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A comparison of traditional curettage adenoidectomy vis-à-vis endoscopically assisted powered adenoidectomy

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ABSTRACT

Objective: This present article is a study with a view to compare the advantages and disadvantages of conventional adenoidectomy with that of endoscopic powered adenoidectomy with a microdebrider.

Methods: A prospective randomized study conducted at a tertiary care teaching hospital. Fifty patients with symptoms pertaining to chronic adenoid hypertrophy and requiring adenoidectomy were chosen and divided into 2 groups of 25 each. Patients in group A underwent conventional curettage adenoidectomy and those in group B underwent endoscopic microdebrieder method. Outcomes measured were intra operative blood loss, completeness of removal, postoperative pain, intra operative and post-operative complications and recurrence of symptoms.

Results: Mean intra-op blood loss was greater in conventional group. The powered procedure fared significantly better, with lower pain scores and more instances of complete tissue resection. Post op complications were found more in the conventional group.

Conclusion: Our study concluded that endoscopic assisted microdebrider adenoidectomy not only provides good visualization of the surgical field to the surgeon, but is also associated with a reduction in intra operative bleeding, post-operative pain as well as reduced incidence of recurrence of symptoms, have less chances of remnant adenoid tissues and provide a much more complete, sophisticated and morbidity free technique for performing adenoidectomy vis-à-vis the conventional blind procedure of adenoidectomy but is a more time consuming, expensive and technologically challenging procedure.

KEYWORDS- adenoidectomy, microdebrider, endoscopic adenoidectomy, powered adenoidectomy, microdebrider adenoidectomy

Introduction

Adenoids are lymphoid tissue situated within the nasopharynx and are a part of the internal Waldeyer's ring. Meyer initially portrayed it in the year 1868.[1,2] Adenoid hypertrophy, frequently associated with tonsillitis, is an extremely common condition found in the pediatric population, at times seen in adolescents and adults also. [3] Macleod Yearsley performed the first adenoidectomy in 1842.[4.]

The most popular technique used for adenoidectomy is the curette. However, this procedure carries a small but possible risk of complications such post-operative nasopharyngeal stenosis and damage to the eustachian tube opening. Another disadvantage is insufficient symptom eradication, which is also prevalent with the traditional curettage approach. [2,5] Over time, more advanced adenoidectomy techniques have developed to address the aforementioned drawbacks. The aim of adenoidectomy is complete adenoid removal, with minimal morbidity and quick recovery. In 1996, David S Parsons described the use of powered instruments in the pediatric population and explained the precision of the microdebrider system with minimal surgical time and blood loss. [6] Powered shavers or debrieders used under endoscopic visualization have made progress as an effective, precise, and thorough adenoid removal procedure.

We have undertaken this study with a view to compare the advantages and disadvantages of conventional adenoidectomy with that of endoscopic powered adenoidectomy with a microdebrider.

Materials and methods

The study was a prospective randomized study. The study was carried out from June 2020 to October 2022 on patients visiting the ENT department at a tertiary care teaching hospital . Fifty patients (4 to 30 years old) with chronic adenoid hypertrophy, who required adenoidectomy, were chosen. The selection included patients with symptoms of adenoid hypertrophy like nasal obstruction, snoring, aural fullness, reduced hearing, bilateral ear discharge and sleep disordered breathing and patients referred by orthodontists in view of pre-treatment adenoidectomy. Patients with all grades of adenoid hypertrophy were included. Patients with congenital

anomalies, submucosal cleft palate, sub-mucus cleft, significant septal deviations, nasal polyposis, choanal atresia, nasopharyngeal tumors ,patients with acute attack of tonsillitis, peritonsillar abscess were excluded. Children who were less than 4 years of age and patients with bleeding diathesis were also excluded from the study. Patients with comorbidities like diabetes mellitus, coagulopathies, renal disorders, cardiac disorders or other systemic ailments or cervical anomalies, any suspicion of lymphoma, patients with ASA status of III or more, or requiring revision adenoid surgery were also excluded from the study.

A sample size of fifty patients was planned. The patients attending the ENT OPD were allocated into two groups till the desired sample size was achieved using the randomization table obtained from the WINPEPI software. Before commencement of the study, the Institutional Ethics Committee's approval was taken. Each patient, or their parents or guardians, gave a written and informed consent. The patients were given information regarding the study's intents, procedures involved, merits and risks in a language they could comprehend.

