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Original research article

Adenoidectomy effects on middle ear function in patients with chronic adenoiditis

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Abstract

Background and Objectives: An inflammatory disease of the middle ear known as otitis media with effusion is defined by the presence of endotympanic fluid without any indication of an acute ear infection. The purpose of this study was to check for any associations between hearing loss in these children and the degree of adenoid hypertrophy, as well as to examine the effects of adenoidectomy on middle ear function in children with chronic adenoiditis.

Methods: 60 patients were utilized of each gender. This cross-sectional investigation was carried out on patients presenting to the ENT outpatient department at Department of ENT and Head and Neck Surgery, Ayaan Institute of Medical Sciences, Hyderabad, Telangana, India, with chronic adenoiditis from November 2021 to October 2022. The approach of consecutive sampling was utilized.

Result: According to the study's findings, an adenoidectomy effectively resolves middle ear effusion and significantly improves postoperative hearing. The accepted standard of therapy for illnesses including obstructive sleep apnea syndrome and the cardio-respiratory effects of severe chronic adenoid enlargement is adenoidectomy. Conversely, less severe instances of chronic adenoiditis might not require surgery. Numerous randomised control studies have demonstrated how well nasal steroid spray treats allergic rhinitis and chronic adenoiditis.

Conclusion: Adenoidectomy successfully drains the middle ear fluid and results in a considerable postoperative hearing improvement, it can be asserted with assurance.

Keywords: Pure tone audiometry, adenoidectomy, otitis media

Introduction

The condition for which kids and their families visit a pediatrician the most commonly, aside from the common cold, is otitis media. The most typical cause of hearing loss in children nowadays is otitis media with effusion (OME) [1]. It can be identified by a buildup of serous or mucous fluid in the middle ear behind an intact tympanic membrane during an inflammatory process and the lack of acute infection signs and symptoms. Due to the success of endoscopic sinus surgery in the 1990s, endoscopic adenoidectomy—which permits for direct visualization throughout the procedure-became the logical next step after conventional adenoidectomy [2, 3].

The finding of the adenoid has had a bigger influence on history. The trans-natal ligature would be the primary explanation for Paul of Aegina's adenoid treatments to correct outward protrusion in the nose and upper neck in AD 640 [4]. Schneider of Wittenberg was the first to physically characterize the pharyngeal tonsil. Snoring, mouth breathing, a peculiar facial expression, a tendency for middle-ear disorders, deafness, and voice changes are all symptoms of adenoid vegetation hypertrophy. For adenoid resection, several different types of tools have been created. The procedure frequently resulted in severe bleeding, but it could always be stopped by chemical cauterization or irrigation with cold water [5, 6].

Methodology

60 patients were utilized of each gender. This cross-sectional investigation was carried out on patients presenting to the ENT outpatient department at Department of ENT and Head and Neck Surgery, Ayaan Institute of Medical Sciences, Hyderabad, Telangana, India, with chronic adenoiditis from November 2021 to October 2022.The approach of consecutive sampling was utilized.

Inclusion criteria

- Patients who present to the ENT
- OPD with grade 3, 4, and adenoid hypertrophy must be of either sex and be between the ages of 5

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and 12.

Exclusion criteria

- Patients with coagulation-related conditions.
- People who have craniofacial anomalies like cleft palates.
- Individuals suffering from systemic illnesses, neuromuscular conditions, or upper respiratory infections.

Results

Out of 60 patients, 10 patients were between the ages of 5-7 years, and 41 patients were older than 9 years.

Table 1: Site distribution by age group

Age group	Site			
	Choana	Multiple site	Peritubaric region	The superior part of the nasopharynx
<7	3	8	2	0
>7	13	10	20	3

The distribution of sites by age group in the choana (16), numerous sites (18), peritubaric regions (22) and the superior part of the nasopharynx (3) is discussed in table 1.

Table 2: Endoscopic grade distribution by age group

Age group	Endoscopic grading		Total
	Grade III	Grade IV	
<7	8	8	16
>7	32	12	44
Total	40	20	60

Table 2 shows the distribution of endoscopic grades by age group, with 40 people in grade III and 20 in grade IV.

Table 3: Age group distribution of radiological grading

Age group	Radiological grading			Total
	Mild	Moderate	Severe	
<7	6	4	3	13
>7	16	26	5	47
Total	22	30	8	60

Table 3 shows the distribution of radiological grading by age group, with 22 in the mild category, 30 in the moderate category, and 8 in the severe category.

Table 4: Age-group comparison of pre- and post-operative hearing improvement

Hearing improvement difference	Age group	N	Mean	Standard deviation
Preoperative - 1 month	<7	8	12.00	5.00
postoperative difference	>7	52	11.10	4.24
Preoperative - 3 months	<7	8	11.90	4.89
postoperative difference	>7	52	12.01	5.47

Table 4 compares pre and postoperative hearing improvement in age groups. The number of patients in Preoperative - 1 month was 8 and the number of patients in Postoperative difference was 52.

Table 5: Comparing the improvement in hearing at the location before and after surgery

Hearing improvement difference	Site	N	Mean	Standard deviation
Preoperative - 1-month postoperative difference	Choana	10	11.00	2.98
	Multiple site	15	14.10	3.87
	Peritubaric region	05	06.04	4.25
	The superior part of the nasopharynx	06	06.47	8.45
	Choana	04	04.21	5.01
Preoperative - 3 months	Multiple sites	16	16.54	5.65

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postoperative difference	The superior part of the nasopharynx	04	04.14	8.89

Table 5 compares pre and postoperative hearing improvement by choana, multiple sites, Peritubaric region, superior part of nasopharynx, and superior part of nasopharynx.

