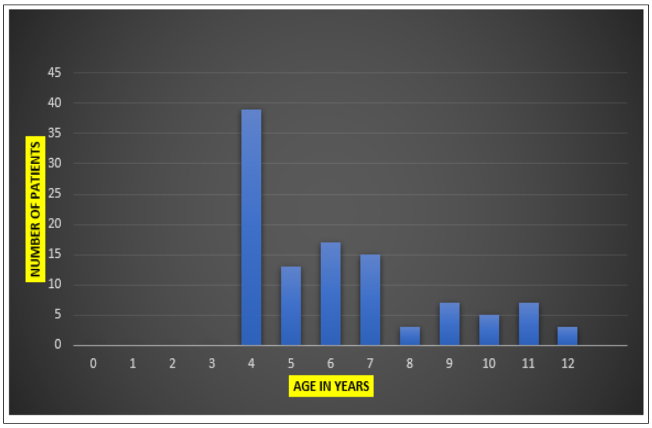


**Figure 3:** Age distribution in our patients.

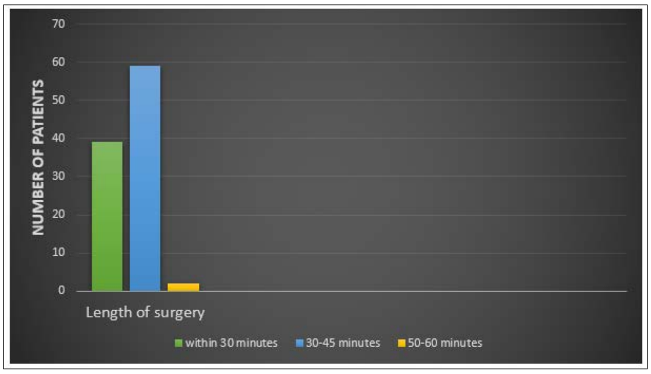


**Figure 4:** Length of surgery (in minutes)

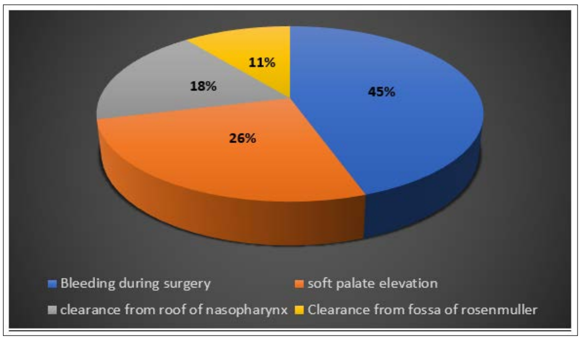


**Figure 5:** Problems during surgery

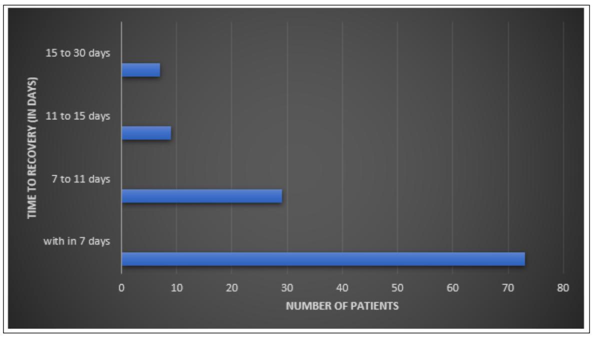


**Figure 6:** Time to recovery in our patients.

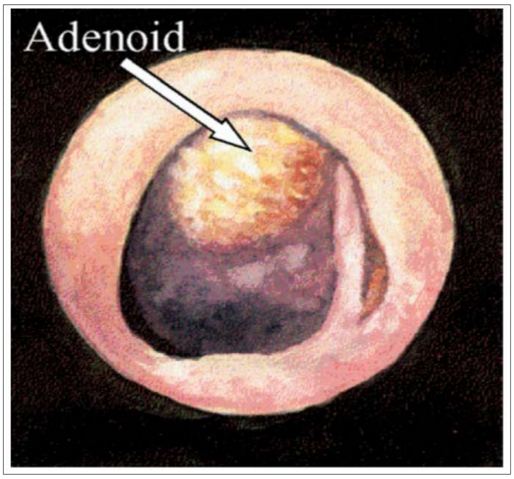


**Figure 7:** Grade 1, adenoid tissue not in contact with adjacent structures. [Parikh et al ([22]) ]

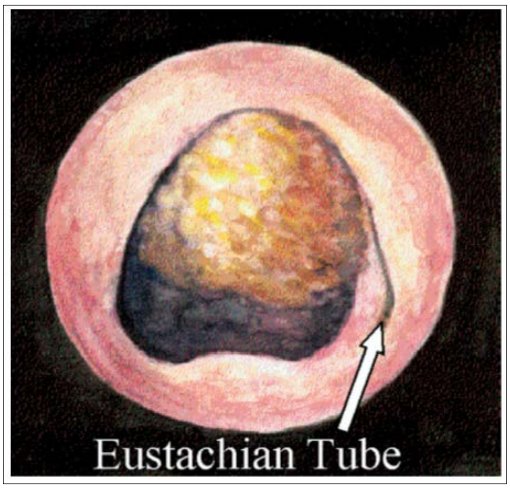


