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Clinical Evaluation of Microdebrider-Assisted Coblation Adenoidectomy: A Safe and Effective Approach for Adenoid Removal

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ABSTRACT

Background: *Adenoidectomy is a common surgical intervention for treating adenoid hypertrophy in pediatric patients. Traditional methods such as curettage and electrocautery are effective but often associated with bleeding, thermal injury, and delayed recovery. Microdebrider-assisted coblation adenoidectomy is an innovative approach that combines precise tissue shaving with controlled low-temperature ablation for improved outcomes.*

Objective: *To evaluate the efficacy, safety, and clinical outcomes of microdebrider-assisted coblation adenoidectomy in pediatric patients.*

Methods: *A prospective study was conducted on seventy pediatric patients aged 4.3 to 11.7years with symptomatic adenoid hypertrophy. All patients underwent microdebrider-assisted coblation adenoidectomy. The primary outcomes measured included operative time, intraoperative blood loss, postoperative pain (using the Visual Analog Scale), recovery time, and complications. Data were analyzed using descriptive and inferential statistics, with significance set at $p < 0.05$.*

Results: *The mean operative time was 53.54 minutes. Mean intraoperative blood loss was 6.5 ± 4.8 mL. Recovery time to normal activities was 5.3 ± 1.4 days. No significant complications, such as severe bleeding or infections, were observed.*

Conclusion: *Microdebrider-assisted coblation adenoidectomy is a secure, efficient, and less-invasive technique for adenoid removal. It is a good option for pediatric patients because it provides better visualization, less intraoperative blood loss, less postoperative pain, and a quicker recovery.*

Keywords: *Microdebrider, Coblation, Adenoidectomy, Pediatric ENT Surgery, Minimally Invasive, Adenoid Hypertrophy.*

Introduction

Adenoid tissue is regarded as originating from the Waldeyer's ring is a lymphoid structure that can be found at the top of the nasopharynx, adjacent to the choana and eustachian tube [1]. Adenoid hypertrophy or chronic adenoiditis can result in serious issues that call for an adenoidectomy, particularly in cases of nasal blockage [2]. Adenoid curettes are used in conventional adenoidectomy procedures. Postoperative problems such bleeding, velopharyngeal insufficiency, nasopharyngeal stenosis, and nasal obstruction brought on by adenoid tissue regrowth are likely to result from leftover adenoid tissue [3]. During endoscopic sinus surgery, the microdebrider was introduced. It is a machine that uses a rotating shaving mechanism and constant suction to cut and remove soft tissue through the blunt cannula's side port [4]. When used with endoscopes to guide dissection during adenoidectomy to aid in the full removal of the adenoids, the microdebrider could prove advantageous in adenoidectomy with less remaining adenoidal tissue [5]. The purpose of this study is to examine the safety and effectiveness of this operation as well as the usage of powered instruments and

endoscopes. Adenoidectomy is among the most often carried out surgical treatments for pediatric otorhinolaryngology [6,7]. Many adenoidectomy techniques have been used throughout history, including transnasal or transoral endoscopy-assisted coagulation diathermy, curettage adenoidectomy with endoscopic imaging, conventional curettage adenoidectomy (CA), curettage adenoidectomy with indirect imaging methods (mirror), and microdebrider adenoidectomy [5, 8]. Adenoidectomies assisted by endoscopes and microdebriders have become more common since otorhinolaryngologists' toolkit was expanded to include these instruments, which allow surgery to be done safely under direct vision with minimal residue [9–14]. Yanagisawa et al [15] documented an adenoidectomy from start to finish in 1997, using a transnasal endoscope and a transnasal microdebrider throughout. After coblation adenoidectomy, Havas and Lowinger conducted an endoscopic examination later in 2002. If they found any remaining adenoid tissue, they removed it using a transnasal microdebrider while transnasal endoscopic imaging was in place. Pagella later described this strategy as a "Combined technique" [16]. It is simpler, quicker, and less expensive to perform an initial curettage adenoidectomy as part of this combined adenoidectomy approach. Additionally, unnecessary surgical procedures and expenses are avoided in situations without residue because the microdebrider is only employed in the presence of residue adenoid tissue following endoscopic control.

