Original paper

Assessment of Adenoids Hypertrophy by Plain X-ray and Nasoendoscopy in Karbala

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Abstract

Background: The pharyngeal tonsil, also called adenoids, is the upper extension of the lymphatic Waldeyer's Ring and is located on the upper posterior wall of the nasopharynx. A great deal of interest has been given to diverse methods of examinations and parameters for identification and evaluation of adenoids hypertrophy.
Objectives: To clarify the accuracy of both lateral plain x-ray of the soft tissue of the nasopharynx and nasoendoscope in evaluation of the adenoids size.
Methods: One hundred-fifty patients presented with nasal obstruction or mouth breathing suspected to have adenoids hypertrophy were seen and examined in the outpatients clinic of E.N.T Department of Al-Hussain Teaching Hospital, Karbala from August to November, 2014. All of the patients evaluated clinically, by lateral plain x-ray of the soft tissue of the nasopharynx and nasoendoscope to determine the size of adenoids.
Results: A total of 150 patients presented with nasal obstruction or mouth breathing, there were 83 (55%) males and 67 (45%) females patients (M/F 1.2:1). According to plain x-ray of the nasopharynx, large size adenoids was seen in 77 patients (51%) , moderate size in 49 patients (33%) , and small size seen in 24 patients (16%). According to endoscopic assessment, the commonest grade of adenoids size was the grade IV seen in 47 patients (31%) and the least common grade of adenoids size was grade I seen in 16 patients (10.7%), while grade II was seen in 44 patients (29.3%), and grade III seen in 43 patients (29%).
Conclusions: Evaluation by endoscope was highly accurate than evaluation by X-ray. Hence, children with classical symptoms of upper respiratory tract obstruction, even without adenoids hypertrophy revealed by X-ray, suggested to be submitted to nasoendoscope for diagnostic accuracy, which is greatly relevant especially for more secure indication of adenoidectomy and help in avoiding unnecessary operation.
Keywords: Adenoids hypertrophy, X-ray of the nasopharynx, nasoendoscope, mouth breathing.

Introduction

The pharyngeal tonsil, also called adenoids, is the upper extension of the lymphatic Waldeyer's Ring and is located on the upper posterior wall of the nasopharynx.[1] Many consider it pedantic to insist on the singular expression, the adenoid, so the more common term, adenoids, will be used. The size of adenoids varies from child to child and also in the same individual as he grows. In general, the normal adenoids attain their maximum size between the ages of 3 and 7 years and then regress.[2] Mouth breathing is highly prevalent among children of all ages,[3-5] and it is frequently caused by obstructive hypertrophied adenoids.[5-7] An untreated adenoids hypertrophy may lead to obstructive sleep apnea, ear problems, failure to thrive, pulmonary hypertension, and craniofacial anomalies.[8] Adenoids radiographic evaluation has been extensively debated over the years. Yet,

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opinions regarding lateral cavum x-ray usefulness are still varied. This uncertainty might be related to the absence of comprehensive studies which simultaneously investigate a considerable number of radio- graphic parameters [9-30]. Adenoids hypertrophy is known to be associated with several harmful clinical conditions[7,31,32]. Due to the relevance of this issue, a great deal of interest has been given to diverse methods of examinations and parameters for identification and evaluation of adenoids hypertrophy [7,33-35]. Among various examination methods, nasofiberendoscopy (NFE) has been currently considered the "gold standard" exam for adenoids evaluation [36]. Moreover, NFE is more effective when identifying adenoids hypertrophy [37], and has been indicated as the main diagnostic tool when adenoidectomy is considered [34].

Patients and Methods

One hundred-fifty patients presented with nasal obstruction or mouth breathing suspected to have adenoids hypertrophy were seen and examined in the outpatients clinic of E.N.T Department of Al-Hussain Teaching Hospital, Karbala from August to November, 2014. All of the patients evaluated clinically, by lateral plain x-ray of the soft tissue of the nasopharynx and nasoendoscope to determine the size of adenoids.

