Correlation Between Preoperative Adenoid Grading and Intraoperative Findings

Original Article

Ali Abd Allah Abd Alrahman, Ahmed Yousef Hassan Yousef, Ahmed Nabil Elsamanody

Department of Otorhinolaryngology, Al-Azhar University Hospitals, Al-Azhar University, Cairo, Egypt.

ABSTRACT

Introduction: Adenoid hypertrophy is one of the most common causes of nasal obstruction especially in children. Adenoid size could be different comparing preoperative radiological size with the intraoperative findings.

Aim and objectives: The purpose of this prospective study was to evaluate and compare between preoperative radiologic grading techniques and intraoperative endoscopic findings.

Patients and Methods: 60 patients with symptomatic adenoid hypertrophy such as; nasal obstruction, snoring, mouth breathing and bilateral recurrent otitis media with effusion were randomly included in this study. All patients had adenoidectomy and was diagnosed by x-ray nasopharynx and flexible nasopharyngoscopy. Patients were scheduled for follow-up visit after one week and one month for clinical assessment of any remnant.

Results: The mean age of these patients is 8.1 with female predominance (60%). There is correlation detected between the preoperative Xray grading of adenoid tissue and the endoscopic view done by the flexible nasopharyngoscopy. This could be occurred due to cases with mild or moderate sized adenoid tissues appeared larger sized adenoid hypertrophy. This could be explained that the endoscopy has magnification power that show larger size of detected adenoid mass.

Conclusion: Adenoid enlargement especially in children is one of most common causes of nasal blockade. Preoperative lateral airway radiograph and intraoperative flexible endoscopic nasopharyngoscopy showed significant correlation in detecting adenoid size.

Key Words: Adenoid Hypertrophy, nasopharyngoscopy, Xray neck.

Received: 26 December 2021, **Accepted:** 26 April 2022

Corresponding Author: Ahmed Nabil El-Samnody, MD, Department of Otorhinolaryngology, El-Hussein University Hospital, Al-Azhar University, Cairo, Egypt, **Tel.:** 01015208353, **E-mail**: ansamnody@hotmail.com

ISSN: 2090-0740, 2022

INTRODUCTION

Adenoidal can be presented in one of the following manifestations as snoring, nasal obstruction plus discharge, mouth breathing, sleep apnea, and hyponasal speech[1].

Rhinosinusitis and repeated otitis media with effusion are main complication related to adenoid hypertrophy especially in children. There are many forms of adenoidectomy which considered as one of most needed surgical interference implicated in children[2,3].

Adenoid enlargement could mainly be diagnosed by history and clinical examination. Clinical assessment of adenoid hypertrophy includes mouth breathing, hyponasal speech, sleep apnea, snoring, rhinorrhea, nasal congestion, adenoid facies and chronic or recurrent otitis media[4].

The inaccuracy of patient history reported by some parents and difficulties in approaching young children are examples of subjective drawbacks in the process of clinical decision making[5].

The majority of the research data indicates that nasopharyngeal radiography by lateral neck X-ray is more useful and diagnostic for the size of the adenoid. Consequently, it is a more objective assessment method for adenoid hypertrophy than clinical assessment. However, interpretation of the PNS radiograph can also be quite subjective and vary from one radiologist to another. Several methods to objectively assess and standardize interpretation of these radiographs have been developed[6].

The two most common radiographic assessment methods are: 1) The adenoid nasopharyngeal ratio: Developed by Fujioka *et al*[7]. 2) The air column soft palate ratio: Developed by Cohen *et al*[7,8].

Video fluoroscopy is one of the alternative diagnostic methods of adenoid assessment. This is implicated in many studies that aimed to reduce the risk of radiation exposure[9].

Nasopharyngoscopy has many advantages that it gives the surgeon direct view to the adenoid and nasopharynx without any radiation exposure[10].

 DOI: 10.21608/ejentas.2022.113064.1453

The purpose of this prospective study was to evaluate and compare between preoperative radiologic grading techniques and intraoperative endoscopic findings.

PATIENTS AND METHODS:

60 patients with symptomatic adenoid hypertrophy such as; nasal obstruction, snoring, mouth breathing and bilateral recurrent otitis media with effusion were randomly included in this study. Patients having significant nasal obstruction due to other causes were excluded such as: allergic rhinitis, septal deviation, hypertrophied inferior turbinate or sinonasal polyps. Patients with congenital nasal or maxillofacial anomalies were also excluded such as cleft lip and palate, choanal atresia, retrognathia or macrognathia. Detailed history taking and clinical examination was done to all patients. Radiological evaluation of the adenoid by X-ray lateral view on the nasopharynx was done according to Fujioka *et al*. in (Table 1)[7].