**Figure 8:** Grade 2, adenoid tissue in contact with torus tubaris. [Parikh et al ([22]) ]

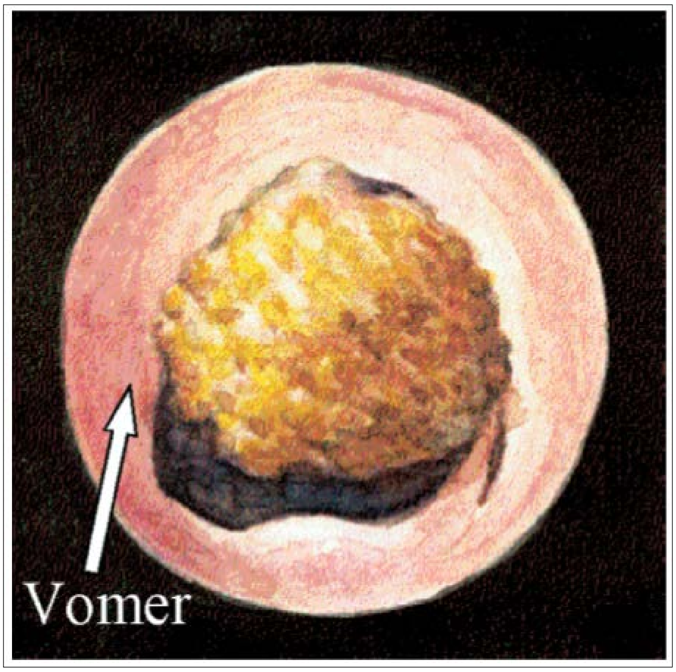


**Figure 9:** Grade 3, adenoid tissue in contact with Vomer. [Parikh et al ([22]) ]

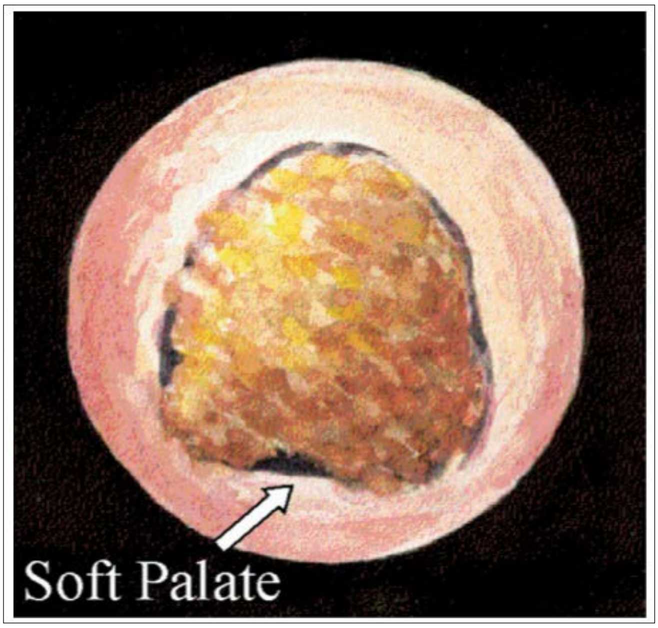


**Figure 10:** Grade 4, adenoid tissue in contact with palate (at rest). [Parikh et al ([22]) ]

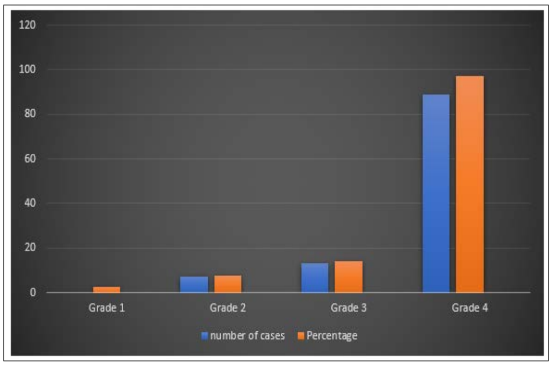


**Figure 11:** Distribution of cases according to endoscopic grading

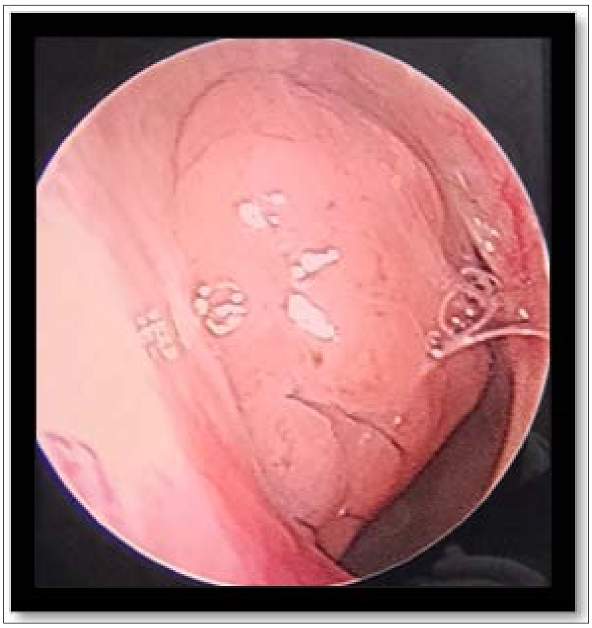