Table 6: Endoscopic grading of hearing improvement before and after surgery

Hearing improvement difference	Endoscopic grading	Mean	Standard deviation
Preoperative - 1-month	Grade III	10.54	5.00
postoperative difference	Grade IV	11.41	4.21
Preoperative - 3 months	Grade III	11.54	4.48
Postoperative difference	Grade IV	10.87	4.47

Table 6 includes the mean and standard deviation for the comparison of pre- and postoperative hearing improvement in endoscopic grading as III and IV.

Table 7: Radiological grading of pre- and post-operative hearing improvement

Hearing improvement difference	Radiological grading	N	Mean	Standard deviation
Preoperative - 1-month	Mild	14	11.01	5.14
Preoperative - 3 months postoperative difference	Mild	15	13.00	4.89
	Moderate	25	12.47	4.47
	Severe	06	12.14	5.01

In radiological gradings as mild, severe, and moderate as 15, 25, and 06, Table 7 compares pre- and postoperative hearing improvement along with their standard deviation.

Discussion

Adenoidectomy is the established standard of therapy for disorders including obstructive sleep apnea syndrome and cardio-respiratory consequences connected to severe chronic adenoid hypertrophy. On the other hand, less severe instances of chronic adenoiditis may be treated without surgery. Nasal steroid spray has been shown to be beneficial in treating chronic adenoiditis and allergic rhinitis in several randomized control studies. 50% of the patients, according to Brooks' research, were between the ages of 5-7. It has been looked at Reddy's research, which led to comparable outcomes. Children who are seven years old and older tend to be the age range in which the adenoid is most obvious [7, 8].

There is a little male majority in our study as compared to the female participants. Tos and Stangerup have shown that male children had a greater prevalence of SOM than female children because men predominate in childhood illnesses. However, Paradise *et al*. found no discernible gender difference in the frequency of SOM. Male teens are more prone than female teenagers to get childhood contamination since they are exposed to allergic and contagious people more frequently [9-11].

Nasal obstruction/snoring, nasal discharge, hearing problems, and fullness were all symptoms described by the patients. Reddy used to receive a lot of criticism for his lectures since he was hard to hear. In the research by Georgalas *et al*., patients exhibited mouth breathing, snoring, rhinorrhea, and coughing [12]. The major cause of middle ear effusion and malfunction of the Eustachian tube in children, as has already been mentioned, is hypertrophic adenoiditis, which affects the nasopharyngeal lymphoid tissue, a component of the Waldeyer ring. An adenoidectomy should be carried out to ensure the auditory tubes are functioning properly.

The first adenoidectomy was performed in 1885, and its utilization peaked in the 1960s. From one author to the next, the acknowledged indications for this kind of surgery vary. In situations of chronic rhinoadenoiditis connected to recurrent otitis media with effusion, it remains the treatment of choice. After an adenoidectomy, several studies shown a significant improvement in Eustachian tube function. In their study, Koloudik *et al*. shown that adenoidectomy can be effective in 82–90% of cases [13-15].

In 78% of instances, otoscopy revealed TM that was dull and amber in color. Previously, it was anticipated that 58% of TM would be retractable. The research only focused on air bubbles 8% of the time. A dull eardrum was the most prevalent otoscopic observation in Syed *et al*. In several areas, including the choana and the most desirable section of the pharynx, the majority of the specimens had peritubaric area pollution apparent [16]. 34% and 66% of patients, respectively, exhibited grade four and grade three adenoid hypertrophy. This study was analogous to that of Hibbert and Stell, who likewise discovered a connection between AH and OME degrees. This shows that in individuals with adenoid hypertrophy, the development ofadenoid hypertrophy is significantly predicted by the growth of it. The typical audiometry readings prior to surgery, after one month, and after three months are 24.2, 13.28, and 12.2, respectively. The p-value is statistically significant if it is less than 0.0001. Hearing improvement compared to preoperative to one month and three months is statistically insignificant with age p values of

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0.894 and 0.812, gender p values of 0.901 and 0.913, location p values of 0.939 and 0.971, adenoid grading of 0.466 and 0.603, and radiological grading of 0.974 and 0.777 [17-19].
The average conductive listening loss, as reported by Fria *et al*., is 27 dB, but the average was 24.5 dB, as reported by OM. Dempster and Mackenzie's investigation in Glasgow has shown a 26 dB listening loss. The suggest dB measured at seven weeks and six months, respectively, is 4.5 and 3.5 dB, according to Black *et al*. [20-23].

Conclusion

Adenoid hypertrophy in children makes them more susceptible to middle ear disease, which may have a poor impact on hearing. The blocking of the eustachian tube entrance by hypertrophied adenoids is one of the postulated causes of chronic middle ear disease, including otitis media with effusion and consequent hearing loss. Adenoidectomy is an excellent treatment for eustachian tube blockage in children with adenoid hypertrophy and for eliminating the cause of the illness. The results of the study indicate that an adenoidectomy considerably improves postoperative hearing and efficiently treats middle ear effusion.

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Conflict of interest: None

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