Table 1: Radiologic Adenoid grading system

Grade	Soft tissue shadow (%)	adenoid hypertrophy
1	0-50	Mild
2	50-75	Moderate
3	75-100	Severe

Endoscopic nasal and nasopharyngeal examination and assessment and grading of the adenoid will be done for all cases using pediatric flexible nasopharyngoscopy after use of local nasal decongestant and anesthesia for 5 minutes prior to the procedure. The sheet in (Table 2) according to Gray 2011 was used to assess adenoid size[11].

Table 2: Endoscopic grading of adenoid tissue

Size	Adenoid tissue
0	No tissue
1	1-25%
2	26-50%
3	51-75%
4	76-100%
Grade of choanal obstruction	
A	No obstruction
B	Partial obstruction
C	Complete obstruction
Eustachian tube (ET)	
-	Not abutting ET or Rosenmeller’s fossa
+	abutting ET or Rosenmeller’s fossa

Adenoid Volume: Adenoid size was determined by subjectively evaluating the volume of tissue filling the nasopharynx. These would include tissue volumes filling the nasopharynx of 0%, 1% to 25%, 26% to 50%, 51% to 75%, and 76% to 100%. The 0% volume would indicate no adenoid tissue from previous adenoidectomy. The above volume is denoted a score of 0, 1, 2, 3, and 4, respectively.

Choanal Obstruction: Relationship and impingement or obstruction of the choanae was next evaluated. This is given a letter grade of either 1, 2, or 3 indicating no obstruction, partial obstruction, or complete obstruction, respectively. Adenoid tissue not completely obstructing the visualization of the choanae, yet migrating beyond the choanae into the posterior nasal cavity, is also designated a score of c.

Eustachian Tube: The last relationship that was determined was the relationship of the tissue to the eustachian tube. This was given a score of (+) or (−). Adenoid tissue abutting the eustachian tube, peri-tubal tissue, or within Rosenmüller's fossa was scored (+). Tissue free and clear of the eustachian tube was designated a (−).

Scoring: Once each relationship was designated a score, the three scores were placed together to give an adenoid grade or designation. For instance, an adenoid that was completely filling the nasopharynx, completely obstructing the choanae, and abutting the eustachian tube would be given a score of 4c+. Another good example would be a revision adenoidectomy that only had 25% volume, was not obstructing the eustachian tube but was completely obstructing the choanae, and hence the persistent nasal obstruction would receive a grade of 1c−. This accurately describes to the interpreter the tissue pathology and area of concern.

All patients underwent adenoidectomy under general anesthesia using adenoid curette (cold technique). Intraoperative endoscopic nasal examination post adenoidectomy was done to evaluate the presence of adenoid remanent and to control bleeding. Patients were recorded for operative time, operative and post-operative complications. Pediatric flexible nasopharyngoscopy were done for all patients 6 months postoperatively for re-assessment of the nose and nasopharynx. Informed written consent were obtained from all patients.

Statistical Methods:

Descriptive statistics included the mean value and standard deviation. The Anova test was used for the analysis of the correlation between data. The SPSS 22.0 program was used for statistical analysis. So, the p-value was considered significant as the following: Probability (*P-value*): *P-value 0.05* was considered insignificant.

RESULTS:

The mean age of these patients is 8.1 with female predominance (60%). There are many clinical manifestations as nasal obstruction (100%), mouth breathing (45%), Snoring (40%), Adenoid facies (20%), obstructive sleep apnea (15%), hypo nasality (25%), and bilateral OME as shown in (Table 3).

Table 3: Demographic data

Variables		Results
Age (Mean ±SD)		8.1 ±3
Sex		
-	Male	40%
-	Female	60%
Clinical manifestations		
-	Nasal obstruction	100%
-	Mouth breathing	45%
-	Snoring	40%
-	Adenoid facies	20%
-	OSA	15%
-	Hypo nasality	25%
-	Bilat. OME	5%

By X-ray grading, there are 22 patients had grade 1 adenoid hypertrophy, 30 patients had grade 2 adenoid hypertrophy, and 8 patients had grade 3 adenoid hypertrophy (Table 4).