**Figure 12:** Intraoperative endoscopic view of adenoid hypertrophy

**Figure 13:** Thick mucopurulent discharge at posterior choana during diagnostic nasal endoscopy.

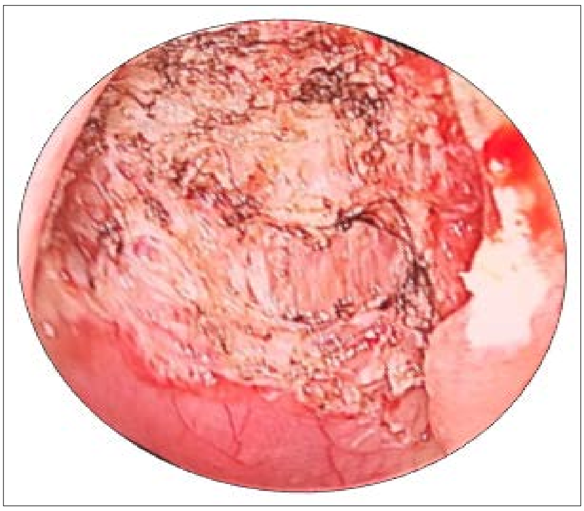

**Figure 14:** Post operative picture showing complete adenoid removal with coblation.

**Table 1: Endoscopic grading of Adenoid hypertrophy (Parikh et al ([22]))**

| Grade | Grade of Adenoid Hypertrophy |
|---|---|
| 1 | No anatomic structure in contact with adenoid |
| 2 | Adenoid in contact with Torus tubarius |
| 3 | Adenoid in contact with Vomer |
| 4 | Adenoid in contact with soft palate at rest |

