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Original Research Article

Endoscopic microdebrider-assisted versus conventional curette adenoidectomy in paediatric adenoid hypertrophy: a randomized controlled study

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ABSTRACT

Background: To compare the clinical and endoscopic outcomes of endoscopic microdebrider-assisted adenoidectomy with conventional curette adenoidectomy in paediatric patients with symptomatic adenoid hypertrophy.
Methods: This prospective randomized controlled study was conducted in 50 children aged 5–15 years with symptomatic adenoid hypertrophy. Patients were randomly allocated into two groups of 25 each. Group A underwent endoscopic microdebrider-assisted adenoidectomy, whereas Group B underwent conventional curette adenoidectomy. Clinical symptoms, endoscopic adenoid grading, and nasal airway patency were assessed preoperatively and at postoperative days 15 and 30. Statistical analysis was performed using appropriate parametric and non-parametric tests, with $p<0.05$ considered statistically significant.
Results: Complete resolution of mouth breathing, snoring, recurrent upper respiratory tract infections, and otologic symptoms was observed in all patients undergoing microdebrider-assisted adenoidectomy, whereas residual symptoms persisted in the conventional curette group. Endoscopic evaluation demonstrated complete conversion to Grade I adenoid tissue in all patients in Group A, while residual Grade II hypertrophy was observed in 44% of patients in Group B. Mean nasal airway patency improved from 39% to 92% in the microdebrider group compared with 32% to 80% in the conventional group. Both groups showed statistically significant postoperative improvement ($p<0.05$), with significantly better outcomes in the microdebrider-assisted group.
Conclusions: Endoscopic microdebrider-assisted adenoidectomy provides superior symptomatic relief, greater improvement in nasal airway patency, and more complete removal of adenoid tissue than conventional curette adenoidectomy. The technique is safe, effective, and offers important clinical advantages in the surgical management of paediatric adenoid hypertrophy.

Keywords: Adenoidectomy, Adenoid hypertrophy, Endoscopy, Microdebrider, Airway obstruction, Child

INTRODUCTION

Adenoid hypertrophy is one of the most common causes of chronic upper airway obstruction in children and is frequently associated with mouth breathing, snoring, recurrent upper respiratory tract infections, recurrent otitis media, and sleep-disordered breathing. Persistent enlargement of the adenoids may adversely affect craniofacial growth, sleep quality, auditory function, speech development, and overall quality of life if left untreated.[1,2]

Adenoidectomy remains the standard surgical treatment for symptomatic adenoid hypertrophy that fails to respond

to conservative medical management. Conventional curette adenoidectomy has been widely practiced for decades because of its simplicity, short operative time, and low cost. However, as a blind procedure, it may result in incomplete removal of adenoid tissue, particularly around the choanae, torus tubarius, and Eustachian tube openings, leading to persistent symptoms, residual disease, and the potential need for revision surgery.[3-5]

Advances in endoscopic visualization and powered instrumentation have led to the development of endoscopic microdebrider-assisted adenoidectomy, which allows direct visualization of the nasopharynx and precise removal of hypertrophied adenoid tissue while preserving adjacent normal structures. Improved visualization facilitates more complete tissue clearance, enhances postoperative nasal airway patency, and reduces residual adenoid tissue compared with conventional curettage.[6-9]

Although several studies have reported favourable outcomes with endoscopic microdebrider-assisted adenoidectomy, evidence directly comparing its clinical and endoscopic outcomes with those of conventional curette adenoidectomy remains limited, particularly in resource-constrained healthcare settings where conventional techniques continue to predominate. [10,11] Therefore, the present study was undertaken to compare the clinical outcomes, endoscopic findings, and postoperative nasal airway patency following endoscopic microdebrider-assisted adenoidectomy and conventional curette adenoidectomy in paediatric patients with symptomatic adenoid hypertrophy.

METHODS

This prospective randomized controlled study was conducted in the Department of Otorhinolaryngology at Parbhani Medical College, R P Hospital & Research Institute, Parbhani, Maharashtra, India, from January 2025 to December 2025. Fifty paediatric patients aged 5-15 years with symptomatic adenoid hypertrophy were enrolled after obtaining written informed consent from their parents or legal guardians.

