

**EVALUATION OF ADENOIDAL HYPERTROPHY BY  
LATERAL PLAIN X-RAY NASOPHARYNX: IN ENDOSCOPY ERA**

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**ABSTRACT**

Adenoid, the hyperplasia of nasopharyngeal lymphoid tissue is one of the main cause of nasal obstruction and mouth breathing in school age children and also leading to snoring and nasal obstruction. Accurate diagnosis of this alteration is important for proper therapeutic planning. Accurate assessment of adenoid size and its relationship to post nasal space is difficult to achieve clinically which can be misleading when a decision for adenoidectomy has to be taken. It is common practice to request for lateral radiograph for post nasal space to visualize enlarged adenoid when adenoidal hypertrophy is suspected in child with upper air way obstruction. Recently with introduction of nasal endoscope has made the examination of nasal cavity and nasopharynx in children possible and considered to be gold standard but has disadvantage of invasive procedure. The aim of this study is to evaluate the reliability of X-ray in diagnosis of adenoid hypertrophy and to validate this with endoscopy of nasopharynx in evaluation of adenoid size. This is a prospective study conducted in E.N.T. department at Misrata Medical Center, of one year duration from June 2015 to May 2016 included 77 patients admitted for adenoidectomy of age group ranging from 1.3 years to 15 years with symptoms of upper air way obstruction had a standard lateral soft tissue neck X-ray and rigid endoscopic examination of nasopharynx to evaluate adenoid size, and size was graded independently. The variable of both procedures were scored and the agreement between two methods assessed using weighted kappa statistics. Adenoidal hypertrophy according to plain X-ray of naso pharynx 41 patients (53.24%) had adenoid grade III (commonest grade). According to endoscopic assessment the commonest grade of adenoid size was grade III seen in 53 patients (68.83%) and Numerical score to determine each size of adenoid in increasing level in which 1 point was credit to small adenoid, 2 point for medium adenoid and 3 point for large adenoid. Mean score for average size of adenoid in a scale 1-3 score it was 1.81 on X-ray while through endoscopy was 2.12, It indicates that endoscopy is more reliable than X-ray to assess the size and shape of adenoid. Out of 77 patients in this study, 40 of them had complete correlation between X-ray and endoscopic findings. The observed agreement is 40/77 (51.95 % of observation) on linear weighted kappa = 0.209, is a fair agreement between these findings. The study revealed that result of X-ray has tendency to underestimate the size of adenoid. Evaluation by endoscopy was more accurate than evaluation by X-ray, though the result is not statistically significant (the chi square statistics is 9, 3871 (p-value is 0.05212), using pearson's chi square at .05 level of significance. Evaluation by endoscope was more accurate than evaluation by X-ray. Hence, the children with symptoms of nasal obstruction even adenoid hypertrophy not revealed on X-ray suggested to be submitted to naso-endoscopy for diagnostic accuracy, which is very relevant for indication of adenoidectomy.

**KEYWORDS:** X-ray nasopharynx, adenoid hypertrophy, endoscopic nasopharynx assessment.

**INTRODUCTION**

The upper airway obstruction a common symptom in children and are often suspected may have adenoid hypertrophy Adenoid, are normal sub mucosal mass of lymphoid tissue situated at junction of roof and posterior wall of naso-pharynx tends to show physiological enlargement<sup>(1)</sup>, attain its maximum size in school age children, and then regress during puberty and completely disappeared by age of 20 years<sup>(2,3)</sup>. if not treated, Adenoidal hypertrophy block the posterior choanae causing nasal obstruction, mouth breathing, snoring, runny nose, and alteration in facial development. Accurate assessment of adenoid size and its relationship to post nasal space is difficult to achieve clinically, can mislead for taking a decision for adenoidectomy. Various objective diagnostic investigating tools have been suggested to diagnose adenoidal hypertrophy like Mirror posterior rhinoscopy, trans nasal fiber optic flexible or rigid endoscopy<sup>(4,5)</sup>.

Acoustic rhinometry<sup>(6,7,8)</sup>. MRI, each of these methods have their advantages and disadvantages. Pediatric patient's cooperation limits the utilization of mirror examination, while acoustic rhinometry and MRI are not practical in the clinical setting. The nasal endoscopy and X-ray are two most common diagnostic tool used to assess for adenoidal hyperplasia, & is a common practice to request for lateral radiograph for post-nasal space to visualize enlarged adenoid when adenoidal hypertrophy is suspected in a child with upper airway obstruction. Recently with introduction of nasal endoscope, the examination of nasal cavity and nasopharynx in children was made possible<sup>(9)</sup> and considered to be gold standard but has disadvantage of invasive procedure.

**AIM OF STUDY**

Is to determine whether X-ray or endoscopy is superior in evaluation of adenoid size in pediatric patient presenting with upper airway obstruction.