Fifty patients in total, diagnosed to have adenoid hypertrophy were divided into two groups of 25 participants each utilizing a random numbers table. Adenoidectomy was performed on Group I using the traditional curettage method, and on Group II using the endoscopic aided microdebrider method.

The chosen patients were evaluated radiologically in the pre-operative period.

1.**X-ray soft tissue skull** was done in all cases and the grading was noted as per Fujioka et al's classification, which is as follows:

Grade 1- distance between maximal bulge of adenoid and soft palate is more than 6mm.

Grade 2- distance between maximal bulge of adenoid and soft palate is 3-6mm.

Grade 3 - distance between maximal bulge of adenoid and soft palate <3mm. [7]

2. **Pre-operative nasal endoscopic examination** was also conducted, either in the OPD in patients who permitted the same, or after induction under general anesthesia, prior to beginning the surgery. This preoperative grade was utilized for evaluation and was rated using the Clemens and McMurray scale. (Figure 1) It was assigned as follows:

GRADE ONE: Adenoid tissue inhabiting one third of the posterior choana's vertical height.

GRADE TWO: Adenoid tissue occupying two third of the posterior choana's vertical height

GRADE THREE: Adenoid tissue occupying two thirds to nearly all but not complete filling of the posterior choana.

GRADE FOUR: Absolute obstruction of posterior nasal choana. [8]

3. All **routine investigations** were done including: X-ray chest PA view, Electrocardiogram, Renal and Liver function tests. Serum Electrolytes and Proteins, Random blood sugar levels, Bleeding and clotting time and PT and INR

4. In patients with aural symptoms and larger grades of hypertrophy, an **Impedance audiometry** and / or **Pure Tone Audiometry** were done as deemed necessary.

The procedures were carried out under general anesthesia, with orotracheal intubation and a pharyngeal pack in situ. Patients were discharged on the 3rd postoperative day and followed up every week for a month, and then monthly for the next 3 months. Post-operative lateral neck

radiography and nasal endoscopy were conducted three months after surgery to evaluate for any residual adenoid tissue.

Under general anesthesia, a Boyle–Davis mouth gag with appropriately sized tongue blade was used to open the mouth. The adenoids were palpated to rule out and then medialized.

In the conventional method, the patient was laid in the Rose position. A St Clair Thompson adenoid curette of appropriate size was used to complete adenoid curettage, with no attempt to visualize the tissue. However, the nasopharynx was palpated to ensure adequate removal. Care was taken to avoid injury to the surrounding structures and the posterior pharyngeal wall. Roller gauze was kept in the nasopharynx to achieve homeostasis.

Endoscopic assisted powered adenoidectomy was carried out under vision using a 4mm or 2.7 mm diameter, 0-degree endoscope. Patients were placed in a supine position. The mouth was opened with Boyle–Davis mouth gag. 0-degree endoscope was inserted through the nasal cavity to visualize the adenoid tissue after decongesting the nasal cavities with 1:10 000 adrenaline xylocaine rinsed cotton pledgets. The microdebrider was utilized in the oscillating setting with concomitant saline irrigation to eliminate the adenoid tissues while the endoscope was inserted through the nostril. The working ends of the instruments were kept under constant visualization. Frequent suction and irrigation were employed for clear visualization. Saline irrigation and concomitant suction removed the shaved adenoid tissue and blood, providing a clear field. Hemostasis was achieved by placing a nasopharyngeal pack for 5 minutes. Blood loss was then determined as the difference between the amount of fluid that was strained and the amount of fluid that was previously utilized for irrigation. All soaked nasopharyngeal gauze packs were then added to this and total blood loss (in milliliters) was then noted.

OUTCOMES MEASURED for two groups were 1. Intra operative blood loss. 2. Completeness of removal (post-operative grade of adenoids) 3. Postoperative pain on the day or surgery as well as on third post-operative day. 4. Intra operative and post-operative complications. 5. Recurrence of symptoms.

The first parameter was intra-operative blood loss. Blood loss during the operation was measured by counting the number of pieces of four-inch gauze being used to pack the nasopharynx. It was considered that each piece of entirely soaked gauze corresponded to a loss of 10 milliliters of blood. Calculating the total intraoperative blood loss involved adding the blood in the suction apparatus to the blood in the gauze pieces and deducting the irrigation fluid that had been used.