The inclusion criteria were children aged 5-15 years presenting with symptomatic adenoid hypertrophy, manifested by chronic mouth breathing, nasal obstruction, snoring, recurrent upper respiratory tract infections, or otologic symptoms, with adenoid hypertrophy confirmed by clinical and endoscopic evaluation, and whose parents or legal guardians provided written informed consent for participation in the study. Patients with obstructive sleep apnoea, craniofacial anomalies, cleft palate, sinonasal masses, previous adenoid surgery, coagulation disorders, or prior use of intranasal corticosteroids were excluded from the study.

All patients underwent preoperative nasal endoscopy for assessment of adenoid size, endoscopic grading, and percentage nasal airway patency. Patients were randomly allocated into two equal groups using a computer-generated random number sequence. Group A underwent endoscopic microdebrider-assisted adenoidectomy, whereas Group B underwent conventional curette adenoidectomy using the St Clair Thompson adenoid curette.

All procedures were performed under general anaesthesia. In Group A, adenoid tissue was removed under direct endoscopic visualization using a 120° microdebrider blade. In Group B, adenoidectomy was performed using the conventional blind curettage technique. Postoperative follow-up was carried out on the 15th and 30th postoperative days, during which clinical symptoms, endoscopic adenoid grading, and percentage nasal airway patency were assessed. Any intraoperative or postoperative complications were recorded.

Data were analysed using appropriate statistical methods. Continuous variables were expressed as mean ± standard deviation. Within-group comparisons of preoperative and postoperative continuous variables were performed using the paired Student's *t*-test, whereas comparisons between the two groups were performed using the unpaired Student's *t*-test. Categorical variables were expressed as frequencies and percentages and analysed using the chi-square test. A p value of <0.05 was considered statistically significant.

RESULTS

A total of 50 paediatric patients were included in the study, with 25 patients each in the microdebrider-assisted adenoidectomy group (Group A) and the conventional curette adenoidectomy group (Group B). The mean age was 10.44 years in Group A and 10.76 years in Group B. The study population comprised 28 (56%) males and 22 (44%) females, with comparable demographic characteristics between the two groups (Table 1).

Table 1: Baseline demographic characteristics of the study population.

Characteristic	Group A (Microdebrider) n=25	Group B (Conventional) n=25	P value
Mean age (years)	10.44	10.76	>0.05
Male, n (%)	14 (56)	14 (56)	>0.05
Female, n (%)	11 (44)	11 (44)	>0.05

Mouth breathing was the most common presenting symptom, followed by snoring, recurrent upper respiratory tract infections, and otologic complaints (Table 2). Representative preoperative endoscopic findings demonstrating Grade IV adenoid hypertrophy are shown in Figure 1.

Table 2: Preoperative clinical characteristics of the study population.

Clinical symptoms	Group A (n=25)	Group B (n=25)	P value
Mouth breathing	25(100%)	21 (84%)	0.107
Snoring	17 (68%)	20 (80%)	0.337
Recurrent upper respiratory tract infection	15 (60%)	15 (60%)	1.000
Acute suppurative otitis media	14 (56%)	12 (48%)	0.569
Adenoid facies	13 (52%)	14 (56%)	0.777

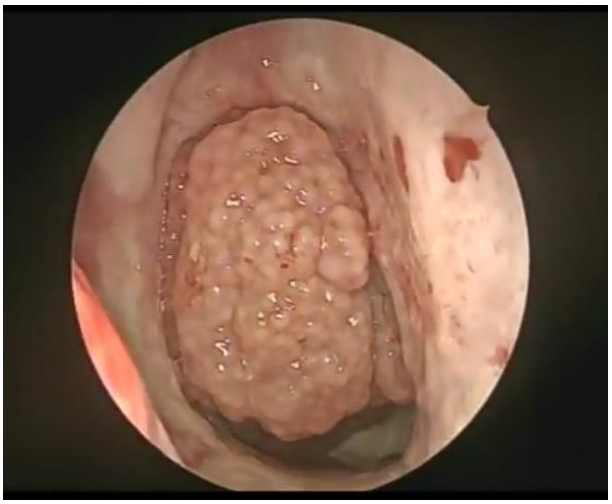

Figure 1: Preoperative nasal endoscopic view demonstrating Grade IV adenoid hypertrophy. Endoscopic image showing marked hypertrophy of the adenoid tissue causing near-complete obstruction of the posterior choanae prior to surgery.