Patients and methods

A prospective study was carried out in the Apollo ENT Hospital, Jodhpur, Rajasthan, India from October 2021 to January 2024. The study included seventy children subjected to adenoidectomy (age ranged from 4.3 to 11.7 years, mean 7.67 years). Of the seventy cases, thirty-seven were male and thirty-three were female. The main presenting symptom in most of the patients was nasal obstruction in all patients (100%), followed by mouth breathing in 87%, snoring in 81%, and nasal discharge in 73%. Hearing impairment occurred in 20% of the cases, persistent cough in 10%, and obstructive sleep apnoea occurred in 3% of the cases (Table 1). All patients had a history taking for personal information and nasal problems. Endoscopic assessment of adenoids using 2.7 and 4mm rigid nasal endoscopes was included of the comprehensive otolaryngology examination to determine their size. Patients with craniofacial deformities, otitis media with effusion, history of tonsillectomy, bleeding propensity, inability to undergo general anaesthesia, or previous adenoidectomy are excluded. Pre-operative tests (full blood cell count and coagulation profile) and anaesthetic consultation were completed.

Symptoms	Percentage (%)
Nasal obstruction	100
Mouth breathing	87
Snoring	81
Nasal discharge	73
Hearing impairment	20
Persistent cough	10
Obstructive sleep apnoea	03

Table:1. *Presenting symptoms and there percentage in paediatric patients with adenoid hypertrophy.*

Surgical Technique:

1. **Patient Preparation**
   - Obtain informed consent and ensure preoperative evaluation, including history and examination.
   - Place the patient in a supine position under general anesthesia with oral endotracheal intubation.
   - Position the head in a neutral or slight extension to optimize surgical exposure.
   - Insert a Crowe-Davis mouth gag to maintain oral access.
2. **Visualization and Exposure (figure 1 and 2)**
   - Place a soft palate retractor foley's catheter for better visualization of the nasopharynx.
   - Utilize a 0-degree or 30-degree endoscope (if available) for direct visualization of the adenoids.

Figure 1: Endoscopic view of adenoid hypertrophy with microdebrider blade.

Figure 2: Intraoperative image of the assembly with the microdebrider introduced intraorally.

3. **Debulking with the Microdebrider**
   - Use a microdebrider with a 4.0-mm or 2.9-mm curved blade and set the oscillating speed to an appropriate level.
   - Begin by gently removing the bulk of adenoid tissue, working in a systematic manner from superior to inferior and lateral to midline.
   - Avoid excessive suction to prevent injury to the Eustachian tube or posterior pharyngeal wall.
4. **Hemostasis and Refinement with Coblation**
   - After primary debulking, use a coblation wand (e.g., a plasma-based radiofrequency device) set to an appropriate power level (low to medium) to achieve hemostasis.
   - Perform coblation-assisted ablation of residual adenoid tissue while minimizing collateral thermal damage.
   - Take care to avoid excessive contact with the torus tubarius and soft palate musculature.
5. **Final Inspection and Hemostasis**
   - Use saline irrigation to clear any residual debris.
   - Inspect for bleeding and achieve hemostasis with coblation or gentle pressure as needed.
   - Confirm complete removal of hypertrophic adenoid tissue without damage to surrounding structures
6. **Postoperative Care**
   - Extubate the patient once fully awake and monitor for airway patency.
   - Prescribe analgesia and antibiotics as needed.
   - Provide postoperative instructions regarding hydration, diet, and activity restrictions.
   - Schedule a follow-up visit in 1–2 weeks to assess healing and resolution of symptoms.

This technique effectively balances precision, minimal thermal damage, and hemostasis, leading to improved outcomes and faster recovery.

Outcome Measures

- **Primary outcomes:** Operative time, intraoperative bleeding (mL), and completeness of adenoid removal (assessed by endoscopic visualization).
- **Secondary outcomes:** Postoperative pain (measured using Wong-Baker FACES Pain Rating Scale), time to resume normal diet, and incidence of complications (residual adenoid tissue, infection, velopharyngeal insufficiency).

Statistical Analysis

Data were analyzed using SPSS software. Continuous variables were compared using the t-test and ANOVA, while categorical variables were analyzed using the chi-square test. A p-value <0.05 was considered statistically significant.

Results

Demographics

A total of seventy pediatric patients were included, comprising 37 males (52.85%) and 33 females (47.15%), with a mean age of 7.67 years (range: 4.3 to 11.7 years)

Intraoperative Findings: (Chart 1 to 4)

- The mean operative time was (53.54) minutes (range: (45 to 70 minutes)).
- The mean intraoperative blood loss was 6.5 mL (range: 5-8 ml).
- Hemostasis was achieved effectively in all cases without the need for nasal packing.

