

Which diagnostic method should be used in which age interval in the diagnosis of adenoid hypertrophy?

Którą z metod diagnostycznych należy stosować w celu rozpoznawania przerostu migdałka gardłowego u dzieci w poszczególnych grupach wiekowych?

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ABSTRACT:

Objective: This study aims to determine in which age range the flexible nasopharyngoscopy (FNF) and lateral nasopharyngeal X-ray (LNx) have been used more effectively for the diagnosis of adenoid hypertrophy in the pediatric population.

Study Design: Prospective Cohort Study.

Materials and Methods: In our study, 281 pediatric patients were included aged 1 to 15 years who were admitted to our otorhinolaryngology outpatient clinic with the complaints of nasal obstruction, snoring, sleep apnea between April 2016 and February 2017 and who were examined with FNF with the pre-diagnosis of adenoid hypertrophy. All FNF examinations were evaluated by a single physician. The degree of choanal obstruction was recorded as percentage (%) by providing the image of adenoid tissue. The patients were divided into four groups according to the quality of the endoscopic examination performed during FNF examination; optimal assessment (Group-1), assisted optimal assessment (Group-2), assisted suboptimal assessment (Group-3), and inability to assess despite assistance (Group-4). LNx was performed for the re-evaluation of adenoid tissue in the patients in Group-3 and Group-4. The statistical analysis was performed among the groups according to the age of the patient.

Results: Optimal images were obtained with FNF in the patients aged 1-2 years and 8-15 years and the predicted images were provided for choanal obstruction. However, no image could be obtained with FNF for the assessment of choanal obstruction in more than 30% of patients between the age of 3 and 8 years (31.2% and 33.3%, respectively), also in more than 50% of the patients who were 4, 5, 6 and 7 years old (60.6%, 56.7%, 55.8%, 66.6%, respectively). For this reason, their degrees of choanal obstruction were determined by LNx.

Conclusion: For the optimal assessment of adenoid hypertrophy, we suggest that LNx graphy for the pediatric patients who are 4, 5, 6 and 7 years old and FNF for the other age groups are more appropriate methods in order not to disturb the polyclinic process of a physician and for patient compliance.

KEYWORDS:

adenoid hypertrophy, flexible, endoscopy, lateral nasopharyngeal X-ray, nasopharyngoscopy

STRESZCZENIE:

Cel: Celem niniejszego badania było ustalenie, w jakim przedziale wiekowym większą skuteczność w rozpoznawaniu przerostu migdałka gardłowego w populacji pediatrycznej wykazuje badanie za pomocą giętkiego nasofaryngoskopu (FNF, ang. flexible nasopharyngoscopy) lub zdjęcie RTG boczne nosogardła (LNx, ang. lateral nasopharynx X-ray).

Projekt badania: Prospektywne badanie kohortowe.

Materiały i metody: W badaniu wzięło udział 281 pacjentów pediatrycznych w wieku od 1 do 15 lat, przyjętych do poradni

otorynolaryngologicznej z objawami niedrożności nosa, chrapaniem i bezdechem sennym w okresie od kwietnia 2016 do lutego 2017 r., którzy zostali zbadani za pomocą FNF ze wstępnym rozpoznaniem przerostu migdałka gardłowego. Wszystkie badania z użyciem FNF oceniane były przez jednego lekarza. Stopień niedrożności nozdrzy tylnych przedstawiano jako procent (%), z załączeniem obrazu tkanki limfatycznej. Pacjentów podzielono na cztery grupy, w zależności od jakości obrazu uzyskanego podczas badania FNF: ocena optymalna (grupa 1), ocena optymalna ze wsparciem rodzica (grupa 2), ocena nieoptymalna pomimo wsparcia rodzica (grupa 3) i brak możliwości oceny pomimo wsparcia rodzica (grupa 4). Badanie LNX przeprowadzono w celu ponownej weryfikacji migdałka gardłowego u pacjentów z grupy 3 i grupy 4. Analizę statystyczną w grupach przeprowadzono w odniesieniu do wieku pacjentów.