Assessment of the patients:

1-Clinical assessment: full history and examination was conducted in a routine way. **2**-Radiological assessment: lateral plain x-ray of the nasopharynx was done. Focus-film distance was 140 cm, and x-ray exposure settings were 70 kv, 12 mA, for 0.40 to 0.64 seconds. During the examination, the child should always be calm, with his back straight, mouth closed, breathing by the nose and with the head oriented in the horizontal plane and lateral to the x-ray. Interpretation of x-ray was based on Cohen & Konak [30] method in which the soft palate thickness (one centimeter below the hard palate or half-centimeter in children younger than 3 years) and the air column width between the palate and the highest point of convexity of the adenoids are compared. It is considered small when the column is not narrower than the palate's thickness; medium, when air column is narrower, but wider than half of the palate's thickness; large, when the air column is narrower than half of palate's thickness (Figures 1 and 2).

Figure 1. Lateral plain x-ray of the soft tissue of the nasopharynx

3-Endoscopic assessment: The examination was performed with flexible fiberoptic nasopharyngoscope under topical anesthesia using 2% xylocaine with no decongestant in both nostrils. The size of adenoids was determined according to Clemens et al classification[38] as shown in table (1).

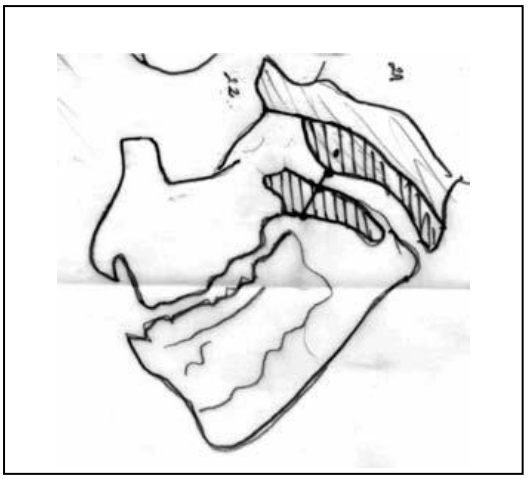

Figure 2. Scheme illustrating Cohen & Konak method, which compares the soft palate thickness (one centimeter below the hard palate or half centimeter in children younger 3 years old) presenting the air column between this spot in the palate and the highest convexity spot of adenoids . In the present example, it is a large adenoids

Table 1. Clinical endoscopic grading of adenoids size

Grade	Description
Grade 1	Adenoids tissue filling one-third of the vertical portion of the choanae
Grade 2	Adenoids tissue filling from one-third to two-third of the choanae
Grade 3	From two-third to nearly complete obstruction of the choanae
Grade 4	Complete choanal obstruction

Results

A total of 150 patients presented with nasal obstruction or mouth breathing, there were 83 (55%) males and 67 (45%) females patients (M/F 1.2:1). The age range was 2 to 16 years with a mean age of 7 year. The highest incidence of large adenoids was seen in 3-6 years old patients (60%) while the lowest incidence was seen in older age group. According to plain x-ray of the nasopharynx, large size adenoids was seen in 77 patients (51%) , moderate size in 49 patients (33%) , and small size seen in 24 patients (16%) as shown in table 2.

According to endoscopic assessment, the commonest grade of adenoids size was the grade IV seen in 47 patients (31%) and the least common grade of adenoids size was grade I seen in 16 patients (10.7%), while grade II was seen in 44 patients (29.3%), and grade III seen in 43 patients (29%) as shown in table 3.

Table 2. Adenoids size based on plain x-ray of the nasopharynx

Adenoids size	Patients with adenoids hypertrophy (n= 150)	
	No.	%
Large	77	51%
Moderate	49	33%
Small	24	16%

Table 3. Adenoids grading according to endoscope

Adenoids grade	Patients with adenoids hypertrophy (n=150)	
	No.	%
Grade I	16	10.7
Grade II	44	29.3
Grade III	43	29
Grade IV	47	31

The correlation between adenoids size by x-ray and endoscope is shown in table 4.

Table 4. Correlation between adenoids size by x-ray and endoscope

Adenoids size by x-ray	**Adenoids grade by endoscope**			**Total**
	Grade 1	Grade 2	Grade 3&4	
Small	15	9	--	24
Medium	--	35	14	49
Large	1	--	76	77
Total	16	44	90	150

P=0.0001*(highly significant using Pearson chi-square test at 0.05 level of significance)