Table 4: X-Ray grading

Grading	Total no. = 60		
	Mild	Moderate	Severe
G 1	22	-	-
G 2	-	30	-
G 3	-	-	8

By endoscopic grading, there are 14 patients had grade G1(A)-ve adenoid hypertrophy, 15 patients had grade G2(A)-ve adenoid hypertrophy, 12 patients had G3(A)-ve adenoid hypertrophy, 6 patients had G3(B)-ve adenoid hypertrophy, 6 patients had G4(B)-ve adenoid hypertrophy and 7 patients had grade G4(C)+ve adenoid hypertrophy as shown in (Table 5).

Table 5: Endoscopic grading

Grading	Total no. = 60		
	A	B	C
G 1 -ve	14	-	-
G 1 +ve	-	-	-
G 2 -ve	15	-	-
G 2 +ve	-	-	-
G 3 -ve	12	6	-
G 3 +ve	-	-	-
G 4 -ve		6	-
G 4 +ve		-	7

There is significant correlation detected between the preoperative Xray grading of adenoid tissue and the endoscopic view done by the flexible nasopharyngoscopy (Table 6). This correlation wasn't affected by detection of smaller sizes of adenoid tissues by radiological assessment as larger grades by endoscopic assessment. The flexible nasopharyngoscopy is a dynamic procedure but not the x-ray, I mean the flexible results may be affected by the phase of breathing or crying which will change the position of the palate, while in x-ray, we get a still image that could change according to the breathing or swallowing.

Table 6: Correlation of adenoid grading by endoscopy and Xray

Grading Endoscopic / X-ray	1	2	3	4	Anova test (*P-value*)
1	14	5	3	0	26.762 (*0.001*> S)
2	0	10	11	9	
3	0	0	4	4	

DISCUSSION

Nasal obstruction is caused mainly by enlarged adenoid tissue occluding the nasopharynx especially in children. It could be accompanied with snoring or sleep apnea[12].

There are many forms of adenoidectomy studied among children. It is challenging to determine the size of the adenoid due to its narrow localization behind the nasal cavity and the soft palate. Many techniques studied to enable the surgeon preoperatively to detect the actual size of the adenoids. However, of these different techniques the lateral nasopharyngeal X-ray is considered the most available and cheap method for evaluation and screening of the adenoid tissue in children[7].

Multiple methods of interpreting films have been devised, including the Fujioka method which implicated to detect the degree of affection of the adenoid tissue on the air column from the nose to the oropharynx. In addition, in their systematic review of neck X-rays and their relation to the adenoid, Major *et al*. conclude that the subjective ranking of a professional appears to be reliable in lateral neck X-ray evaluation. A disadvantage of this modality, however, is the exposure of the child to radiation. Nasal endoscopy has also been used with good success in diagnosis of adenoid hypertrophy, as it provides a direct view of the adenoid. However, endoscopic nasopharyngoscopy still is prone to subjectivity and poor inter-rater reliability. In addition, endoscopic nasopharyngoscopy may be difficult to perform in younger children, sometimes even requiring sedation for the procedure[13].

As there is no consensus on a true, universal standard of adenoid size assessment in the literature, we have selected the percent blockage of the choana by the adenoid pad. Intra-operative mirror nasopharyngoscopy is supported in the literature as correlating strongly with volume of adenoid tissue and endoscopic nasopharyngoscopy[14].

In addition, this was also the only examination that could be done easily with the entire study population, especially with the younger children who do not generally tolerate endoscopic nasopharyngoscopy while awake. Although the exam can be extremely subjective, we tried to eliminate this with having only one surgeon conducting all of the assessments. All the children included in this study presented with nasal obstruction. The subjective degree of obstruction was unable to be determined. It should be noted that all children in this study ultimately underwent an adenoidectomy due to the degree of obstruction caused by the adenoid pad[7,13].

Systematic review prepared by Major *et al*. showed that lateral neck X-ray stated that the subjective ranking of radiographs by a professional are reliable, our results are in accordance with this. The radiologist's interpretations of the films, which are subjective, were found to correlate the adenoid size indeed. This is to be expected to some degree, as it is typical in a given clinical practice to have multiple different radiologists interpreting films on any given day. Inter-reader variability among radiologists is widely accepted, even with standardized digital imaging, and comparing radiologists with a similar level of training[13,15].

