Outcomes of Endoscopic guided adenoidectomy versus conventional adenoidectomy

Ezzat Mohamed Saleh, Hamza Elshafee Ahmed, Shimaa Ibrahem Mohammed

Department of Otorhinolaryngology, Faculty of Medicine, Assiut University, Assiut, Egypt

Corresponding to Shimaa Ibrahim Mohammed
Department of Otorhinolaryngology, Faculty of Medicine, Assiut University, Assiut, Egypt

E-mail: amerragab2020@yahoo.com
Mobile No.: 01285876066

Pan Arab Journal of Rhinology
2018, 8:76-82

Background: Adequate removal of obstructing adenoid tissue with conventional curettage adenoidectomy is achievable only in about two thirds of patients. The reason for that is the fact that it is a blind surgery to a far extent. The introduction of endoscopes and powered instruments in nasal surgery allowed better visualization and made precise disease control possible.

Aim: The aim of this study was to compare the outcome of curettage adenoidectomy –group A- and endoscopic guided adenoidectomy (curettage adenoidectomy assisted with sinuscopy-group B- and Shaver adenoidectomy –group C).

Patients and Methods: The study included 60 patients with enlarged adenoids justifying surgery. Patients were classified into 3 groups A,B, and C and were subjected to curettage adenoidectomy, curettage adenoidectomy assisted with sinuscopic removal of any remnants and shaver adenoidectomy respectively.

Results: Adenoid residue after surgery was significantly higher in group A than in group B and C. No significant difference was found between group B and C. Duration of surgery was significantly less in group A than group B and C. Group B was the longest. Blood loss was significantly less in group C than in group A and B. Complications were generally few and insignificant in the 3 groups.

Conclusion: Although curettage adenoidectomy is a fast surgery, it has a high incidence of residual disease which may require another surgery. Use of endoscope improved the visibility of the operative field. Any residual adenoid can be dealt with either with regular or powered instruments like the Shaver.

Keywords: Adenoidectomy, endoscopic guided techniques.

Pan Arab Journal of Rhinology 2018, 8:76-82

Introduction

Adenoids, a nasopharyngeal lymphoid tissue forming a part of Waldeyer'sring, was initially described in 1868 by Meyer. [1] Adenoidal hypertrophy during childhood may both fill the nasopharynx and extend through the posterior choanae into the nose, resulting in mouth breathing and rhinorrhea, sleep disordered breathing, speech anomalies, feeding difficulties, chronic sinusitis, otitis media with effusion (OME) and craniofacial growth anomalies. [2]

Dissatisfaction with the conventional adenoidectomy regarding poor visibility and inadequate adenoid tissue removal together with the marked developments in fiberoptics and endoscopic instrumentation, both led to the emergence of alternative methods of adenoidectomy including endoscopic guided and power assisted methods. [3]

Patients and Methods

This is a prospective randomized comparative study which was conducted in the Otolaryngology department Assiut University Hospital {AUH}from July 2015 to July 2017.

This study was approved by the institutional ethical committee.

The study included 60patients who came to the AUH outpatient clinic aged from (1-14) years with de-novo adenoid hypertrophy. The adenoid was both radiologically and endoscopically evident and was causing obstructive symptoms in the form of snoring with chronic mouth breathing, obstructive sleep apnea or sleep disturbances, craniofacial growth abnormalities like adenoid facies, inflammatory symptoms like OME and recurrent otitis media, recurrent sinusitis, chronic purulent rhinitis, nasopharyngitis, recurrent laryngitis and tracheobronchitis.

Patients with recurrent adenoids, submucous, overt or operated cleft palate, other nasopharyngeal masses, cervical spine abnormalities as in Down syndrome were excluded from the study. Patients with bleeding disorders or coagulopathy and those with markedly deviated nasal septum that may hind intra and postoperative endoscopy were also excluded.

Radiological grading of adenoid size was done to be compared with the endoscopic grading.

A written consent was obtained from each participant's parent prior to enrollment in the study. All patients were subjected to full ENT history taking and thorough clinical examination with full preoperative laboratory investigations.