Discussion

The first adenoidectomy was probably performed in the second half of the 19th Century. For a long time, due to inexistence of clear criteria for indication of surgery, this procedure fell into disbelief among physicians and public opinion. Recently, accurate indications and clear rules for adenoidectomy have proved to be less controversial[39]. Today, there is not much consensus over the best way of checking the size and position of adenoids tissue in preoperative evaluation. Mignon formerly observed the shadow of adenoidal tissue in 1898. Later, it was verified that this tissue narrowed the nasopharynx and, after that, many authors investigated different aspects of adenoids and nasopharynx x-rays in an attempt to minimize chances of misinterpretation [40]. There are reports of different radiographic methods for evaluation of nasopharynx, while the interpretation of presence or absence of adenoids hypertrophy is not a consensus among authors. According to Wormald et al. who conducted a comparative study among methods, Cohen & Konak developed the best approach providing the highest positive predictive value[11]. According to these authors, their method takes into account the relation between nasopharynx and adenoids sizes, besides being a simple approach, once it does not require measures and calculations. Moreover, they emphasize that the otolaryngologist should consider the air column rather than adenoid's size or shape, leading to physiological interpretation[30]. Hirschmann[41] firstly performed a nasosinusal endoscopy in 1901.

In our study adenoids hypertrophy were found in children from 2 to 16 years with 7 years as mean age. The highest incidence of large adenoids was seen in 3-6 years old child (60%). While the lowest incidence was seen in older age group children. These findings were probably due to rapid growth of lymphoid tissue and relative decrease in postnasal space in addition to highest incidence of upper respiratory tract infection (viral or bacterial) due to low immunity during childhood period.[42] Different results were reported by others. Pruzansky reported that large adenoids were most frequently observed between the ages of 6-8 years [43]. Fujioko and Young reported that adenoidal-nasopharyngeal ratio reached its highest value at age 4 years and then decreased in 1398 referred patients[44]. Another study by Bercin and his colleagues reported that adenoids reach a maximum size at the age of 3-7 years, and then start to regress[45]. There was a slight overall male predominance, with a male to female ratio of 1.2:1 in our study. This finding is different from other study by E.S. Kolo and his colleagues revealed that 22 (64.7%) were males and 12 (35.3%) were females in their study of 34 children with obstructive adenoids [46]. and similar to others literatures [47]. Differences probably were due to the larger sample studied in our study.

In order to compare the results obtained by X-ray with endoscopic findings, we consider grade I equal to small size adenoids, Grade II equal to moderate size

adenoids and summation of Grade III and IV equal to large size adenoids.

There was good agreement between the x-ray and endoscopy findings, 126 out of 150 patients had complete correlation between the x-ray and endoscopy findings (table 4). The observed agreement between endoscopy and x-ray was 126/150 – 84%.

The differences between the endoscopy and X-ray results (table 4) were probably due to many factors which may include the lack of standardization of X-ray, the two-dimensional views by X-ray rather than the three-dimensional views by endoscope[21], and the effects of positional changes and respiration movement of the patient, all these are examples of factors that may influence the findings and evaluation of the adenoids size by plain x-ray[48].

Cohen, Koltai and Scott found also support the inaccurate assessment of the adenoids size by plain X-ray, since they found that X-ray examination of the postnasal space to determine the adenoids size and the postnasal airway was poorly correlated with the size of adenoids at operation[49].

On the other hand nasal endoscope was a reliable, safe, easily tolerated with three-dimensional view and probably play an important role in differentiation of adenoids from other masses which have the same appearance on plain X-ray as tumors, cysts and aneurysm.

Evaluation by endoscope was more accurate than evaluation by X-ray. [P=0.0001* (Highly significant using Pearson chi-squared test at 0.05 level of significance)].

These results are supported by Yilmas and Kindermann and their colleagues in their assessment of the adenoids size[50,51].

Another important fact in the adenoids enlargement that the growth can be in lateral directions which will be missed by lateral plain X-ray of the postnasal space. This fact was stressed on by Wright and his colleagues in their study on the importance of endoscope in the assessment of adenoids enlargement in lateral direction rather than anterior direction which will be missed by routine X-ray of the postnasal space [52].

This is why made Wormald and Prescott to indicate in doubtful cases nasal endoscopy under local anesthesia to provide definitive evaluation of nasal cavity and the state of postnasal space [53].

Conclusions and Recommendations

1- The highest incidence of large adenoids was seen in 3-6 years old children, which reflect the importance of the screening program in preschool and first year school children for early diagnosis and management.

2- Children with classical symptoms of upper respiratory tract obstruction, even without adenoids hypertrophy revealed by X-ray, suggested to be submitted to nasoendoscope for diagnostic accuracy, which is greatly relevant especially for more secure indication of adenoidectomy and help in avoiding unnecessary operation.

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