

Efficacy of Nasoendoscopy Over X-Ray Nasopharynx in Diagnosing Adenoid Hypertrophy

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Abstract

Introduction: The adenoids are lymphoid tissue associated with hypertrophy and nasal obstruction following recurrent upper respiratory infections. The evaluation of adenoids on physical examination is challenging and hence radiographs and diagnostic nasal endoscopy have come up as useful tools to confirm the diagnosis and plan for surgery.

Materials and Methodology: In the present study we have compared the diagnostic efficacy of x-ray nasopharynx lateral view and nasal endoscopy towards the assessment of adenoid size.

Results: 62 patients have been included and by kappa analysis there is 82.3% agreement between x-ray assessment and endoscopic grading. Sensitivity and specificity of endoscopic assessment is 78.75% and 86.96% respectively.

Conclusion: In a child with sleep disordered breathing both x-ray nasopharynx and diagnostic nasal endoscopy provide similar diagnostic efficacy, however the use of endoscope aids to the accuracy of identifying the involvement of eustachian tube orifice and obstruction of nasal choana without the exposure of ionizing radiations.

Keywords: Adenoids; X-Ray Nasopharynx; Nasoendoscopy; Fujioka Method; Cohen Konak Method

Introduction

The adenoid or nasopharyngeal tonsil are the lymphoid tissues constituting a part of the inner Waldeyer's ring. In childhood adenoid acts as the 1st site for contact of airborne antigens with the lymphoid tissue leading to development of humoral immunity [1]. Pathological presentation of adenoid hypertrophy is manifested as nasal obstruction, rhinosinusitis, recurrent otitis media, obstructive sleep apnoea [2,3].

There is an increasing trend towards performing adenoidectomy in isolation rather than combining it with adeno-tonsillectomy due to clearly laid down indications such as sleep disordered breathing and otitis media with effusion [4]. The evaluation of adenoids on physical examination is challenging and hence radiographs and diagnostic nasal endoscopy have come up as useful tools to confirm the diagnosis and plan for surgery [5].

In the present study we have compared the diagnostic efficacy of x-ray nasopharynx lateral view and nasal endoscopy towards the assessment of adenoid size.

Materials and Methodology

It is a prospective observational study carried out at a tertiary care hospital over a period of one year from January 2019 to December 2019. Informed consent from parents and ethical clearance was obtained from the institution ethics committee.

A total of 62 patients clinically proven to have chronic adenoiditis on the basis of history, clinical examination, x-ray nasopharynx lateral view and pre-operative diagnostic nasal endoscopy were included in the study. Children presenting with craniofacial anomalies

such as cleft palate, patients not willing to undergo diagnostic nasal endoscopy and patients with bleeding dyscrasis were excluded.

Size of the adenoid on x-ray was graded based on Cohen and Konak’s grading system and Fujioka’s method to calculate the adenoid/nasopharyngeal ratio [6,7]. The endoscopic grading of adenoids has been interpreted as per the grading system given by Clemens and McMurray and patients were classified from grade 1 - 4 [8].

Results

A total of 62 subjects of mean age 9.24 ± 2.93 years varied between 4 to 15 years were considered for the study. We observe that, most of the samples in the study are of the age group “8 - 11” years followed by “4 - 7” years. Majority of the subjects in the sample were males.

The most common presenting complaint was mouth breathing and snoring around 60% followed by pain while swallowing and nasal obstruction respectively. Adenoid facies was seen in 66% of cases.

As per the Cohen and Konak method for measurement of adenoids on X-ray, 16 out of 62 had small adenoids (25%), 31 patients (51%) had moderate degree enlargement and 15 patients (24%) had large adenoids on X-ray (Figure 1).

By Fujioka’s method on X-ray, 37 patients (60%) had ratio ranging in between 0.5 and 0.8. Ratio ranging in between 0.3 and 0.5 was seen in 13 (21%) patients and 19% i.e. 12 patients had ratio more than or equal to 0.8. The mean A/N ratio in our study was 0.65 (Figure 1).

In our study maximum children had grade 3 adenoid hypertrophy on endoscopy seen in 34 patients (55%) followed by grade 2 and grade 4 which were seen in 26% and 18% respectively. Only 1 patient had grade 1 hypertrophy on nasal endoscopy according to Clemens classification (Figure 1).

Comparison between X-ray method i.e. Cohen and Konak method and the endoscopic Clemens method was also done. p value was statistically significant ($p < 0.05$). This states that both methods have good association between each other and evaluation by endoscopy method was more accurate than X-ray method (Table 1).