Patients were randomly assigned into three matched groups. Group A patients underwent adenoidectomy using only adenoid curette (n=20), Group B patients underwent adenoidectomy using adenoid curette assisted with endoscopic guided instrumental removal of any remnants (n=20) and Group C patients underwent adenoidectomy using shaver (n=20).

Operative techniques

All procedures were performed under general anesthesia

using oro-trcheal tube and inhalation anesthesia. If there was associated chronic tonsillitis or OME adenoidectomy was done prior to tonsillectomy and myringotomy.

The nasal cavities were decongested using cotton pledges soaked in 4%lignocaine with 1:10,000 adrenaline. The theater setup and positioning were as for a standard functional endoscopic sinus surgery {ESS}.Intra operative assessment of adenoids was done using a 0°, 2.7 mm rigid telescope (Karl Storz_Endokope, Germany) before and after operation. Scopes with 4mm diameter were used in older children.

Clinical grading of adenoid size was done: [4]

- **Grade I:** Adenoid tissue filling one-third of the vertical portion of the choanae
- **Grade II:** Adenoid tissue filling up to two-thirds of the choanae.
- **Grade III:** From two-thirds to nearly complete obstruction of the choanae.
- **Grade IV:** Complete choanal obstruction.

In group A: The child was placed in the Rose position. A Boyle-Davis mouth gag was used to retract the tongue and lower jaw. The patient was covered with sterile drapes, and the palate was palpated to exclude a missed sub-mucosal cleft. The main bulk of the adenoid tissue was removed first using a suitable sized non-toothed adenoid curette. The nasopharynx was checked for remaining parts using digital palpation. Any detected residual adenoids were curetted using small sized adenoid curette. A gauze was left for few minutes in the nasopharynx for hemostasis. The nasal endoscope was then used to check the nose and nasopharynx for remaining parts, their site and size. The presence of trauma to the vomer or tubal cushion was checked. Other trauma to the oropharyngeal mucos or, soft palate was also reported.

In group B: As in group A, adenoidectomy was done using the adenoid curette after inserting the mouth gag in the Rose position with the neck extended. The main bulk of the adenoid tissue was removed first. The mouth gag was removed, and the theater setup and positioning were as for a standard ESS where the patient is supine, and the head of the table is elevated. The remaining parts of adenoids were identified using rigid telescope and removed under direct vision using Blakesley, Up-bitter or small through- cutting forceps.

In group C: Adenoidectomy was done entirely trans-nasally using the shaver (Karl Storz_Endoscope unidrive S III ENT, Germany). The theater setup and positioning was as for a standard ESS. The posterior choanae and nasopharynx was assessed using rigid endoscope. Under endoscopic vision, the shaver cannula was passed into the nose with the suction switched off to allow passage without trauma to the turbinates or the septum. The suction was then turned on and adenoidectomy was performed under constant endoscopic vision from proximal to distal with care not to lacerate the torus tubarius. The tissue was removed at the site of the oscillating blade only, and the blade was kept under vision all the time using the scope. Saline irrigation was used when required. The cutting and aspirating action of the shaver removed both adenoid tissue and blood, providing a clear view.

At the end of surgery, endoscopic evaluation for adenoid remnants and any complication were done.

The patient was transferred to the recovery room for observation of the general condition and any post-operative bleeding and then transferred to his or her room and discharged few hours after surgery.

The parents were advised to train their kids to close their mouth after surgery to overcome the habitual mouth breathing.

Comparison between the three groups was done as regard adenoid residue, operative time, amount of bleeding and complications

1. Adenoid remnants, if any, were detected using 0-degree naso endoscope after the procedure was finished. Any remnant was recorded in terms of site and size.
2. The operative time in minutes was recorded on a stop watch, starting from application of the mouth gag till its removal or till the beginning of another procedure like tonsillectomy or myringotomy.
3. The amount of blood loss was calculated from the difference between the amount of the collected fluid in the vacuum flask and the irrigating fluid used. We tried to use suction instead of cotton or gauze pack. When pack was used, it was washed in a container with a measured amount of saline and the suction was used to transfer the product of this washing to the vacuum flask.
4. Injury to the following structures was also recorded (tubal cartilage, pharyngeal muscles, Oropharyngeal mucosa, turbinates, nasal septum, choanal bony boundaries, uvula and vestibule of the nose).