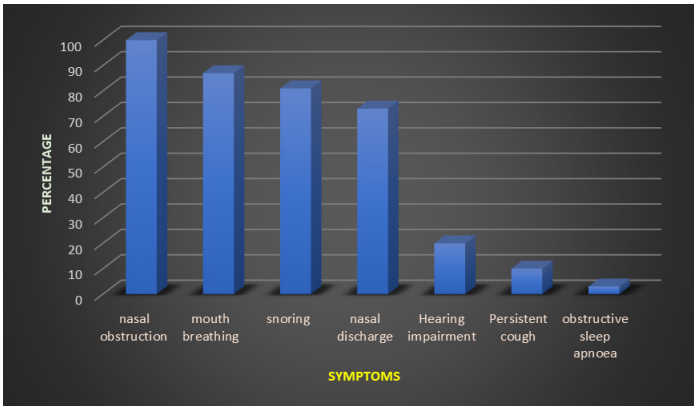

Chart 1. Symptoms that children with adenoid hypertrophy present with and their percentage.

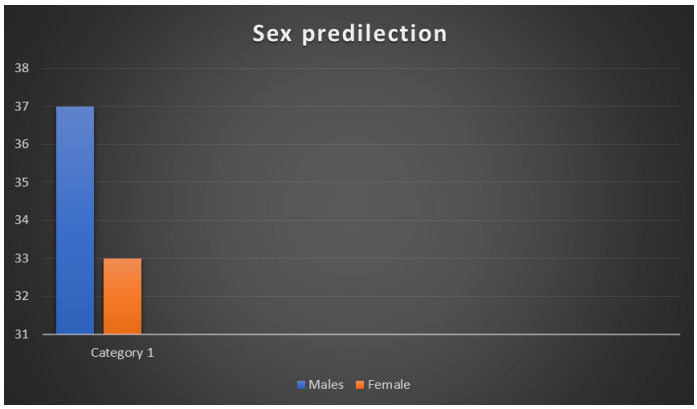

Chart: 2. Sex predilection

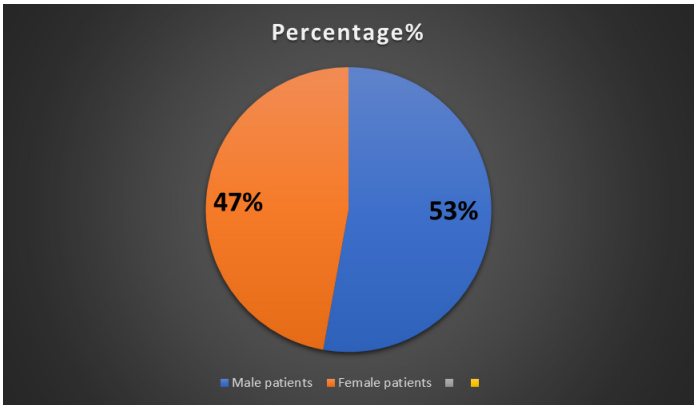

Chart: 3. Percentage of study participants that were male and female.

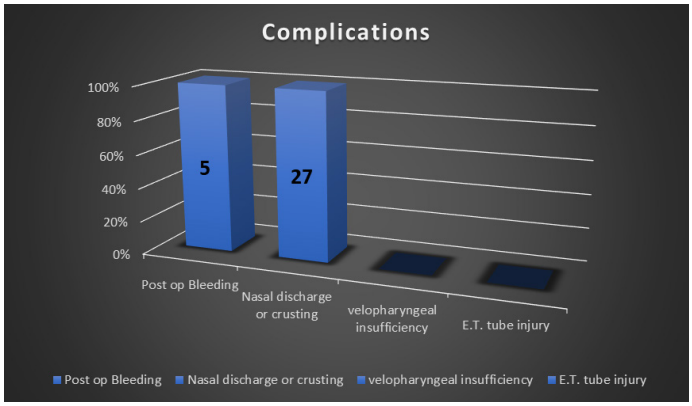

Chart:4. Complications following adenoidectomy.

Postoperative Outcomes

- No major intraoperative complications were observed.
- Minor complications included:
  - » Mild postoperative bleeding in five patients (7.14%) which resolved with conservative management.
  - » Transient nasal crusting or discharge in twenty seven patients (38.6%).
  - » No cases of Eustachian tube injury or velopharyngeal insufficiency were reported.
- Pain scores, based on the visual analog scale, were low with a mean of 1.5 on the first postoperative day and decreased further at follow-up.