Radiologist have searched for many techniques to detect the accurate size of adenoid tissue. There some research advised for usage of computed topography of the nose and paranasal sinuses to detect the overall size of the adenoid tissue and if there is choanal adenoid or affection of the fossa Rosenmeller. In this study, preoperative Xray grading of adenoid tissue and the endoscopic view done by the flexible nasopharyngoscopy. Another author studied difference between flexible nasopharyngoscopy and mirror examination of the adenoids intraoperatively. And this study implicated the result of larger endoscopic picture viewed preoperatively compared with mirror image. Although they showed high correlation between the size of adenoid using either nasopharyngoscopy or mirror[7].

CONCLUSION

Preoperative lateral airway radiograph and intraoperative flexible endoscopic nasopharyngoscopy showed significant correlation in detecting adenoid size.

CONFLICT OF INTEREST

There are no conflicts of interest.

REFERENCES

1. Pathan F, Sudarshan K, Satpathy S. Endoscopic Adenoidectomy using a Microdebrider: A Series of 20 Cases. International Journal of Current Medical and Applied Sciences. 2016, 11(2):116-118.

2. Emerick KS, Cunningham MJ. Tubal tonsil hypertrophy: a cause of recurrent symptoms after adenoidectomy, Archives of Otolaryngology—Head and Neck Surgery. 2006; 132(2):153–156.

3. Ferreira MS, GomesMJ, Ximendes R, Evangelista AR, Miranda EL, Garcia LB, Stamm AC. Comparison of three different adenoidectomy techniques in children–has the conventional technique been surpassed? International Journal of Pediatric Otorhinolaryngology. 2018; 104:145–149.

4. Buzatto GP, Tamashiro E, Proenca-Modena JL, Saturno TH, Prates MC, Gagliardi TB, Carenzi LR, Massuda ET, Hyppolito MA, Valera FC, Arruda E, Anselmo-Lima WT. The pathogens profile in children with otitis media with effusion and adenoid hypertrophy. PLoS ONE. 2017; 12(2):e0171049.

5. Saedi B, Sadeghi M, Mojtahedi M, Mahboubi H. Diagnostic efficacy of different methods in the assessment of adenoid hypertrophy. Am J Otolaryngol. 2011; 32(2):147–51.

6. Feres MF, Hermann JS, Sallum AC, Pignatari SS. Radiographic adenoid evaluation: proposal of an objective parameter. Radiol Bras. 2014; 47(2): 79–83.

7. Fujioka M, Lionel W Young, BR Girdany. American journal of roentgenology. 1979; 133 (3), 401-404.

8. Cohen D, Konak S. The evaluation of radiographs of the nasopharynx. Clin Otolaryngol 1985; 10: 73-8.

9. Ysunza A, Pamplona MC, Ortega JM, Prado H. Video fluoroscopy for evaluating adenoid hypertrophy in children. Int. J. Pediatr. Otorhinolaryngol. 2008; 72(8):1159-65.

10. Lertsburapa K, Schroeder JW, Sullivan C. Assessment of adenoid size: A comparison of lateral radiographic measurements, radiologist assessment, and nasal endoscopy. Int. J. Pediatr. Otorhinolaryngol. 2010;74(11):1281-5.

11. Gary D. Josephson, In response to Proposed definitive grading system tool for the assessment of adenoid hyperplasia, The Laryngoscope, 2011; 121(6):1349-1350.

12. Caylakli F., Hizal E., Yilmaz I., Yilmazer C., Correlation between adenoid–nasopharynx ratio and endoscopic examination of adenoid hypertrophy: a blind, prospective clinical study, Int. J. Pediatr. Otorhinolaryngol. 2009; 73 (11):1532–1535.

13. Major M.P., Flores-Mir C., Major P.W., Assessment of lateral cephalometric diagnosis of adenoid hypertrophy and posterior upper airway obstruction: a systematic review, Am. J. Orthod. Dentofacial Orthop. 2006; 130(6):700–708.

14. Lourenco E.A., Lopes Kde C., Pontes A., Oliveira M.H., Umemura A., Vargas A.L., Comparison between radiological and nasopharyngo-laryngoscopic assessment of adenoid tissue volume in mouth breathing children, Braz. J. Otorhinolaryngol. 2005; 71(1):23–27.

15. Provenzale J.M., Ison C., Delong D., Bidimensional measurements in brain tumors: assessment of interobserver variability, Am. J. Roentgenol. 2009; 193 (6):W515–W522.