Follow up

- Patients were asked to come back for Follow up at 2 weeks and 3 months after surgery. In each visit symptomatic and endoscopic assessment were done.
- The patient and his/her family members were asked for the presence of snoring, mouth breathing, speech changes (Hypernasality or Hyponasality).
- Endoscopic follow up for adenoid remnants was done at 2 weeks and 3 months for all patients using suitable rigid endoscope after decongesting and anesthetizing the nose.

Statistical analysis:

Statistical analysis was performed using SPSS 22.0 {Statistical Package for the Social Sciences}. Pearson chi-square test was used in analysis of the qualitative variables and the student –t test was used for the continuous variables.P value <0.05 was considered statistically significant.

Results

In this study, 60 children with adenoids were randomly assigned into three matched groups. There were 31 males (51.7%) and 29 females (48.3%) . The age of the patients ranged from 1 year to 14 years. The mean age was 6.14±3.76.The main complaint was nasal obstruction and snoring in 100% of patients, **Table 1**.

Table 1 Demographic data, diagnosis and complaint

	No.	%
Age (Mean±SD)		
Range	1 –14 years	
Mean±SD	6.14±3.76	
Sex		
Male	31	51.7
Female	29	48.3
Diagnosis		
Adenoids & chronic tonsillitis	29	48.4
Adenoids & bilateral OME	23	38.3
Adenoids	8	13.3
Complaint		
Nasal obstruction, snoring & recurrent upper respiratory tract infection.	29	48.4
Nasal obstruction, snoring & bilateral diminution of hearing	23	38.3
Nasal obstruction & snoring	8	13.3

Preoperative grading using plain X-ray soft tissue lateral view on nasopharynx and preoperative endoscopic grading showed a good correlation between both of them except in five patients (8.3%) who diagnosed by x-ray to have grade III adenoid enlargement but upgraded to grade IV by endoscopic grading. The difference between the two methods of grading is statistically insignificant, **Table 2**.

Table 2 Correlation between preoperative X-ray grading and preoperative endoscopic grading

No. of patients	X-ray			Preoperative Endoscopic grading			P. value
	II	III	IV	II	III	IV	
60	2	46	12	2	41	17	0.445

As regard adenoid residue immediately after adenoidectomy; the best group found was group (C) where there was no adenoid residue at all which is statistically significant. On the other hand group (A) was the worst one where all patients have postoperative adenoid remnants except one patient who had no adenoid remnants, **Table 3**.

The duration of operation was shortest in group (A) with mean duration (5.9±2.15 minutes) which is statistically significant followed by group (C) where mean duration was 17.65±5.22 minutes. The longest duration was in group (B) with mean duration 24.5±6.24minutes, **Table 3**.

As regard the amount of bleeding; it was found that group (C) was the least bloody operation. The mean blood loss was 20.5±5.6 cc which is statistically significant; on the other hand the blood loss of other two groups was nearly equal, **Table 3**.

Table 3 Comparison between the groups (A), (B) & (C) regarding adenoid residue, duration of operation and amount of bleeding

Group	Adenoid residue %	Duration of operation (minutes)	Amount of bleeding (CC)
A	32.25±18.32	5.9±2.15*	34.25±9.77
B	2.25±5.73	24.5±6.24	34.25±12.06
C	0±0*	17.65±5.22	20.5±5.6*
P. value	<0.001**	<0.001**	<0.001**

Only five patients (8.3%) had intraoperative complications, three of them had tubal cartilage injury, one had posterior oropharyngeal wall tear which was repaired with 2/0 silk by the end of the procedure. The last patient had injury of the right inferior turbinate and nasal septum. There was no postoperative reactionary or secondary hemorrhage, **Table 4**.

Table 4 Operative complications in the three groups

Group	No of patients	Operative complications
A	2 (10%)	Tubal cartilage injury
B	1 (5%)	Tubal cartilage injury
	1 (5%)	Posterior oropharyngeal wall tear
C	1 (5%)	Injury of the right inferior turbinate and nasal septum

There is no significant difference between the three groups regarding first and second endoscopic follow up. Twenty two patients had adenoid residue in the post-operative follow up 19 patients (86.4%) of them were found in group A. On the other hand, group C had the best results where only one patient had (grade I) adenoid residue in the second follow up, **Table 5**.