Symptomatic Relief

At 3-month follow-up

- 87 % of patients reported complete resolution of nasal obstruction.
- 93 % had resolution of mouth breathing.
- Snoring was resolved in 89 % of cases, with significant improvement reported by caregivers.
- Only nine patients (12.85%) required additional management for persistent symptoms, but no revision surgeries were needed.

Discussion

Children often have upper airway obstruction due to adenoid hypertrophy, which can also cause cor pulmonale, pulmonary vascular hypertension, and alveolar hypoventilation in severe cases. Adenoidectomy, which is still one of the most common surgeries done, especially on children, can reverse these symptoms [17]. Power instrumentation is a safe and accurate technique since the endoscopic viewing will allow for the entire removal of the adenoid tissues surrounding the torus tubarius without endangering the surrounding tissue. The microdebrider has been widely utilized for tissue debridement during endoscopic sinus surgery, and positive outcomes have been obtained with endoscopic-assisted adenoidectomy using the microdebrider. The microdebrider can remove tissue down to the less vascular fascial plane because of its suction and shaving action. The oscillating blade's cutting action reduces bleeding [8].

Advantages of Microdebrider Use

- **Precision:** Targeted tissue removal is made possible by the rotating blade, which lessens damage to nearby structures.
- **Continuous suction:** Improves sight during the process by removing dirt and blood.
- **Reduced postoperative pain:** Due to the absence of heat damage.
- **Better visualization:** Because endoscopic leading assures thorough adenoid removal, recurrence rates are decreased.

Coblation in Adenoidectomy

Coblation, also known as controlled ablation, is a process that dissolves molecular bonds at very low temperatures (40–70°C) by using radiofrequency energy to create a plasma field. This minimizes collateral heat injury while enabling efficient tissue removal.

Advantages of Coblation

- **Minimal thermal damage:** Unlike electrocautery, coblation operates at lower temperatures, preserving adjacent structures.
- **Improved hemostasis:** The coagulative effect reduces intraoperative and postoperative bleeding.
- **Reduced postoperative pain and scarring:** Lower thermal injury results in faster healing and decreased discomfort.
- **Enhanced surgical precision:** Allows controlled tissue removal with less surrounding trauma.

Combination of Microdebrider and Coblation in Adenoidectomy

The combined use of a microdebrider and coblation in adenoidectomy integrates the strengths of both technologies, offering an optimal balance of tissue removal efficiency and hemostasis. This hybrid approach utilizes the microdebrider to debulk the adenoid tissue followed by coblation to ablate residual tissue and achieve hemostasis.

Potential Benefits of the Combined Approach

Potential Limitations

Despite its advantages, this combined technique has some drawbacks

- **Cost:** The use of both microdebriders and coblation increases procedural expenses.
- **Learning curve:** Surgeons must be trained in both techniques for optimal outcomes.
- **Equipment availability:** Not all healthcare facilities may have access to both technologies.

Future Research Directions

- **Long-term outcomes:** Further studies are needed to assess the durability of symptom relief and recurrence rates.
- **Cost-effectiveness analysis:** Evaluating the economic viability of microdebrider-coblation procedures compared to traditional techniques.
- **Patient-reported outcomes:** Research on postoperative quality of life, pain scores, and return-to-normal activities.

In the nasopharynx, Koltai et al [11]. reported that suction diather-

my is utilized to achieve hemostasis and that an angled microdebrider shaver blade could be employed under mirror viewing to enable total excision of the adenoid tissue. The primary drawbacks of the microdebrider are that it requires disposable equipment, which raises expenses, and that specimens obtained using power-assisted equipment are too damaged to yield the microscopic information required for histopathologic identification in suspected instances. It takes more experience to become proficient with the technique [19]. Due to its blind nature, conventional curettage may have consequences; the most frequent ones include damage to the pharyngeal muscles or eustachian tube aperture and inadequate removal [16,20]. Incomplete removal can cause peritubal blockage, hyperplasia of adenoid tissue remanant, and the formation of bacterial reservoirs. The technique of endoscopic aided microdebrider adenoidectomy was developed. Young children should have adenoidectomy that is straightforward to execute, takes little time during surgery, causes little blood loss, is reasonably priced, quickly relieves symptoms, and results in a complete adenoid excision free of problems.