Wyniki: Optymalne obrazy przedstawiające niedrożność nozdrzy tylnych uzyskano za pomocą FNF u pacjentów w wieku od 1 do 2 lat i od 8 do 15 lat. Niemniej jednak, nie udało się uzyskać obrazów FNF z oceną drożności nozdrzy tylnych u ponad 30% pacjentów w wieku od 3 do 8 lat (odpowiednio 31,2% i 33,3%), a także u ponad 50% pacjentów w wieku 4, 5, 6 i 7 lat (odpowiednio 60,6%, 56,7%, 55,8%, 66,6%). Z tego powodu występujący u nich stopień niedrożności nozdrzy tylnych oceniano za pomocą badania LNX.

Wnioski: W celu optymalnej oceny przerostu migdałka gardłowego wskazane jest obrazowanie za pomocą zdjęć RTG boczno-nosogardła (LNX) w przypadku dzieci w wieku 4, 5, 6 i 7 lat oraz badanie przy użyciu giętkiego nasofaryngoskopu (FNF) w pozostałych grupach wiekowych. Metody te są najbardziej odpowiednie, ponieważ nie zakłócają procesu diagnostycznego i umożliwiają lekarzowi dobrą współpracę z pacjentem.

SŁOWA KLUCZOWE: przerost migdałka gardłowego, giętka, endoskopia, RTG boczno-nosogardła, nasofaryngoskopia

INTRODUCTION

Adenoid or nasopharyngeal tonsils are situated on the roof of the nasopharynx. Adenoids are a part of our lymphoepithelial system and play a protective role in upper respiratory tract diseases (1). Adenotonsillary hypertrophy is the growth of the Waldayer's ring, which is found in the nasopharyngeal region, due to usually contagious and obstructive causes. The diagnosis of adenoid hypertrophy rapidly increased since the "adenoid vegetation" term was used by Meyer in 1868 (2). At that time, adenoid hypertrophy was difficult to diagnose. Due to its location, i.e. in the posterior nasopharyngeal airway, it is difficult to assess its size and the degree of obstruction. Various methods such as lateral nasopharyngeal x-ray (LNX), videofluoroscopy, palpation and flexible nasopharyngoscopy (FNF) are available for the diagnosis of adenoid hypertrophy (3). FNF and LNX are the most frequently used preoperative methods in clinical practice (4). Standard diagnostic criteria may only be indicative and the diagnosis is made with FNF performed by an otorhinolaryngologist (ORL). Multiple methods have been developed to interpret the films, including the adenoid / nasopharynx ratio (ANR), which is a Fujioka method, in LNX graphy, described as a useful and reliable diagnostic tool in the patients with suspicion of adenoid hypertrophy (5). Currently, there is no clear age-specific test to help a physician in evaluating a child with suspicion of adenoid hypertrophy. Therefore, our aim is to determine in which age range, FNF and LNX, which are frequently used for the diagnosis of adenoid hypertrophy, are used more effectively and to provide clinical experience information to ORLs and pediatricians.

MATERIALS AND METHODS

Ethics Committee

Our study was conducted as a prospective cohort study by obtaining approval from the local ethics committee of our hospital (ethics committee no. 2016-111).

Participants

In our study, 281 pediatric patients aged 1 to 15 years were included who were admitted to our otolaryngology outpatient clinic with the complaints of nasal obstruction, snoring, sleep apnea between April 2016 and February 2017 and who were examined with FNF with the pre-diagnosis of adenoid hypertrophy. All FNF examinations were evaluated by a single physician and the patients were divided into four groups according to the quality of the performed endoscopic examination (Table-1).

Exclusion criteria

Except for adenoid hypertrophy, the pediatric patients with nasopharyngeal mass secondary to obstructive sleep apnea, those with the diagnoses of nasal foreign body, nasal septum deviation, antrochoanal polyp, nasal polyp, those who had previously undergone nasal endoscopy and oronasal operation and those with cognitive dysfunction and genetic diagnoses were excluded from the study.