From kappa statistic, we conclude that there is a moderate agreement between X-ray results and Endoscopy results. We observed 82.3% agreement between Cohen Konak X-ray assessment and Clemens McMurray endoscopy grading whereas 72.6% agreement between Fujioka x-ray assessment and endoscopy gradings.

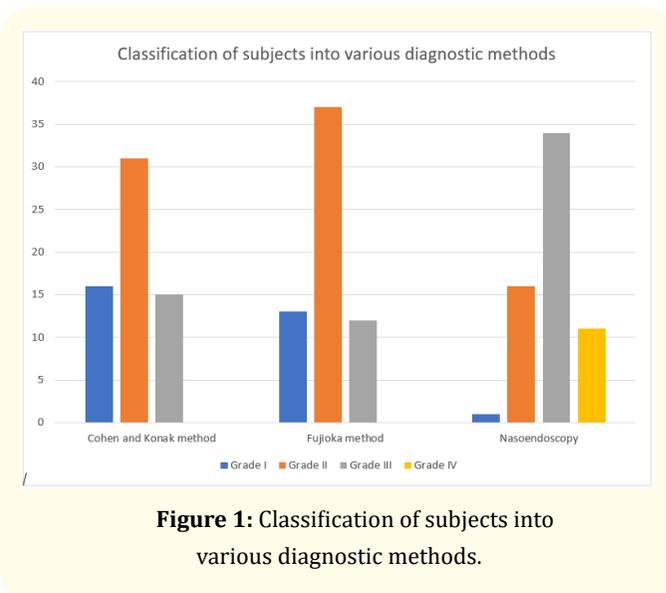


Figure 1: Classification of subjects into various diagnostic methods.

Cohen and Konak X-ray measurement	Clemens McMurray endoscopic grading				
	Grade I	Grade II	Grade III	Grade IV	Total
Small (grade I)	1	10	5	0	16
Moderate (grade II)	0	5	26	0	31
Large (grade III)	0	1	3	11	15
Total	1	16	34	11	62
Chi-square	47.541				
p-value	< 0.00001				

Table 1: Comparison of Cohen Konak x-ray measurement with endoscopic grading.

Sensitivity and Specificity of Fujioka grading is 29% and 88.89% respectively and sensitivity and specificity of Cohen Konak X-ray assessment is 64.71% and 88.89% respectively (Table 2). Sensitivity and specificity of endoscopic assessment is 78.75% and 86.96% respectively.

Discussion

Adenoid hypertrophy or chronic adenoiditis may cause significant problems requiring adenoidectomy in situations in which the tonsils themselves are not diseased and are not contributing to symptomatology. Adenoidectomy is indicated in craniofacial maldevelopment (adenoid facies), obstructive sleep apnoea, chronic recurrent sinusitis and otitis media with effusion as it will relieve the obstruction to the drainage of secretions. Therefore, it is imperative to have a proper diagnostic evaluation of adenoids pre-operatively. Adenoid hypertrophy is known to cause morbidity predominantly in childhood. Therefore, only children between age group of 4 - 15 years were included in our study.

X-ray		Endoscopic		Total	% of Agreement	Kappa*
		Mild	Moderate-severe			
Cohen Konak method	Mild	11	5	16	82.3%	K = 0.546
	Moderate-severe	6	40	46		
Total		17	45	62		
		Endoscopic		Total	% of Agreement	Kappa*
		Mild	Moderate-severe			
Fujioka method	Mild	5	5	10	72.6%	K=0.210
	Moderate-severe	12	40	52		
Total		17	45	62		

Table 2: Agreement between assessment of adenoid on basis of X-ray and nasal endoscopy.

Cohen Konak X-ray results classified small as mild and moderate and large as moderate-severe , Fujioka results classified < 0.5 as mild and ≥ 0.5 as moderate-severe whereas Endoscopic results classified as grade 1 or grade 2 as mild and grade 3 or grade 4 as moderate-severe.

In a study done by Hamza SB and Ranjith VT in 2019 it was reported that 62% were males and 38% were females out of 100 children with adenoid hypertrophy. The commonest presenting symptoms were snoring and mouth breathing (75%). The mean AN ratio on Fujioka method was 0.72 which is correlating with our study [9].

Study done by Dawood MR and Khammas AH in 2017 included 80 children with obstructed adenoids from 4 to 12 years of age. They reported achieving highly significant p value after comparing x-ray and endoscopic method which correlated with our study [10].