Table 5 First and Second endoscopic follow up

	First follow up (2Weeks)				Second follow up (3Months)			
Group	No adenoid residue	I	II	III	No adenoid residue	I	II	III
A	1 (5%)	11 (55%)	6 (30%)	2 (10%)	1 (5%)	11 (55%)	6 (30%)	2 (10%)
B	17 (85%)	3 (15%)	0 (0%)	0 (0%)	17 (85%)	3 (15%)	0 (0%)	0 (0%)
C	20 (100%)	0 (0%)	0 (0%)	0 (0%)	19 (95%)	1 (5%)	0 (0%)	0 (0%)

Three patients in the group A showed no improvement of snoring and mouth breathing which is insignificant statistically in the other two groups.

Only one patient in the study had speech problem in the form of hypernasality which was found only in the first follow up visit and disappeared in the second follow up visit, **Table 6**.

Table 6 First and Second symptomatic follow up

	Snoring		Mouth breathing		Speech problems	
Group	First follow up	Second follow up	First follow up	Second follow up	First follow up	Second follow up
A	3 (15%)	3 (15%)	3 (15%)	3 (15%)	0 (0%)	0 (0%)
B	0 (0%)	0(0%)	0(0%)	0(0%)	1(5%) hypernasality	0 (0%)
C	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
P. value	0.043*	0.043*	0.043*	0.043*	0.362	-

Discussion

This study included 60 children with adenoids. The age of these patients ranged from 1 to 14 years with a mean of 6.4±3.6. Both sexes were equally distributed. There was no sex difference in our, or other studies. [5-7] The main complain of patients with adenoid hypertrophy was nasal obstruction and snoring. It is present in all patients. **Table 1.**

Pre-operative X-ray soft tissue lateral view to the nasopharynx used to be the standard modality of investigation to diagnose adenoids when symptoms point to adenoid hypertrophy. Grading the adenoid size with X-ray correlated well with grading using pre-operative endoscopic evaluation. In this study there was no significant difference between these 2 ways of investigation – **Table 2**. This raises the question of the need for X-ray with its inherited hazards of radiation when endoscopic evaluation is possible. In their study in India Kurien et al found good agreement between the findings of X-ray and endoscopic examination of the nasopharynx. [8]

This study showed that about two thirds of the total number of patients-38 patients-had no residual adenoids after surgery. Twenty two patients had some residue 19 of them were found in group A, **(Fig 1)**. The other three patients were found in group B. Our results showed that the adenoid residue immediately after surgery was significantly higher in group A than in group B and C -with the mean percentage of choanal obstruction in group A of 32.25±18.32-. The best results were found in group C where there was no adenoid residue immediately after surgery. This result was statistically significant **Table 3**.

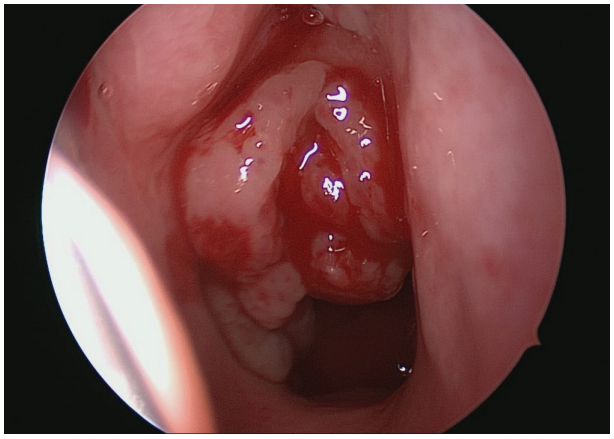

Fig 1 Immediate post operative endoscopic evaluation after curettage adenoidectomy showing adenoid residue

Forty percent of group A patients had grade 2 or 3 adenoid residue after surgery. Havas T and Lowinger D [9-11] in 2002 reported residual obstructive adenoids in 39% of traditional adenoidectomy and Zero % residue when power shaver was used.. This is quite logic to everyone, because in this blind surgery and using the hard metal curette, the movement of curettage cannot perfectly meet the concavity and convexity and angulations of an organ with complex anatomy like the nasopharynx. Also, the choanal and intranasal extensions of adenoids are impossible to clean without direct vision. No significant difference was found between group B and C because surgery in both of them was done under direct vision. Abdelhamid M et al [12] in a recent Egyptian study found that the rate of adenoid recurrence 6 months after the primary surgery to be 4times in the conventional adenoids than those done under direct endoscopic evaluation-36% Vs 8%.