**Table 2: Distribution of cases according to endoscopic grading:**

| Grade of adenoid hypertrophy | Number of cases | Percentage |
|---|---|---|
| Grade 1 | 0 | 0 |
| Grade 2 | 7 | 7.63 |
| Grade 3 | 13 | 14.17 |
| Grade 4 | 89 | 97.01 |

**Table 3: Symptoms of pediatric patients with Adenoid hypertrophy**

| Sr. No. | Symptoms | Number of subjects |
|---|---|---|
| 1. | Nasal obstruction | 109 |
| 2. | Rhinorrhea | 97 |
| 3. | Snoring | 95 |
| 4. | Nasal tone | 83 |
| 5. | Postnasal discharge | 49 |
| 6. | Decreased hearing | 23 |

Patients underwent a thorough systemic examination and were deemed fit for general anaesthesia before scheduling surgery. Patients with congenital defects, prior surgical histories, allergies, or bleeding diathesis were excluded from the study. Patients were discharged from the hospital 2-3 days after surgery and followed up at 7 days, 14 days, and 3 months later.

**Surgical Procedure**

With a Boyle-Davis gag in place, the patient is put in the adenoidectomy position. The soft palate and nasopharynx are elevated with the use of Foley's catheters.

Similar settings (coagulation setting 3 and ablation setting 9) are employed with the EVac 70 wand, just like in tonsillectomy procedures.

Both the suction and flow of the saline irrigation are set to maximum. By softly indenting the surface and allowing the tissue fronds to be drawn onto the instrument's tip, the adenoid tissue is removed with a gentle stroke of the wand over it.

The tip of the wand is continuously moving to prevent obstruction. The majority of veins coagulate during the adenoid ablation, but any that are not can be sealed with a quick coagulation burst.

With short, intermittent bursts of ablation energy, the lymphoid tissue covering the eustachian cushions is carefully eliminated under vision.

In order to dissolve adenoid tissue obstructing the posterior choanae from within, the wand will also extend past the posterior margin of the nasal septum. If necessary, the wand can be bent to the needed form.

This procedure allows for the removal of only the appropriate quantity of adenoid tissue that is determined to be sufficient to release obstruction in the eustachian tube or post-nasal space orifices; the pre-vertebral muscle layer is not targeted for tissue removal.

Our experience shows that it takes less time overall than the conventional adenoidectomy because hemostasis doesn't need to be performed for any longer.

The nearly bloodless field following adenoids excision is depicted in Figure 2. The amount of blood lost in each case using this procedure thus far has been less than 1 milliliter.

**Statistical Analysis**
The results were plotted using descriptive statistics. Symptoms and indicators were calculated as a percentage. Tables and figures were created using Microsoft Word 2010 and Excel 2010.

**Results**
This study was conducted on pediatric patients aged 4 to 12 years with bilateral nasal obstruction, 109 such cases of enlarged adenoids were found. There were 47 males and 62 females. The patients studied for a period of 43 months. All patients had bilateral nasal obstruction along with rhinorrhoea in nighty seven cases, snoring in nighty five cases and nasal tone in eighty three cases, postnasal discharge in forty nine cases, decreased hearing in twenty three cases. All of the cases reported previous medical treatments in the form of antibiotics, antihistamines and/ or decongestants (local or systemic). Most common symptom was nasal obstruction while most common otological sign was retracted tympanic membrane. In all the cases endoscopic assisted adenoidectomy was performed under general anaesthesia. All 109 patients underwent endoscopic adenoidectomy and postoperative period was uneventful. Important parameters included length of surgery, problems during surgery, pain after surgery, time to recovery, and rates of adenoid regrowth.