Completeness of adenoid removal was second parameter. All participants were subjected to a rigid endoscopy prior to surgery and the adenoid hypertrophy was classified as per the Clemens & McMurray scale. Postoperatively, nasal endoscopy was done after resection just prior to extubation once haemostasis was achieved, and also once on 30th day. The grade of the remaining adenoid tissue if present, was noted.

The third parameter was post-operative pain, which was assessed using a visual analogue scale (where 0 = no pain and 10 = intolerable pain)

The fourth parameter intra operative and post-operative complications observed.

A) Intra-operative injury to surrounding structures i.e. torus tubarius of eustachian tube orifice ,injury to soft palate, injury to the posterior pharyngeal wall were noted under endoscopic visualization during the course of surgery.
B) Postoperative complications like hyper-nasal speech & velopharyngeal insufficiency. These were noted in the immediate post-operative recovery period and when patient came for follow up at 7th, 14th, 21st and 42nd post-operative days.

The last parameter was recurrence of symptoms. These were assessed in the follow up period at the third post-operative month or as and when patients reported with symptoms. The symptoms of persistence / recurrence included nasal obstruction, otitis media with effusion, chronic otitis media with perforation, persistent open mouth breathing and sleep disordered breathing.

The collected data were entered into and analyzed with Microsoft Excel® spreadsheet software, and statistically evaluated using SSPSS software version 24 was utilized. The T-test and the chi square test were used to measure the significance of the differences among both the groups. A P value of $P<0.05$ was considered as significant statistically.

Observations & Results

In group I, adenoidectomy was performed with conventional curettage method and in group II, adenoidectomy was performed using endoscopic assisted microdebrider method.
The majority of individuals were between the ages of 5 and 10 (66%) and 10 to 16 (34%) in the traditional and microdebrider groups, respectively (table 1).

Table 1: Distribution within the research groups, in terms of age:

Age Group (in years)	Conventional		Microdebrider		Chi Square	p value
	N=25	%	N=25	%		
5-10	18	72	15	60	13.97	0.17
10-16	7	28	10	40		

In this study, male and females comprised of 56%, 44% and 52%, 48% of the subjects in conventional and microdebrider group respectively. Gender distribution was comparable among the study group as $p>0.05$ (table 2).

Table 2: Distribution of gender among the research groups:

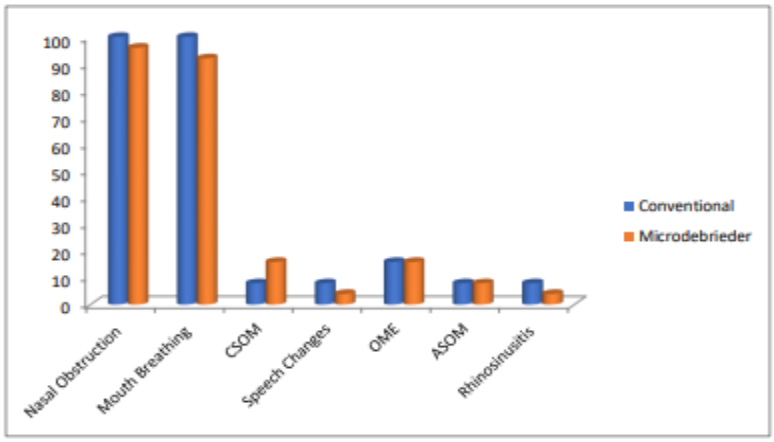
Gender	Conventional		Microdebrider		Chi Square	p value
	N=25	%	N=25	%		
Male	14	56	13	52	1.36	0.74
Female	11	44	12	48		

Table 3, graph 3 shows the indications for adenoidectomy among the study groups. The most commonly seen indication was nasal obstruction, followed by open mouth breathing.

