

EFFECT OF ADENOTONSILLECTOMY ON PULMONARY HYPERTENSION SECONDARY TO ADENOTONSILLAR HYPERTROPHY

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Introduction

Adenotonsillar hypertrophy (ATH) is a common condition in children, often leading to nasal obstruction, obstructive sleep apnea (OSA), and other systemic complications. One significant but vague consequence is pulmonary hypertension (PH), which arises from chronic upper airway obstruction, intermittent hypoxia, and reduced nitric oxide (NO) bioavailability. NO, produced primarily in the paranasal sinuses, plays a crucial role in pulmonary vasodilation. This study aimed to evaluate the prevalence of PH in children with ATH and assess the impact of adenotonsillectomy on PH.

Aim of the work

- 1-Estimate the prevalence of pulmonary hypertension in children with adenoidal or adenotonsillar hypertrophy.
- 2- Assess the impact of adenotonsillectomy on pulmonary hypertension in affected patients.

Patients and Methods

Study Design: Part 1: Comparative cross-sectional study conducted to screen all participants for PH and to identify associated factors.

Part 2: Interventional prospective study assessing the effect of adenotonsillectomy on PAP in echocardiography-confirmed cases.

Participants:150 children under 18 years scheduled for adenoidectomy or adenotonsillectomy, excluding children with preexisting cardiac or pulmonary conditions.

Conducted at the Department of Otorhinolaryngology, Faculty of Medicine, Alexandria University.

Assessment:Preoperative evaluations included detailed history, clinical examination, lateral nasopharyngeal X-rays (to calculate adenoid-nasopharynx ratio, ANR), tonsillar grading (using Friedman grading score), echocardiography (to measure pulmonary arterial pressure, PAP), and tympanometry.

Surgical Intervention:Conventional adenotonsillectomy was performed with postoperative echocardiography performed on PH-positive cases after three weeks.

Results

1-Prevalence of PH:

Among the 150 pediatric patients with ATH, 26 screened positive for PH, yielding a prevalence of 17.3% (95% CI: 11.5-24.3%) in this population. Children with elevated pulmonary arterial pressure had a mean PAP of 41.19 ± 3.14 mmHg (range: 36-50 mmHg).Figure 1.

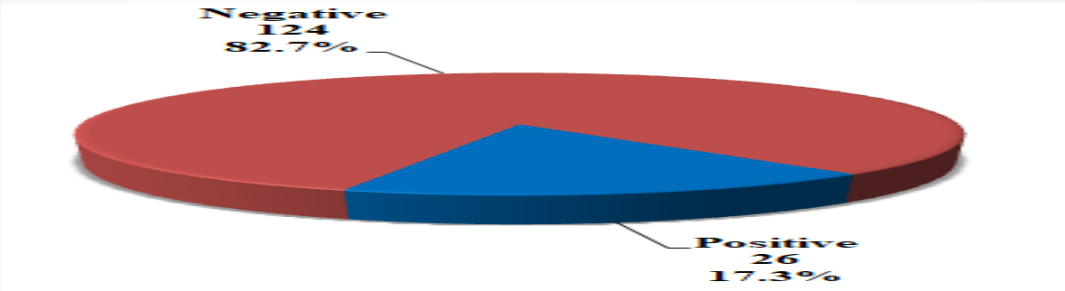


Figure (1) : Distribution of the studied cases according to echocardiography results (n = 150)

2 -Clinical and Structural Correlations:

- 1-PH affects younger age groups; children with a mean age of 5.25 years were more likely to develop pulmonary hypertension as compared to older children (mean age 6.56 years).
- 2-Among PH-positive patients, 50% (13/26 cases) had documented obstructive sleep apnea, compared to only 0.8% (1/124 cases) of the PH-negative group, revealing a strong association between OSA and PH in children with ATH (p value < 0.001)
- 3-Severe tonsillar hypertrophy (Grade 4) was significantly more common in PH-positive children (30.8% vs 8.9%, p=0.037). Those with combined severe adenotonsillar hypertrophy (AG4/TG4) had a sevenfold higher PH risk (p=0.022), this demonstrates a significant correlation between PH and severe upper airway obstruction. No significant correlation was found between PH and gender or adenoidal hypertrophy alone . table (1) & table (2)

Table (1): Comparison between the two studied groups according to tonsillar hypertrophy grading

	Total (n = 150)		Echocardiography				MCp
			Negative (n = 124)		Positive (n = 26)		
	No.	%	No.	%	No.	%	
Tonsils Grade							
Grade 1	18	12.0	16	12.9	2	7.7	0.037*
Grade 2	53	35.3	47	37.9	6	23.1	
Grade 3	60	40.0	50	40.3	10	38.5	
Grade 4	19	12.7	11	8.9	8	30.8	

Table (2):Comparison between the two studied groups according to combined adenoid & tonsil hypertrophy grading

	Total (n = 150)		Echocardiography				MC _p
			Negative (n = 124)		Positive (n = 26)		
	No.	%	No.	%	No.	%	
Adenoid & Tonsils Hypertrophy Grade							
A G3 TG3	8	5.3	7	5.6	1	3.8	0.022
AG3 TG4	1	0.7	0	0.0	1	3.8	
AG4 TG3	8	5.3	6	4.8	2	7.7	
AG4 TG4	5	3.3	2	1.6	3	11.5	
Other	128	85.3	109	87.9	19	73.1	

3- Postoperative outcomes

Adenotonsillectomy resulted in normalization of pulmonary arterial pressure in 92.3% of PH-positive children, while only 7.7% showed persistent PH postoperatively (p<0.001) . Table (3)

Table (3):Comparison between pre-operative and post-operative pulmonary arterial pressure in the positive echocardiography group (n = 26)

	Preoperative		Postoperative		p
	No.	%	No.	%	
Pulmonary arterial pressure (PAP)					
Normal	0	0.0	24	92.3	McN _p <0.001*
High	26	100.0	2	7.7	
Min. – Max.	36.0 – 50.0				
Mean ± SD.	41.19 ± 3.14				
Median (IQR)	40.0 (40.0 – 43.0)				

Conclusion

Adenotonsillar hypertrophy (ATH) is a significant risk factor PH in children, with 17% prevalence overall and highest risk in those with concurrent OSA . Major risk factors include younger age children,with either severe tonsillar hypertrophy (grade 4) or combined adenoid-tonsil obstruction. Adentonsillectomy showed high efficacy in normalizing PAP, confirming its role as a cardiopulmonary protective intervention. This study established PH in ATH as a reversible, obstruction-driven condition mediated by mechanical factors, intermittent hypoxia, and nitric oxide deficiency. These finding advocate for routine PH screening for severe ATH (Grades 3-4).Early adenotonsillectomy in OSA/severe obstruction cases.Multidisciplinary collaboration between ENT, pediatric cardiologist and sleep specialists to optimize outcomes