By postoperative day 30, complete resolution of mouth breathing, snoring, recurrent upper respiratory tract infections, and acute suppurative otitis media was observed in all patients in Group A. In contrast, residual symptoms persisted in Group B, with 8 patients continuing to have mouth breathing, 7 having persistent snoring, 6 experiencing recurrent upper respiratory tract infections, and 9 having persistent otologic symptoms (Table 3). Preoperative endoscopic assessment demonstrated Grade II to Grade IV adenoid hypertrophy in both groups. All patients in Group A underwent endoscopic microdebrider-assisted adenoidectomy under direct visualization in Figure 2.

Postoperative nasal endoscopy demonstrated complete conversion to Grade I adenoid tissue in all patients in Group A, whereas residual Grade II hypertrophy persisted in 11 patients (44%) in Group B on postoperative day 30 (Table 4). A representative postoperative endoscopic appearance following complete microdebrider-assisted adenoidectomy is shown in Figure 3.

Table 3: Postoperative clinical outcomes at postoperative day 30.

Clinical symptoms	Group A (n=25)	Group B (n=25)	P value
Mouth breathing	0	8(32%)	0.002
Snoring	0	7(28%)	0.005
Recurrent upper respiratory tract infection	0	6(24%)	0.010
Acute suppurative otitis media	0	9(36%)	<0.001

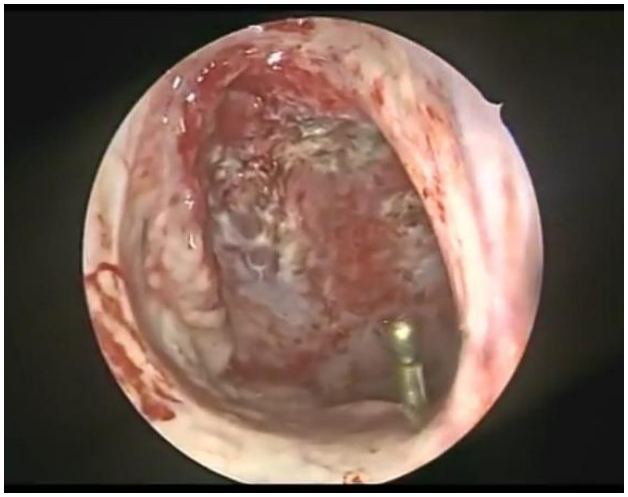

Figure 2: Endoscopic microdebrider-assisted adenoidectomy under direct visualization. Intraoperative endoscopic view demonstrating powered removal of hypertrophied adenoid tissue using a microdebrider under direct visualization, facilitating precise tissue excision while preserving surrounding nasopharyngeal structures.

Table 4: Endoscopic adenoid grading before and after surgery.

Endoscopic findings	Group A (n=25)	Group B (n=25)	P value
Preoperative Grade II–IV	25 (100%)	25 (100%)	1.000
Postoperative Grade I	25 (100%)	14 (56%)	<0.001
Postoperative Grade II	0	11 (44%)	<0.001

Figure 3: Postoperative endoscopic view following complete microdebrider-assisted adenoidectomy. Endoscopic image obtained after completion of adenoidectomy demonstrating complete clearance of adenoid tissue with restoration of a patent nasopharyngeal airway.

Mean nasal airway patency improved significantly in both groups following surgery. In Group A, the mean nasal airway patency increased from 39% preoperatively to 92% postoperatively, whereas in Group B it increased from 32% to 80%. The improvement in nasal airway patency was statistically significant in both groups ($p<0.05$) (Table 5).

Table 5: Comparison of nasal airway patency before and after surgery.

Nasal airway patency (%)	Group A	Group B
Preoperative mean	39	32
Postoperative mean	92	80
Mean improvement	53	48
Within-group p-value	<0.001	<0.001
Between-group p-value (postoperative)	-	0.021*

*Comparison of postoperative nasal airway patency between Groups A and B using the unpaired Student's t-test.

No major intraoperative or postoperative complications were observed in either group during the study period.