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**MATERIAL AND METHOD**

This is a prospective study conducted in E.N.T. department at Misrata Medical Center, of one year duration from June 2015 to May 2016 included 77 patients admitted for adenoidectomy of age group ranging from 1.3 years to 15 years with symptoms of nasal obstruction, mouth breathing, snoring, nasal discharge, decreased hearing, underwent a standard lateral soft tissue neck radiography to have an idea about adenoid size and the size of the adenoid was graded according to the air way between the soft palate border and point of maximum convexity of the adenoid shadow that was most proximal to the soft palate was measured in m.m<sup>(10)</sup>.

- Grade I - Nasopharyngeal space larger than 6 m.m.
- Grade II- Nasopharyngeal space between 4 m.m. and 6 m.m.
- Grade III- Nasopharyngeal space between 2 m.m. and 4 m.m.
- Grade IV- Nasopharyngeal space 0 m.m. to 2 m.m.



A per operative per oral endoscopic assessment of adenoid was done using 70 degree angled 4 mm endoscope introduced through mouth before adenoidectomy under general anesthesia to assess the size of adenoid for grading, using the grading system proposed by Parikh et al.<sup>(11)</sup> (Figure):

- Grade 1 for adenoid tissue not in contact with adjacent structures;
- Grade 2 for adenoid tissue in contact with torus tubarius,
- Grade 3 for adenoid tissue in contact with vomer, and
- Grade 4 for adenoid tissue in contact with soft palate (at rest) Parikh et al., 2006<sup>(11)</sup>.

Statistical analysis- The variables of both procedure were scored and agreement between two methods were assessed using Kappa weighted statistics<sup>(12,13)</sup>.

**RESULT**

This study involved 77 patients male 41 (53.35%) female 36 (46.75%) with age ranged from 1.3 years to 15 years with mean age 6.5 years (median 6 years and mode 4 years). There were 32 patients (41.55%) below the age of 5 years and 7 patients (9.10%) between ages

of 11-15 years the highest numbers of patients belong to age group 6 to 10 years 38 patients (49.35%) Among the symptoms of upper air way obstruction, Nasal obstruction and mouth breathing were most common complaints in 77 patients (100%) followed by snoring in 65 patients (84.41%).

Adenoidal hypertrophy according to plain X-ray of nasopharynx, 41 patients (53.24%) had adenoid grade III as shown in (table 1).

(Table 1) shows Adenoid size based on lateral plain X-ray of nasopharynx.

Grading of Adenoid size	Patients with adenoid hypertrophy	Percentage
Grade I (mild)	-	-
Grade II (Moderate)	25	32.36%
Grade III (severe)	41	53.24%
Grade IV (Complete)	11	14.30%

According to endoscopic assessment, the commonest grade of adenoid size was grade III seen in 53 patients (68.83%) (table 2).

(Table 2) shows adenoid size according to endoscopy.

Adenoid (Grade)	No, of patients with Adenoid hypertrophy(77)	Percentage (%)
Grade I(mild)	-	-
Grade II (moderate)	7	9.09%
Grade III (severe)	53	68.83%
Grade IV complete)	17	22.07%

Out of 25 patients, those who were on grade II in X-ray, only 5 patients were on Grade II while 17 patients upgraded to grade III and 3 patients to grade IV on endoscopy. Out of 41 patients those who were on grade III on X-ray, only 30 patients were in grade III, but 9 patients up graded to grade IV, 2 patients degraded to grade II on endoscopy. 11 patients those who were on grade IV in X-ray, only 5 patients were on grade IV while 6 patients degraded to grade III on endoscopy.

(Table 3) shows the relationship between adenoid size assessed by Lateral plain X-ray of nasopharynx and endoscopy.

Grade of Adenoid size based on X-ray	Adenoid Size based on Endoscopy				Total
	Grade I	Grade II	Grade III	Grade IV	
Grade I(mild)	-	-	-	-	-
Grade II(moderate) 25 patients	-	5 (20%)	17 (68%)	3 (12%)	25 (32.46%)
Grade III(severe) 41 patients	-	2 (4.87%)	30 (73.17%)	9 (21.55%)	41 (53.24%)
Grade IV(complete) 11 patients	-	0	6 (54.55%)	5 (45.45%)	11 (14.30%)
<b>Total</b>	-	<b>7 (9.09%)</b>	<b>53 (68.83%)</b>	<b>17 (22.07%)</b>	<b>77 (100%)</b>

A Table was prepared for Numerical score to determine each size of adenoid in increasing level in which 1 point was credit to small adenoid, 2 point for medium adenoid and 3 point for large adenoid. It was possible to determine the arithmetical mean of adenoid size through X-ray and endoscopy. (Table 4) shows mean score of average size of Adenoid on X-ray and endoscopy.