The amount of blood loss was least in group C. It was around 20 CC of blood in this group. This was about 40% less than group A and B in which blood loss was around 35 CC, **Table 3**. This difference is highly significant. In group A and B the multiple passes of the hard dull curette to remove the adenoids and the often incomplete removal of adenoids together with the frequently seen injuries to the near-by structures like the muscle layer of the pharynx, the posterior septum, the tubal cushion or even the palate and posterior pharyngeal wall all contribute to this large amount of blood loss. On the other hand, the oscillating cutting action of the microdebrider drawing the loose tissue of adenoids into the window helps to remove the tissue fast down to the less vascular fascial plane with subsequently less blood loss. [13]

The duration of surgery in our study showed a wide variation between the 3 groups. The shortest duration was found in the curettage adenoidectomy with a mean time around 6 minutes and the longest one was the curettage adenoidectomy assisted with endoscopic instrumental removal of the residual adenoids- group B-. The time in this method was roughly 4 times longer. In the midway between the previous methods came the shaver method. The difference between the 3 groups here was highly significant, **Table 3**. The reasons for longer duration in group B were in fact many ones. The time needed for changing the position of the patient and the position of the table to suit the type of surgery was one reason. Other reasons are the time to remove oral-cavity set of surgery and bring the ESS set and adjusting the camera and monitor for that. In their study Songu M, et al [14] found that the operative time of curettage adenoidectomy was around 7 minutes and with endoscopic guidance to be around double that time. Somani SS, et al [13] in their shaver-only adenoidectomy- reported about 12 minutes for adenoidectomy. Stanislaw P et al [11] reported shorter time - about 10 minutes- to complete adenoidectomy with the shaver. This time is even shorter than the curettage adenoidectomy. This is a shorter time than ours. We do believe that the more time a surgeon trains with these power assisted tools the shorter the time a surgeon requires to perform any surgery and it was not until very recent when we started to use the shaver in adenoidectomy. In this study the longer time in shaver group was attributed to some difficulties like introduction of the microdebrider tip into the nasopharynx with the telescope in the same side of the nose.

Complications noticed in adenoid surgery are typically

few, and usually not dangerous. In our series complications occurred in five children (8.3 %). There were 3 cases of tubal cartilage injury<0.5 cm, one case of posterior oropharyngeal wall tear and one case of inferior turbinate and septal mucosal tear. All cases of tubal cartilage injury were with the use of curette -group A and B-. Late follow up for these patients at 3 months showed no consequences on the middle ear or hearing. The single case with oropharyngeal wall tear was repaired immediately using 2/0 silk suture and in the early follow up the stitches were not there and the posterior oropharyngeal wall looked normal, **Fig 2**. The multiple in and out action with the endoscope caused tear in the inferior turbinate and opposite septal mucosa in one patient in group C. Late follow up showed some synechiae between the septum and the inferior turbinate in that patient. **Table 4**.

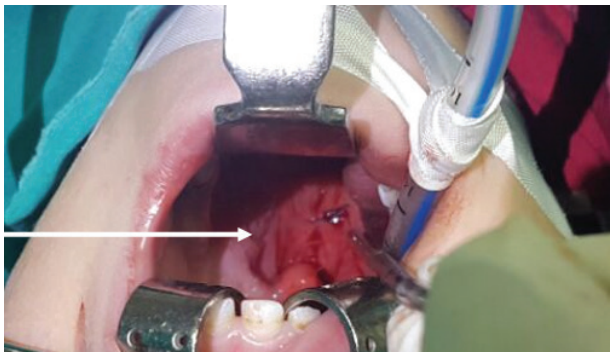

Fig 2 Posterior oropharyngeal wall tear after CA which was repaired

Findings in the first and second endoscopic follow up for all patients showed no significant differences in terms of number of patients with adenoid residue, and its grade. This means that the result of surgery was stable at least for the following 3 months after surgery **Table 5**.