DISCUSSION

The present prospective randomized controlled study demonstrated that endoscopic microdebrider-assisted adenoidectomy resulted in better postoperative clinical and endoscopic outcomes than conventional curette adenoidectomy in children with symptomatic adenoid hypertrophy. Patients undergoing microdebrider-assisted surgery experienced complete resolution of mouth breathing, snoring, recurrent upper respiratory tract infections, and otologic symptoms by postoperative day 30.

Endoscopic assessment also demonstrated complete clearance of adenoid tissue in all patients in the microdebrider group, with significantly greater improvement in nasal airway patency compared with the conventional curettage group.

Conventional curette adenoidectomy remains one of the most widely performed procedures because of its simplicity, short operative time, and low cost. However, the procedure is performed without direct visualization, making complete removal of adenoid tissue around the choanae and Eustachian tube openings technically challenging. Residual adenoid tissue may contribute to persistent nasal obstruction, recurrent infections, and the need for revision surgery. In contrast, endoscopic microdebrider-assisted adenoidectomy enables direct visualization of the nasopharynx, allowing precise tissue excision while preserving surrounding structures.[12,13]

In the present study, all patients in the microdebrider group demonstrated complete postoperative resolution of the major presenting symptoms, whereas residual symptoms persisted in several patients treated with conventional curettage. These findings are consistent with those reported by Murray et al who demonstrated improved symptom relief and more complete adenoid removal with powered adenoidectomy compared with conventional techniques.[14] Similar observations have also been reported by Clemens et al, Finkelstein et al and Shin and Hartnick, who highlighted the advantages of endoscopic and powered techniques in achieving better visualization, more complete tissue clearance, and improved postoperative outcomes.[15-17]

Postoperative endoscopic examination demonstrated complete conversion to Grade I adenoid tissue in all patients in the microdebrider group, whereas residual Grade II hypertrophy remained in 44% of patients treated with conventional curettage. These findings support those of Cannon and Replogle, who reported that endoscopic-assisted adenoidectomy significantly reduces residual adenoid tissue by improving visualization of the nasopharynx during surgery.[13]

A recent systematic review by AlShatti et al further concluded that endoscopic techniques consistently achieve more complete adenoid removal and improved postoperative outcomes compared with conventional curettage.[10] Both surgical techniques resulted in significant improvement in nasal airway patency; however, the magnitude of improvement was greater following microdebrider-assisted adenoidectomy. Mean nasal airway patency increased from 39% to 92% in the microdebrider group compared with 32% to 80% in the conventional group. This greater improvement is likely attributable to more precise tissue resection under endoscopic guidance together with continuous suction

provided by the microdebrider, resulting in more effective clearance of the nasopharyngeal airway.[13,16,17]

No major intraoperative or postoperative complications were observed in either group, indicating that both procedures are safe when performed appropriately. Although microdebrider-assisted adenoidectomy requires specialised equipment and greater surgical expertise, the improved visualization and more complete tissue removal achieved with this technique may justify its use, particularly in patients with large adenoids or disease extending around the Eustachian tube openings. Previous studies have likewise demonstrated low complication rates and favourable safety profiles for powered endoscopic adenoidectomy.[18,19]

The present study has several strengths, including its prospective randomized design and the use of both clinical and endoscopic outcome measures to assess surgical success. However, certain limitations should be acknowledged. The study was conducted at a single centre with a relatively small sample size, and the follow-up period was limited to 30 days. Consequently, long-term recurrence rates, postoperative quality-of-life outcomes, and cost-effectiveness could not be evaluated. Larger multicentric studies with longer follow-up are warranted to confirm these findings and further define the long-term benefits of endoscopic microdebrider-assisted adenoidectomy.

CONCLUSION

Endoscopic microdebrider-assisted adenoidectomy is a safe and effective technique for the surgical management of symptomatic adenoid hypertrophy in children. In the present study, it was associated with greater postoperative symptomatic relief, improved nasal airway patency, and more complete endoscopic clearance of adenoid tissue compared with conventional curette adenoidectomy. Although both techniques were safe and effective, endoscopic microdebrider-assisted adenoidectomy demonstrated superior short-term clinical and endoscopic outcomes. Further multicentric studies with larger sample sizes and longer follow-up are recommended to evaluate long-term outcomes and recurrence rates.

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Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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