ISSN 2515-8260 Volume 09, Issue 07, 2022

Table 3: Indications for adenoidectomy among the study groups

Indications	Conventional		Microdebrider		Chi Square	p value
	N=25	%	N=25	%		
Nasal Obstruction	25	100	24	96	0.59	0.81
Mouth Breathing	25	100	23	92		
CSOM	2	8	4	16		
Speech Changes	2	8	1	4		
OME	4	16	4	16		
ASOM	2	8	2	8		
Rhinosinusitis	2	8	1	4		

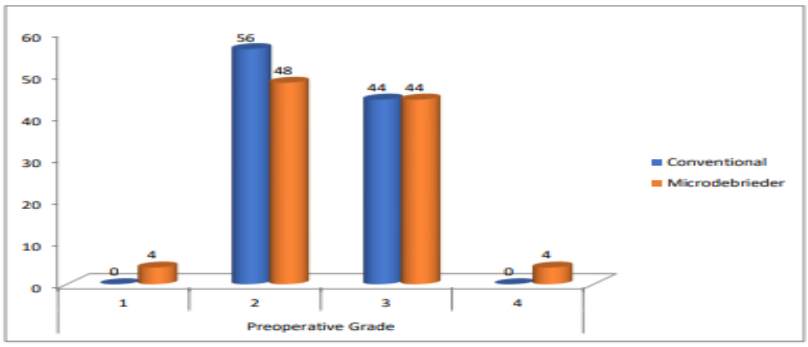


Graph 3: Indications for adenoidectomy among the study groups

In the conventional and microdebrider groups, preoperative adenoid tissue grades 2 and 3 were present in 56%, 44%, and 48% and 44% respectively, of the participants. In the microdebrider group, 4% of patients each had grades 1 and 4 recorded. The study groups' preoperative tissue grades were equivalent (p>0.05) (table 4, graph 4).

Table 4: Preoperative grade distribution among the study groups

Preoperative Grade	Conventional		Microdebrider		Chi Square	p value
	N=25	%	N=25	%		
1	0	0	1	4	2.15	0.54
2	14	56	12	48		
3	11	44	11	44		
4	0	0	1	4		



Graph 4: Preoperative grade distribution among the study groups

Additional procedure viz. grommet insertion and tonsillectomy was performed in 16% and 24% of the subjects in conventional group respectively, while the same was done in 16% and 28% of the subjects in microdebrider group respectively (table 5).

Table 5: Additional procedure among the study groups

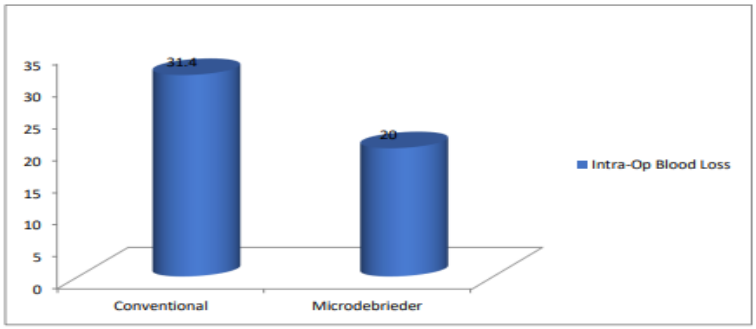
Additional Procedure	Conventional		Microdebrider		Chi Square	p value
	N=25	%	N=25	%		
Nil	15	60	14	56	0.11	0.95
Grommet Insertion	4	16	4	16		
Tonsillectomy	6	24	7	28		

Mean intra-op blood loss (in ml) was found to be more in the conventional adenoidectomy group (31) as compared to microdebrider group (20) with statistically significant difference when compared using t test (table 6, graph 6).

Table 6: Intra-op blood loss (in ml)

Group	Intra-Op Blood Loss (In ml)		t test	p value
	Mean	SD		
Conventional	31	4.88	3.17	0.026*
Microdebrider	20	3.77		

*: statistically significant



Graph 6: Intra-op blood loss (in ml)