First and second symptomatic follow up were almost identical in terms of snoring, mouth breathing, and speech problems. Three patients in group A showed no improvement in their snoring or mouth breathing. This correlated with the 2 cases with post-operative grade 3 adenoids{endoscopic follow-up} and one case of those with grade 2. Also there was a case with post-operative speech problem in the form of temporary hypernasality that noticed in the first follow up and disappeared in the second follow up, **Table 6**. Somani SS, et al [13] reported transient hypernasality in more than 13% of their shaver adenoidectomy.

Conclusion

- Preoperative endoscopic examination of the nasopharynx correlates well with plain x-ray without the potential hazards of exposure to radiation in young age and extra-cost.
- Although the conventional curettage adenoidectomy is a fast procedure it is less effective in controlling the obstructive symptoms and more likely to leave the patient with residual disease. It also carries a higher risk of intra-operative blood loss and tubal cartilage injury.
- Shaver adenoidectomy carries the benefits of direct vision of adenoid tissue, less blood loss, less complications and a relatively rapid surgery, but the technique is expensive and the shaver is not available in all centers. Training with the shaver is mandatory to minimize time and complications.
- Adding the endoscope to the field by the end of curettage adenoidectomy and removing any residual adenoid tissue improves the outcome and could replace shaver adenoidectomy in developing countries with poor economy.

Financial support and sponsorship
Nil.

Conflicts of interest
There are no conflicts of interest

References

1. Thornval A. Wilhelm meyer and the adenoids. Archives of Otolaryngology. 1969;90:383-6.

2. Wang D, Clement P, Kaufman L, Derde M. Chronic nasal obstruction in children. A fiberscopic study. Rhinology. 1995;33:4-6.

3. Parsons DS. Rhinologic uses of powered instrumentation in children beyond sinus surgery. Otolaryngologic clinics of North America. 1996;29:105-14.

4. Clemens J, McMurray JS, Willging JP. Electrocautery versus curette adenoidectomy: comparison of postoperative results. International journal of pediatric otorhinolaryngology. 1998;43:115-22.

5. Acar B, Karabulut H, Babademez MA, Genc S, Karaşen RM. Is the Traditional Treatment Approach Adequate in Children with Adenoid Hypertrophy? Turkish Journal of Medical Sciences. 2009;39:97-100.

6. Lesinskas E, Drigotas M. The incidence of adenoidal regrowth after adenoidectomy and its effect on persistent nasal symptoms. European Archives of Oto-Rhino-Laryngology. 2009;266:469-73.

7. Öztürk Ö, Polat Ş. Comparison of Transoral Power-Assisted Endoscopic Adenoidectomy to Curettage Adenoidectomy. Advances in Therapy. 2012;29:708-21.

8. Kurien M, Lepcha A, Mathew J, Ali A, Jeyaseelan L. X-Rays in the evaluation of adenoid hypertrophy: It's role in the endoscopic era. Indian journal of otolaryngology and head and neck surgery. 2005;57:45-7.

9. Havas T, Lowinger D. Obstructive adenoid tissue: an indication for powered-shaver adenoidectomy. Archives of Otolaryngology–Head & Neck Surgery.

2002;128:789-91.

10. Rodriguez K, Murray N, Guarisco JL. Power-Assisted Partial Adenoidectomy. The Laryngoscope. 2002;112:26-8.

11. Stanislaw P, Koltai PJ, Feustel PJ. Comparison of power-assisted adenoidectomy vs adenoid curette adenoidectomy. Archives of Otolaryngology–Head & Neck Surgery. 2000;126:845-9.

12. Abdelhamid M, Dewidar H, Nassar A, Eltelety A. The value of endoscopic examination at the end of conventional adenoidectomy. The Egyptian Journal of Otolaryngology. 2017;33:24-30.

13. Somani SS, Naik CS, Bangad SV. Endoscopic Adenoidectomy with Microdebrider. Indian Journal of Otolaryngology and Head & Neck Surgery. 2010;62:427-31.

14. Songu M, Altay C, Adibelli ZH, Adibelli H. Endoscopic-assisted versus curettage adenoidectomy: a prospective, randomized, double-blind study with objective outcome measures. Laryngoscope. 2010;120:1895-9.