In a study done by Fatma Caylakli., *et al.* in 2009 there was a strong correlation between the A/N ratio and nasal endoscopic examination findings (p < 0.0001) [11]. In another study done by Talebian S., *et al.* in 2018 similar result was noted wherein there was a positive significant correlation between A/N ratio and endoscopic adenoid size (r = +0.46, p = 0.01) [12]. These results were in line with our findings.

Kindermann., *et al.* in 2008 demonstrated a sensitivity and specificity of nasal flexible fiberoptic endoscopy as 92% and 71% respectively and Pathak K., *et al.* in 2019 reported sensitivity of endoscopic method as 87.10% and specificity of 63.16% which was consistent with our study. Therefore, it is suggested that in a cooperative child performing endoscopy is much superior than causing unnecessary radiation exposure with X-ray [13,14].

In the present study we have also observed that 16.12 % of patients who were in grade II of Cohen Konak X-ray grading were also grade II on endoscopy grading, whereas 83.87 % of grade II

adenoid on x-ray landed in grade III of endoscopy grading (Figure 2). These differences are probably due to improper patient positioning or inadequate exposure on x-ray as well as the variation between the 2-D view versus the 3-D when endoscopy is employed. Endoscopy also gives a fair idea of the lateral extension of adenoids over the eustachian tube orifice as well as the actual obstruction of the nasal choana. This view is in accordance with that of Cohen., *et al.* who suggested the discrepancy in the actual adenoid size at operation to that diagnosed on x-ray by taking into consideration the post nasal air column to grade adenoid size [6].

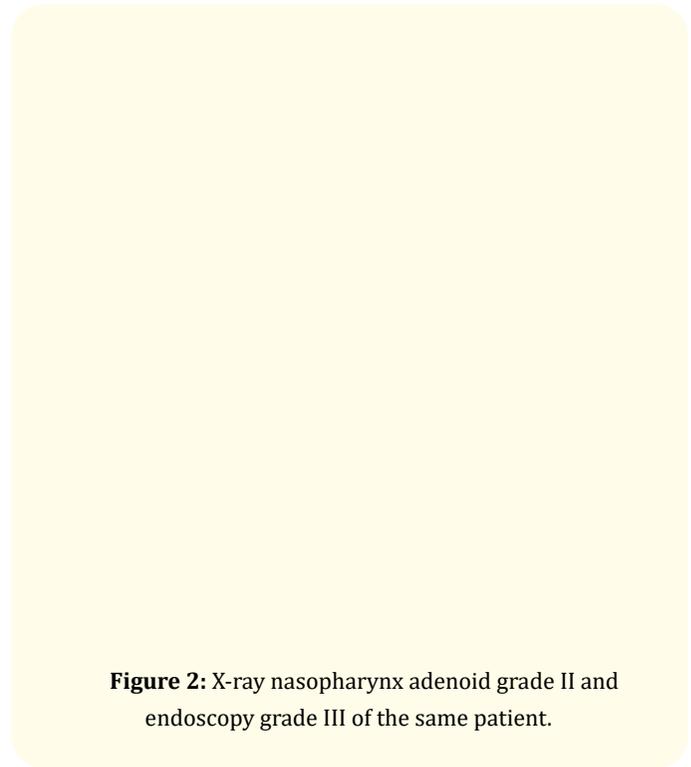


Figure 2: X-ray nasopharynx adenoid grade II and endoscopy grade III of the same patient.

In the present study it is seen that 74.28% of the patients in endoscopy grade III and IV presented with mouth breathing and nasal obstruction whereas 77.27% patients with x-ray grade II and 77.77% with x-ray grade III had these complaints. This shows that both the methods are equally relating well with the symptoms of sleep disordered breathing and the need to undergo surgery, keeping in mind the obvious superiority of endoscope in differentiating adenoids from other nasopharyngeal masses such as aneurysms, tumours and granulomas [15].

Therefore, both the x-ray and endoscopy provide a similar specificity in diagnosing adenoid hypertrophy and both methods have a significant agreement in their diagnostic efficacy. However, both the methods have their own merits and demerits. While x-ray exposes the child to harmful radiations, it also is a quick and non-invasive tool. Whereas, endoscopy though has a higher diagnostic accuracy, it also is difficult to perform in apprehensive children and can lead to mucosal injuries.

Conclusion

In a child with sleep disordered breathing both x-ray nasopharynx and diagnostic nasal endoscopy provide similar diagnostic efficacy, however the use of endoscope aids to the accuracy of identifying the involvement of eustachian tube orifice and obstruction of nasal choana without the exposure of ionizing radiations.

Conflict of Interest

None.

Informed Consent

Obtained.

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Ethical Standards

The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional guidelines on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008. This article does not contain any studies with animals performed by any of the authors.

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