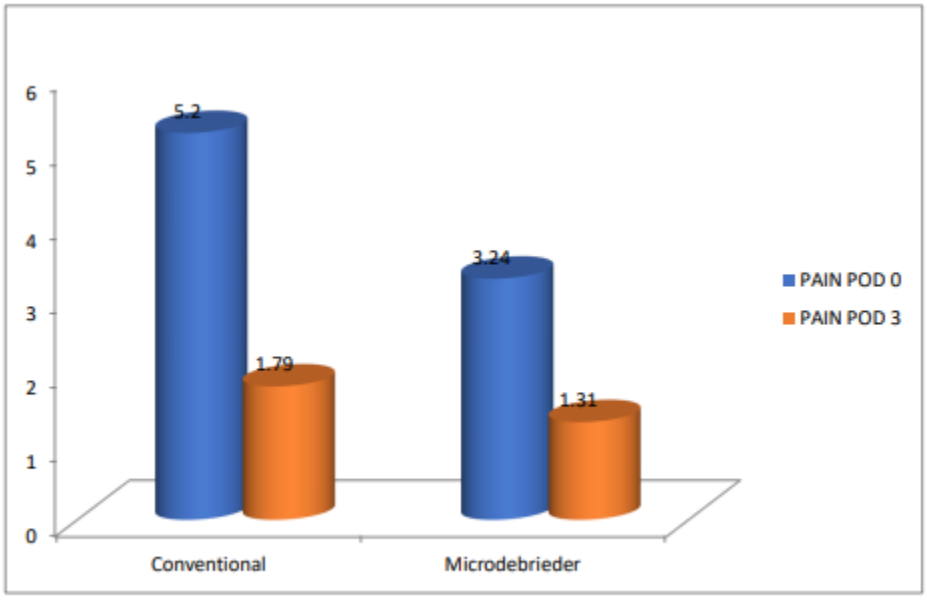
ISSN 2515-8260 Volume 09, Issue 07, 2022

Mean pain score was found to be more in the conventional group at all the intervals as compared to microdebrider group. When pain scores from the traditional and microdebrider groups were compared, a statistically significant distinction (p 0.05) was discovered (table 7, graph 7).

Table 7: Comparison of pain score at different intervals

Pain	Conventional		Microdebrider		t test	p value
	Mean	SD	Mean	SD		
POD 0	5.20	0.82	3.24	1.05	54.16	<0.01*
POD 3	1.79	0.68	1.31	0.58	2.99	0.043*

*: statistically significant



Graph 7: Comparison of pain score at different intervals

Post-operative residual tissue was reported more in conventional as compared to microdebrider group with statistically significant difference (p<0.011) (table 8, graph 8).

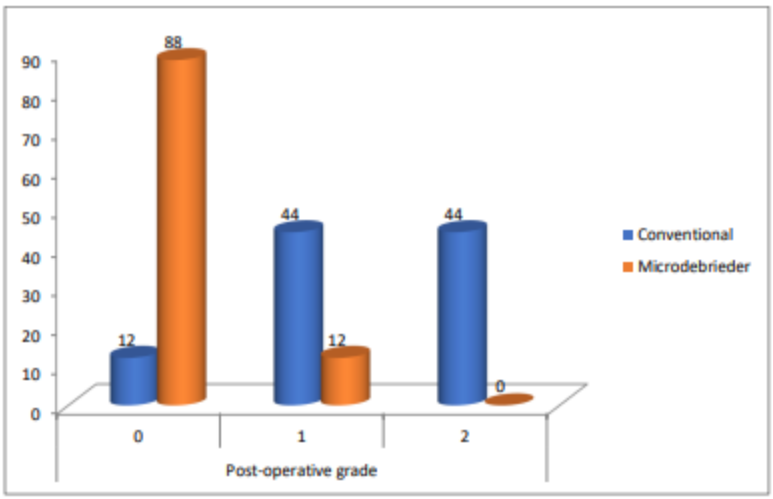
In the conventional adenoidectomy group ,there was 44% of post-operative grade 1 and 2 adenoid hypertrophy, whereas in the microdebrider group, there was only 12% grade 1 adenoid hypertrophy seen postoperatively.

Table 8: Post-operative residual grade distribution among the study groups

Post-operative Grade	Conventional		Microdebrider		Chi Square	p value
	N=25	%	N=25	%		
0	3	12	22	88	14.19	<0.01*
1	11	44	3	12		
2	11	44	0	0		

*: statistically significant

ISSN 2515-8260 Volume 09, Issue 07, 2022



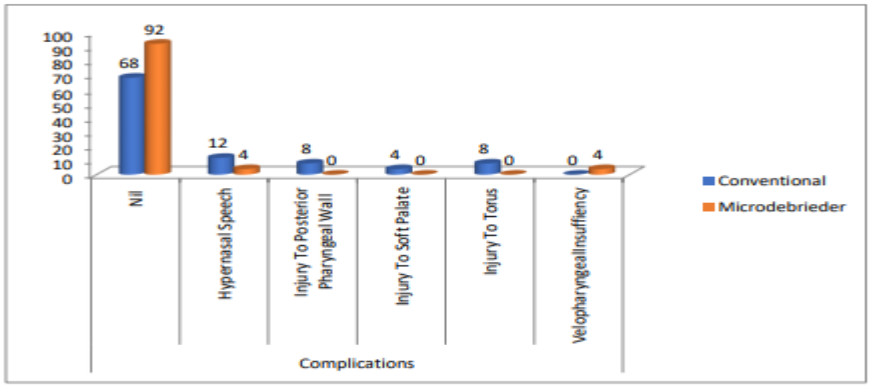
Graph 8: Post-operative grade distribution among the study groups