Endoscopic assessment

The endoscopic evaluation was performed in a closed room,

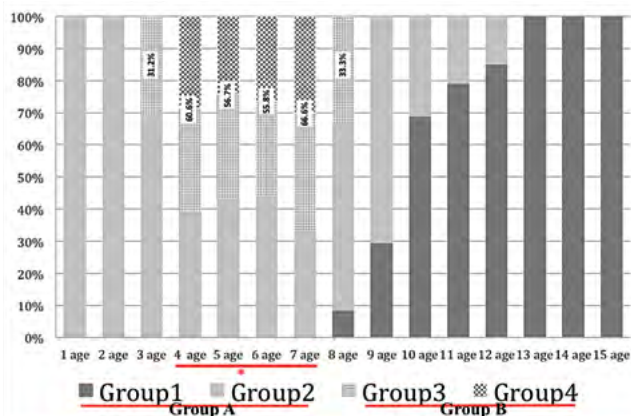


Fig. 1. Percentage of groups according to age.

Tab. I. Groups according to the quality of the performed endoscopic examination.

	OCENA	OBJAŚNIENIE	
Group-1	Optimal assessment	Without parental assistance	
Group-2	Assisted-optimal assessment	Clear assessment of adenoid hypertrophy obstruction with parental assistance	Group A
Group-3	Assisted-suboptimal assessment	Inability to clearly assess adenoid hypertrophy obstruction with parental assistance	Group B
Group-4	Could not be assessed	Inability to visualize adenoid tissue with parental assistance	

at normal room temperature (24 °C), under the conditions of sufficiently bright examination room, with the attendance of only one parent.

The patient was seated in a vertical position on the parent's lap or on his/her own in the examination chair. Prior to endoscopic assessment, topical spray (Vemcaine %10 Pump Spray©) containing 1%-10% lidocaine was administered to both nasal cavities. A 2.8-mm-thick flexible nasopharyngoscope was used to perform endoscopic examination. The degree of choanal obstruction was recorded as percentage (%) by providing the image of adenoid tissue. When the examination was suboptimal and could not be performed, the patient was referred to LNX and the assessment of adenoid tissue was made with the ANR ratio.

Statistical method: Mean, standard deviation, median, the lowest and the highest value, frequency and ratio values were used for the descriptive statistics of the data. The distribution of the variables was measured with the Kolmogorov-Smirnov test. The SPSS 22.0 program was used for the analyzes.

RESULTS:

The mean age of the included pediatric patients was found to be 7.33 ± 3.46 years. Of the patients, 161 were girls, 120 were boys. Patients were divided into four groups according to the quality of endoscopic examination. There were 73 patients in Group 1, 118 patients in Group 2, 55 patients in Group 3, and 35 patients in Group 4. The mean ages of the groups were 10.72 ± 2.11 , 6.74 ± 2.93 , 5.81 ± 1.41 , and 5.78 ± 0.92 years, respectively (Table-2). The age range was 8-15 years for Group-1, 1-12 years for Group-2, 3-8 years for Group-3 and the ages of 4,5,6 and 7 years for Group-4. Optimal images were obtained with FNF in the patients aged 1-2 and 8-15 years and the predicted images were provided for choanal obstruction. However, no image could be obtained with FNF for the assessment of choanal obstruction in more than 30% of patients between the age of 3 and 8 years (31.2% and 33.3%, respectively), and in more than 50% of the patients at 4, 5, 6 and 7 years of age (60.6%, 56.7%, 55.8%, 66.6%, respectively), (Figure 1). For this reason, the degree of choanal obstruction of the patients was assessed with LNX and ANR.

DISCUSSION

In the presented prospective cohort study, we performed a practical analysis that can be used by ORLs and pediatricians as a diagnostic method for adenoid hypertrophy which is frequently encountered in their outpatient clinics. To our knowledge, this is the first such a study in the literature. The basic findings of the study can be summarized as follows: more than 50% of the pediatric patients in the age group of 4, 5, 6 and 7 years could not be assessed optimally with FNF; therefore, for optimal assessment of adenoid hypertrophy, LNX was performed as the second investigation. Thus, LNX for the assessment of adenoid hypertrophy in the age group of 4, 5, 6 and 7 years would be more appropriate.