Endoscopic follow for a period of 6 to 18 months was done (Figure 1). Endoscopic grading showed patients who were having large adenoids (Grade 3 or 4) as per grading scale (Table 2)

**Discussion**
In 1724, Santorini wrote about "Luschka's tonsil," also known as the nasopharyngeal lymphoid aggregation [14]. The term "adenoid" was first used in 1870 by Wilhelm Meyer to refer to what he called "nasopharyngeal vegetations."

Adenoid tissue is one of the first line immunological defence mechanisms of the upper aero digestive tract and reaches its maximal size between 3 to 7 years of age. In general, it attains maximum size between the ages of 3 and 7 years and then regresses [15]. However, there is a significant growth of the soft tissue of the nasopharynx between the age of 3 and the age of 5 years, which leads to the narrowing of the nasopharyngeal airway [16]. Subsequently, the growth of the nasopharynx increases while the soft tissues remain relatively unchanged, and thus, the airway increases [17]. At the upper respiratory tract portal, the adenoid is a component of Waldeyer's ring of lymphoid tissue. This is where inhaled antigens first come into touch with the immune system in early development.

Throughout history, the adenoid has been linked to obstruction of the upper respiratory tract, sepsis, and, more recently, the persistence of otitis media with effusion.

The ability to precisely diagnose the nasopharyngeal adenoid and determine its size, form, and degree of encroachment on the airway and Eustachian tube using nasal endoscopic examination represents a significant advancement in the diagnosis of Sino-nasal illness [18-21].

The intensity of symptoms cannot be explained by the mere existence of adenoid hypertrophy. One grading method, which divides adenoid hypertrophy into grades 1 through 4 based on structures in touch with the adenoid tissue, was proposed by Parikh et al [22]. and used to categorize the condition. The clinical findings and the severity of the symptoms matched the grading scheme.

Despite being comparatively quick, easy, and safe, conventional adenoidectomy using a curette has been linked to a few well-documented issues. Blood loss in very young children can occasionally be significant, even though it is rarely excessive. Furthermore, it can occasionally be hard to manage, requiring the insertion of post-nasal packs and the intubation of young children during the recovery phase.

Two more recent methods that have been shown to dramatically lower per-operative blood loss are power-assisted microdebrider adenoidectomy and suction coagulator adenoidectomy [23-27]. Given the exceptionally minimal blood loss and additional benefits outlined below, adding coblation to adenoidectomy seemed a reasonable next step. Conventional adenoidectomy, being a blind technique, increases the risk of trauma to the eustachian tube orifices and posterior end of the nasal septum. The removal of adenoid tissue located inside the posterior choanae (which is challenging to curet with traditional methods) and in the lateral walls of the nasal cavity around the orifices of the eustachian tube has proven to be very effective when using the EVac 70TM coblation wand.

Our perspective on the application of coblation is that, with preservation of tissue architecture, there is very little surrounding tissue damage and fibrosis due to the shallow depth of energy penetration and low tissue temperatures at the coblated interface [28]. While coblation and suction diathermy are equally precise and bloodless, we think coblation results in significantly less underlying tissue damage than electrosurgery [29]. In a recent research of 721 adenoidectomies, the use of monopolar suction diathermy was found to be a risk factor for Grisel's syndrome (non-traumatic atlantoaxial joint sublaxation), highlighting the four-fold higher energy level with monopolar compared to bipolar diathermy [30]. The current findings show that endoscopic coblation adenoidectomy can guarantee the safe and thorough removal of adenoid tissue because of its small wand tip and endoscopic control, which allow it to reach the adenoid intranasal extension and its most cranial portion—areas that are inaccessible with a Beckmann curette.