Injury to the posterior pharyngeal wall, injury to the soft palate, injury to the torus tubarius, and hyper-nasal speech were the most common intraoperative and postoperative complications, with a difference of $p<0.05$, which was significant statistically (table 9, graph 9). Transient velopharyngeal insufficiency was found to be more (4%) in the microdebrider group.

Table 9: Intra op & Post op complications among the study groups

Complications	Conventional		Microdebrider		Chi Square	p value
	N=25	%	N=25	%		
Nil	18	68	23	92	7.69	0.046*
Hyper-nasal Speech	3	12	1	4		
Injury To Posterior Pharyngeal Wall	2	8	0	0		
Injury To Soft Palate	1	4	0	0		
Injury To Torus	2	8	0	0		
Velopharyngeal Insufficiency	0	0	1	4		

*: statistically significant



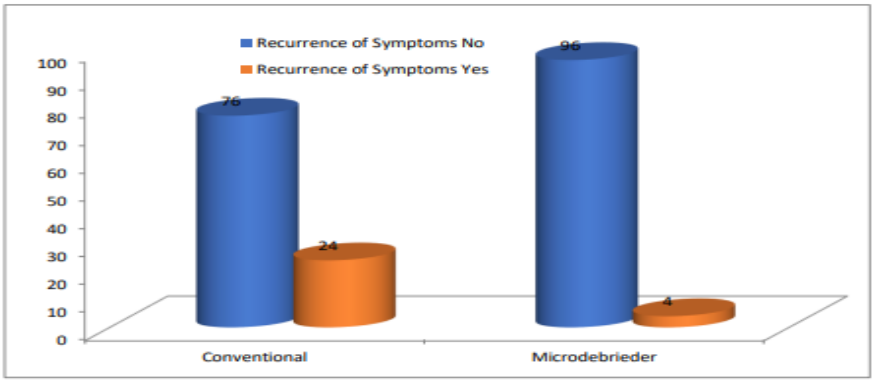
Graph 9:Intra op & Post op complications among the study groups

Recurrence of symptoms after three months of injury was revealed in 24% and 4% of the subjects in conventional and microdebrider group respectively. When recurrence of symptoms was compared between conventional and microdebrider group using chi square test, statistically significant difference was found (table 10, graph 10)

Table 10: Recurrence of symptoms (at three months)

Recurrence of Symptoms	Conventional		Microdebrider		Chi Square	p value
	N=25	%	N=25	%		
No	19	76	24	96	4.15	0.042*
Yes	6	24	1	4		

*: statistically significant



Graph 10: Recurrence of symptoms (at three months)

Discussion

In children, adenoid hypertrophy is frequent. Up to the age of six, the adenoid increases in size. Thereafter, it gradually atrophies until it vanishes entirely at the about the age of sixteen. Adult adenoid hypertrophy is uncommon. The most frequent indication of adenoidectomy i.e. adenoid hypertrophy, exhibits a modest male predominance. Most common indication was nasal obstruction followed by mouth breathing in this study. Vanika Anand et al also found this to be their study of 40 pediatric cases to the most common presentation of adenoid hypertrophy.[9] The reasons for undergoing surgery ranged, and both groups had a combination of indications. Adenotonsillectomy has been proven to be effective in treating children with sleep disordered breathing, and it is frequently indicated for the same**.**

Preoperative Grade of Adenoid Hypertrophy: In the conventional and microdebrider groups, 56%, 44%, and 48%, respectively, of the participants reported having preoperative grades 2 and 3. As $p>0.05$ in this study, preoperative tissue grade was equivalent between study groups.

