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A prospective study to determine the incidence of atopy in children undergoing adenotonsillectomy for obstructive sleep apnea

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KEYWORDS
Obstructive sleep apnea;
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Summary

Objectives: To investigate the relationship between adenotonsillar hypertrophy seen in pediatric obstructive sleep apnea and upper airway allergy to airborne allergens.
Methods: A prospective study of Radioallergosorbent (RAST) tests to common airborne allergens in children (<16 years old) undergoing adenotonsillectomy for obstructive sleep apnea in a London Teaching Hospital.
Results: 20.9% of patients had a positive RAST result to house dust mite, 2.8% to cat hair, 0% to mixed feather, 7.8% to mixed grass pollen and 3.8% to dog hair.
Conclusions: This study does not support the hypothesis that the adenotonsillar hypertrophy seen in pediatric patients with obstructive sleep apnea is contributed to by allergy to airborne allergens. It is possible that there is a localized allergic reaction in the upper respiratory tract mucosa which is not apparent on an assay of systemic IgE.

1. Introduction

Obstructive sleep apnea (OSA) is a common condition where during sleep, there are recurrent episodes of cessation of airflow despite persistent effort due to a mechanical obstruction anywhere from the nose to the vocal cords [1]. Episodes of apnea lead to hypoxia and hypercapnia, which stimulates an increase in sympathetic output causing a rise in heart rate and blood pressure. This causes subcortical arousal which enables the individual to relieve the airway obstruction by changing their body position. OSA occurs in adults and children although the two groups usually have different etiologies. In children the vast majority of cases are due to adenoidal and tonsillar hypertrophy and as a consequence, the normal treatment for children with obstructive sleep apnea is adenotonsillectomy [2].

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Table 1 Study population demographics

117 patients
65 male, 52 female
Mean age: 4.5 years
Median age: 4 years
Age range: 1—14 years

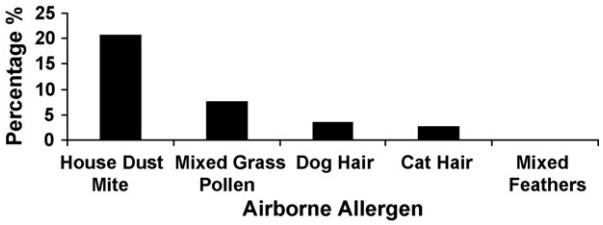

Fig. 1 Percentages of patients with positive RAST tests to common airborne allergens.

Little is known about why certain children develop adenotonsillar hypertrophy leading to sleep apnea. Known risk groups for OSA in children are symptoms of rhinosinusitis, obesity, African descent, a family history of OSA, and children with craniofacial abnormalities. In children OSA leads to a poor quality sleep and substantial associated morbidity for the affected patient [3]. Symptoms include snoring, restless sleep, excessive nocturnal sweating, bed wetting, increased total sleep, daytime sleepiness or more commonly hyperactivity, irritability, lack of concentration, a dry mouth and morning headaches. Signs include chronic mouth breathing, failure to thrive, broken facial capillaries due to chronic hypercapnia, pectus escavatum from longstanding intercostal recession during sleep, pulmonary hypertension and in extreme cases right heart failure.

In this paper we set out to test our hypothesis that the adenotonsillar hypertrophy seen in obstructive sleep apnea patients is related to upper airway allergy to airborne allergens by prospectively carrying out Radioallergosorbent (RAST) tests on pediatric patients with obstructive sleep apnea.

2. Methods

All children (<16 years of age) under the care of the third author at a London teaching hospital who were undergoing adenotonsillectomy for OSA between January 2003 and April 2004 for obstructive sleep apnea were considered for inclusion in the study. Patients with craniofacial abnormalities were excluded from the study. Obstructive sleep was diagnosed clinically with a symptom questionnaire and with a pre operative sleep study. Sleep studies were carried out by nurse observed continuous pulse oximetry monitoring of oxygen saturations and heart rate with documentation of snoring, arousals and desaturations of less than 97% on room air or if the diagnosis was in doubt a sleep study was carried out with video, audio and pulse oximetry monitoring of oxygen saturations and heart monitoring. Blood was taken during the general anesthetic and sent for RAST testing (Pharmacia Immunocap) to house dust mite (dermatophygoides pteryonyssinus), feathers, grass pollen, cat hair, and dog hair. Informed consent for taking a blood sample peri-operatively to investigate allergy and to take part in the study was obtained from the parents of the patients preoperatively. All the parents consented to this. The RAST result was graded 0 (no reactivity) to 6 (strongly reactive). Tonsils were also sent for histological examination which is routine practice at our center. This study was discussed with the local ethics committee but as RAST testing in this patient group was routine practice in our department before the start of the study it was deemed that ethics approval was not required as this was an audit of our current practice.

3. Results

One hundred and seventeen patients were included in the study (Table 1) with a mean age of 4.5 years (range 1—14). Seven patients were not included due to clinical error. The results of the RAST tests are shown in Table 2 and Fig. 1. Histology from all the tonsils showed lymphoid hypertrophy with no indication of etiology.

Table 2 RAST test results

Allergen	Number of patients tested	Number of +ve tests	RAST grading					
			1+	2+	3+	4+	5+	6+
House dust mite	115	24	3	5	6	3	1	6
Cat hair	109	3	0	1	2	0	0	0
Mixed feather	87	0	0	0	0	0	0	0
Mixed grass pollen	102	8	0	3	2	1	1	1
Dog hair	53	2	0	1	1	0	0	0