The capacity to ablate and coagulate tissue with a single tool during a coblation adenoidectomy offers an additional advantage over cold curettage in terms of patient recovery.

In comparison to cold curettage, coblation adenoidectomy has the following primary benefits:

- Less bleeding (cold curettage causes excessive bleeding);
- A direct endoscopic view of the adenoid (cold curettage causes blind surgery or a mirror view);
- The capability of accessing every region of the nasopharynx up to the Eustachian tube aperture (curettage is not effective in reaching the cranial portion of the nasopharynx);
- Fewer concerns (coblation adenoidectomy requires no cutting blade);
- Decreased risk of remaining adenoid tissue following coblator surgery;
- It is appropriate for patients of all ages, though for pediatric patients, the reduction of pain intensity and duration is crucial;
- It reduces the need for post-operative medication and parent work days missed as a result of quicker healing following surgery (as evidenced by the days of pain reporting, analgesic days, liquid diet days, and absence from school days).

Endoscopic coblation adenoidectomy, in contrast to traditional cold curettage, also permits precise and targeted ablation of the adenoid tissue, which is no longer blind but rather visible under direct 0° endoscopic vision.

There was no evidence of intraoperative or postoperative bleeding, and surrounding tissues like the nasal, pharyngeal, and tube mucosa were all meticulously preserved.

For this reason, compared to curette/cautery adenoidectomy, coblation adenoidectomy, according to others is linked to decreased postoperative neck pain. The primary drawbacks of an endoscopic method over conventional cold curettage are the requirement for a full operating theater setup for paediatric endoscopy, the time required for preparation, the need to obtain nasal cavity decongestion with patties, and a unique learning curve for paediatric endoscopy [10].

The endoscopic approach to the nasopharynx necessitates nasal decongestion, secretion suctioning, and meticulous inspection; nevertheless, it also allows for more precise and gradual removal of adenoid tissue than "en bloc" removal, which is why the surgery time was shorter in the cold curettage group.

Even if the total amount of time required may decrease due to improvements in the learning curves of surgeons and nurses, this data should be taken into account when planning surgical procedures in operating rooms, potentially involving the scheduling of several endoscopic coblation adenoidectomies to reduce preparatory time.

Several early theories are stimulated by histological study of nasopharygeal mucosa slices from patients in both groups. A fibrosis-type repair with minimal lymphocyte infiltration of the lamina propria was seen in the coblation group, which is consistent with more firm and conclusive control of the adenoid hypertrophy. Traditional cold curette treatment increases the risk of recurrence and is accompanied by a significant lymphocytic infiltration.

An earlier work used a coblator to examine the pattern of injury and assess postprocedural healing on the nasal mucosa in an experimental animal model. It discovered that moderate fibrosis had replaced the adenoid tissue [31].

According to research conducted after a period of time, respiratory outcomes following endoscopic coblator adenoidectomy are stable and within normal limits, with no potential of recurrence or persistence of adenoid tissue (based on histological data) [32].

## Conclusion

Among pediatric patients with adenoid hypertrophy, endoscopic coblation-assisted adenoidectomy has shown to be a useful procedure. Compared to conventional adenoidectomy techniques, this minimally invasive treatment has a number of benefits, such as less intraoperative bleeding, less postoperative pain, and a quicker recovery time. Targeted tissue removal is made possible by the precision of coblation technology, which improves the procedure's safety and effectiveness. Furthermore, the endoscopic visualization enhances anatomical clarity, improving results and lowering the possibility of problems. This is an important improvement in pediatric ENT surgery, as it provides a refined and effective treatment for adenoid-related obstructive symptoms.

## Consent

Written informed consent was obtained from the patient's parents for the publication of this case report and any accompanying images.

## Acknowledgment

We would like to acknowledge the patient for providing consent for the publication of this case report.

## Conflict of Interest

The authors declare no conflicts of interest.

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## Authors' Contributions

All authors contributed to the conception, drafting, and critical revision of the manuscript. All authors have approved the final version of the manuscript for submission.

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