Symptomatic adenoid hypertrophy is a common disease in the pediatric population. Adenoidectomy is one of the most commonly used operations in this population. Due to its location in the posterior nasopharyngeal region, the degree of adenoid hypertrophy and its size are difficult to assess. Numerous methods were discovered to evaluate the correlation of adenoid tissue with nasopharyngeal airway. LNX and FNF are frequently used to assess the size of adenoid tissues. However, many studies were conducted to find the best way to determine the size and location of adenoid tissue in the preoperative period (6-7). No studies regarding the age range in which these two commonly used assessments can be used optimally prompted us to conduct this study and thus provide useful information to physicians in clinical practice.

Tab. II. Age distributions of groups.

	AGE			TOTAL	
	MEAN \pm S.D.	MED (MIN-MAX)	N-%	FEMALE N-%	MALE N-%
Study Group	7,33 \pm 3,46	7 (1-15)	281	132 - 46%	149 - 54%
Group 1	10,72 \pm 2,11	11 (8-15)	73 - 25,97%	30	43
Group 2	6,74 \pm 2,93	6 (1-12)	118 - 41,99%	61	57
Group 3	5,81 \pm 1,41	6 (3-8)	55 - 19,57%	29	26
Group 4	5,78 \pm 0,92	6 (4-7)	35 - 12,45%	12	23

Tab. III. Statistical analysis by age and sex between group A and group B.

		GROUP A		GROUP B		P
		MEAN \pm S.D.	MED (MIN-MAX)	MEAN \pm S.D.	MED (MIN-MAX)	
Age		8,14 \pm 3,83	7 1-15	5,62 \pm 1,39	6 3-8	0.000 ^T
		n	%	n	%	
Sex	Female	81	42,4%	51	56,7%	0.167 ^C
	Male	110	57,6%	39	43,3%	

^TIndependent samples t-test / ^CChi-square test

FNF is a painless, reliable, and easily-tolerable diagnostic method when used under appropriate conditions with appropriate endoscopies, and yields subjective results (8,9). However, the assessment of the images acquired during FNF shows variations among physicians. Looking at the literature, the adenoid tissue volume and the values and assessments of choanal obstruction ratio are based on the subjective estimation of experts (6). The visualization of adenoid hypertrophy-associated choanal obstruction via FNF along with apneic symptoms is an indication for adenoidectomy for many physicians. However, this method is sometimes difficult in pediatric patients. The compliance of pediatric patients with this procedure is not easy and they may be afraid of the procedure. Another problem is that pediatricians are not always able to find an ORL to evaluate adenoid tissue by nasal endoscopy. Therefore, LNX is important for pediatricians.

LNXs are often used by pediatricians and ORLs to evaluate adenoid tissue in clinics. This method is easy to perform and tolerate particularly in pediatric patients. It has some disadvantages such as superposition of anatomic structures and radiation (10). One study reported that patient's positional change and respiratory movements may affect the x-rays of anatomic

tissues (11). There are many studies in the literature on the association of LNX with adenoid tissue volume and nasopharyngeal area thickness (12-14). ANR was discovered in 1979 by ANR Fujioka et al. to assess the volume of adenoid tissue (19). Numerous clinical trials suggested that this ratio correlated significantly with clinical manifestations (16). Saedi et al. compared the diagnostic measurement methods of adenoid tissue and concluded that FNF and LNX films were complementary (17). Considering the advantages and disadvantages of FNF and LNX, there is a need for a study examining in which age group they can be used for preoperative evaluation. For this reason, in our study, we attempted to provide an explanation which tests are more appropriate for pediatric age groups by evaluating the diagnostic tests according to the age of the patient.

CONCLUSION:

We reached a conclusion that for the optimal assessment of adenoid hypertrophy, LNX graphy for pediatric patients in the age group of 4, 5, 6 and 7 years and FNF for the other age groups are more appropriate methods not to disturb the polyclinic process of a physician and patient compliance.

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