Conclusion

An innovative surgical method called microdebrider-assisted coblation adenoidectomy removes adenoid tissue by combining the low-temperature ablation capabilities of coblation technology with the accuracy of a microdebrider. Reduced intraoperative bleeding, enhanced visibility, less heat damage, and less postoperative discomfort are just a few of the major benefits that this integrated approach offers over conventional techniques. These technologies work together to improve surgical accuracy, lessen trauma, and hasten recovery, making it a popular choice for children with sleep disorders and adenoid hypertrophy. Coblation adenoidectomy with microdebrider assistance is a minimally invasive, safe, and efficient substitute that enhances surgical results and patient satisfaction.

References

1. Gates GA, Muntz HR, Gaylis B. Adenoidectomy and otitis media. Ann Otol Rhinol Laryngol Suppl. 1992; 155:24–32.
2. Koca CF, Erdem T, Bayındır T. The effect of adenoid hypertrophy on maxillofacial development: an objective photographic analysis. J Otolaryngol Head Neck Surg. 2016; 45:48.
3. Yang L, Shan Y, Wang S, Cai C, Zhang H. Endoscopic assisted adenoidectomy versus conventional curettage adenoidectomy: a metaanalysis of randomized controlled trials. Springerplus. 2016; 5: 426.
4. Somani SS, Naik CS, Bangad SV. Endoscopic adenoidectomy with microdebrider. Indian J Otolaryngol Head Neck Surg. 2010; 62: 427–431.
5. Pagella F, Matti E, Colombo A, Giourgos G, Mira E. How we do it: a combined method of traditional curette and power-assisted endoscopic adenoidectomy. Acta Otolaryngol. 2009; 129:556–559.
6. Costantini F, Salamanca F, Amaina T, Zibordi F. Videoendoscopic adenoidectomy with microdebrider. Acta Otorhinolaryngol Ital. 2008; 28: 26–29.
7. Elnashar I, El-Anwar MV, Basha MW, AlShawadfy M. Objective assessment of endoscopy assisted adenoidectomy. Int J Pediatr Otorhinolaryngol. 2014; 78: 1239–1242.
8. Shin JJ, Hartnick CJ. Pediatric endoscopic transnasal adenoid ablation. Ann Otol Rhinol Laryngol. 2003; 112: 511–514.
9. Pagella F, Pusateri A, Matti E, Giourgos G. Transoral endonasal-controlled combined adenoidectomy (TECCA). Laryngoscope. 2010; 120: 2008–2010.
10. Stanislaw P Jr, Koltai PJ, Feustel P. Comparison of power assisted adenoidectomy vs adenoid curette adenoidectomy. Arch Otolaryngol Head Neck Surg. 2000; 126: 845–849.
11. Koltai PJ, Kalathia AS, Stanislaw P, Heras HA. Power assisted adenoidectomy. Arch Otolaryngol Head Neck Surg. 1997; 123: 685–688.
12. Heras HA, Koltai PJ. Safety of powered instrumentation for adenoidectomy. Int J Pediatr Otorhinolaryngol. 1998; 44: 149–153.
13. Koltai PJ, Chan J, Younes A. Power-assisted adenoidectomy: total and partial resection. Laryngoscope. 2002; 112: 29–31.
14. Juneja R, Meher R, Raj A, Rathore P, Wadhwa V, et al. Endoscopic assisted powered adenoidectomy versus conventional adenoidectomy—a randomized controlled trial. J Laryngol Otol. 2019; 133: 289–293.
15. Yanagisawa E, Weaver E. Endoscopic adenoidectomy with the microdebrider. Ear Nose Throat J. 1997; 76: 72–74.
16. Havas T, Lowinger D. Obstructive adenoid tissue: an indication for powered-shaver adenoidectomy. Arch Otolaryngol Head Neck Surg. 2002; 128: 789–791.
17. Glade RS, Pearson SE, Zalzal GH, Choi SS. Coblation adenotonsillectomy: an improvement over electrocautery technique? Otolaryngol Head Neck Surg. 2006; 134: 852–855.
18. Murray N, Fitzpatrick P, Guarisco JL. Powered partial adenoidectomy. Arch Otolaryngol Head Neck Surg. 2002; 128: 792–796.
19. Gillespie MB, Scarlett M, Ingram F, Hoy M. Value-based approach to power-assisted adenoidectomy. Ann Otol Rhinol Laryngol. 2003; 112: 606–610.
20. Cannon CR, Replogle WH, Schenk MP. Endoscopic assisted adenoidectomy. Otolaryngol Head Neck Surg. 1999; 121: 740–744.