Intra-Op Blood Loss (in ml): In the present study, mean intra-op blood loss (in ml) was found to be more in conventional group (30) as compared to microdebrider group (20) with statistically significant difference when compared using t test. Surgical time was not however, taken as a comparative parameter in the present study, as the surgery was performed by surgeons of different levels of expertise. Similar to this, *Atef Taha El-Bahrawy et al*. found that the endoscopic aided powered adenoidectomy group had just one patient (11.1%) compared to 4 patients (44.4%) in the conventional curettage method group who experienced greater intraoperative bleeding.[9] In contrast, *Wadia and Dabholkar* discovered that endoscopic procedures caused higher blood volume loss, while the distinction between the groups was not

significant.[10] This was also in line with the findings of *Juneja et al*, as they discovered that there was no discernible difference in the amount of blood loss between the two groups.[11]

Pain Score: Mean pain score was found to be more in conventional group at all the intervals as compared to microdebrider group. When pain scores from the traditional and microdebrider groups were compared, a distinction was discovered, which was significant statistically ($p<0.05$) Postoperative pain was much higher in the conventional curettage technique as opposed to the microdebrider technique, according to a 2019 study by *Singh, Padiyar, and Sharma*.[12] *Muniraju M et al*. reported in their study that there was no significant decrease in postoperative pain, perhaps as a result of the limited number of cases and how an isolated adenoidectomy results in less postoperative discomfort overall.[13]

Residual Tissue: In this study, post-operative residual tissue was reported more in conventional as compared to microdebrider group with statistically significant difference. In the study conducted by *Atef Taha El-Bahrawy et al* , in contrast to the endoscopic aided powered adenoidectomy group, which had none, the conventional curettage group was linked to postoperative remnant adenoid hypertrophy in three subjects (33.3%).[9] This corresponded to the findings of *Juneja et al*., study demonstrated that no subjects in the group undergoing endoscopic microdebrider aided adenoidectomy had any remaining adenoid tissue.[11] In the conventional adenoidectomy group, twenty-two subjects had remnant adenoids on x-ray (an adenoid to nasopharynx ratio of to 0.4 or less) and on endoscopy (eighty percent of them showed grade one residual adenoid tissue and eight percent , grade two residual adenoid tissue), with only three patients having less than 20% remnant tissue. The computed p-value was less than 0.005, which was noteworthy.

Intra Operative & Post-Operative Complications: Both intra operative as well as post-operative complications viz. hyper-nasal speech, injury to posterior pharyngeal wall, injury to soft palate and injury to torus was found more in conventional as to microdebrider group having a difference that was statistically significant at $p<0.05$. In their research work, *Lt Col R Datta et al*. have also shown that there were no injuries to the surrounding tissues in Group B (endoscopic microdebrider approach) compared to Group A (traditional curettage method) which showed collateral damage in three cases.[14]

Recurrence of Symptom: Recurrence of symptoms after three months of injury was revealed in 24% and 4% of the subjects in conventional and microdebrider group respectively statistically significant difference was found in this study. Similar findings were found in the study by *Atef Taha El-Bahrawy et al*.[9] In the endoscopic assisted powered adenoidectomy group, no residual pathology was discovered during follow-up at three months, according to *Singh et al*.[12] Thus, it was determined that the endoscopic approach had considerably lower likelihood of residual disease than the conventional technique

Limitations

The main limitation of microdebrider include high cost of the devise, the replacement cost of blades and technical expertise required . By this study we wish to establish the safety and efficacy of this procedure currently being routinely carried out at our institution.

CONCLUSION

From our study we could conclude that endoscopic assisted microdebrider adenoidectomy not only provides good visualization of the surgical field to the surgeon, but is also associated with a reduction in intra operative bleeding, post-operative pain as well as reduced incidence of recurrence of symptoms. Patients who undergo endoscopic assisted microdebrider adenoidectomy have less chances of remnant adenoid tissues being left behind in the nasopharynx. Endoscopic microdebrider assisted adenoidectomy is a more time consuming, expensive and technologically challenging procedure; however, in view of the significantly decreased morbidity, it is worth pursuing and ENT surgeons should be well versed in this technique. The microdebrider and endoscope together provide a much more complete, sophisticated and morbidity free technique for performing adenoidectomy vis-à-vis the conventional blind procedure of adenoidectomy.

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Figure 1. X-ray lateral skull demonstrating soft tissue shadow (adenoid hypertrophy) in nasopharynx

Figure 2. Patient positioning used for endoscopic assisted powered adenoidectomy- 0 degeree endoscope inserted intra-nasally, with microdebrider blade introduced trans-orally.

Figure 3. Intraoperative image of RAD 60 blade and adenoid mass visualized endoscopically in the nasopharynx.

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