**(Table 4)** The mean score of average size of Adenoid on X-ray and endoscopy.

Adenoid size (Numerical score)	X-ray		Endoscopy	
	No. of patients	%	No. of patients	%
1 (small)	25	32.46%	7	9.10%
2 (medium)	41	53.24%	53	68.83%
3 (large)	11	14.30%	17	22.07%

Mean score for average size of adenoid in a scale 1-3 score it was 1.81 on X-ray while through endoscopy was 2.12. It indicates that endoscopy is more reliable than X-ray to assess the size and shape of adenoid.

#### DISCUSSION

Clinical evaluation of adenoid size in children is very difficult. History reported by parents (subjective measure) of nasal obstruction, mouth breathing ground up the relationship with adenoid enlargement, not visible at direct inspection through anterior rhinoscopy, and regarding posterior rhinoscopy technical difficulty in approaching young children, it's real value is controversial<sup>(14)</sup>. Objective measure of adenoidal hypertrophy like nasal endoscopy are use full to provide information that may help for deciding the need of surgery.

Evaluation of adenoid hyperplasia is done by clinical, radiological and endoscopic examination has been reported<sup>(15)</sup>. However, the best method to diagnose adenoid hyperplasia is debatable topic. Many studies have been performed to purpose the ideal method<sup>(4)</sup>. The radiological technique of the nasopharynx to visualize enlarged adenoid still in use now a days (lateral X-ray of neck for nasopharynx<sup>(16)</sup> gives a measure of size of adenoid and also an assessment of its relation to the size of air way<sup>(17)</sup>. X-ray in the diagnosis of enlarged adenoid has been less popular with advent of nasal endoscope, which is considered to be gold standard. Lateral X-ray neck for nasopharynx is noninvasive procedure, well tolerated by children. Nasal endoscopy an easy method per operatively but for preoperative diagnosis the endoscopic method however has dis advantage of being an invasive procedure<sup>(18)</sup>. The difference between the results of X-ray and endoscopy as shown in (table 4) revealed that endoscope was better than X-ray In determining the size of adenoid.

These differences were probably due to two-dimensional nature of X-ray rather than that the three-dimensional view by endoscope lead to under diagnosed adenoid in our study. This finding in present study is in agreement with Laurence et al<sup>(19)</sup>. Who found that the mouth breather children who showed small adenoid by X-ray mostly had moderate size adenoid when examined by endoscope, those with moderate size adenoid in X-ray were mostly considered large by endoscope and lastly those with large adenoid seen in X-ray were also reported large by endoscope<sup>(19)</sup>. Cohen Koltai and Scott<sup>(20)</sup> also support the inaccurate assessment of adenoid size by plain X-ray since they found poorly correlation of adenoid size in X-ray with size of adenoids at operation.

Despite all advantage of nasal endoscopy still X-ray are easy and more complaint to child for diagnosis of adenoid hypertrophy. More so, though it has minor variables in grading than nasal endoscopy still it is at equal with endoscope as far as decision making for adenoidectomy is concerned. Some studies cite the importance of endoscope in the assessment of adenoidal hypertrophy in lateral direction rather than anterior direction, will be missed by routine X-ray of post nasal space laterally<sup>(21)</sup>.

As seen in table No 4 arithmetical mean of adenoid size through X-ray and endoscopy, Average size of adenoid in a scale 1-3 score, it was 1.3 on X-ray while through endoscopy was 2.1, therefore adenoid evaluated by endoscopy were on average 61.58% larger as compared to adenoid evaluated by X-ray. It indicates that endoscopy is more reliable than X-ray to assess the size and shape of adenoid. Wormald et al<sup>(4)</sup> reported that in doubtful cases nasal endoscopy provide definite evaluation of nasal cavity and naso pharynx state<sup>(11)</sup> on statistical analysis, there was poor agreement between X-ray and endoscopy finding. The observed agreement is 40/77 (51.95% of the observation) UN weighted kappa=0.161. On Linear weighted kappa=0.209, assessed this way the strength of agreement is considered to be fair. Evaluation by endoscope was more accurate than evaluation by X-ray The chi square statistic is 9.3871 (p- value is .05212) is not statistically significant at p< .05 (using Pearson chi square at .05 level of significance). These result are consisted with findings of studies carried out by Yilmaz and Kinderman and their colleagues in assessment of adenoid size<sup>(22,23)</sup>. In this study, X-ray showed a tendency to underestimate the size of Adenoid compared with Endoscopy; therefore, we suggest that patients presenting with mouth-breathing symptoms and normal radiography be referred for endoscopy, a complementary assessment with naso-pharyngoscopy, which is associated with greater diagnostic accuracy due to its tridimensional and dynamic nature

#### CONCLUSION

Nasal endoscopy is an emerging gold standard for diagnosis of adenoidal hypertrophy but owing to nonin-

vative nature of X-ray, it still serves as a reliable diagnostic tool. Preoperative X-ray combined with per operative nasal endoscopy are complementary to each other and serve in the best interest of the patient.

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