Allergol Immunopathol (Madr). 2018;46(4):311–312

Allergologia et immunopathologia

Sociedad Española de Inmunología Clínica, Alergología y Asma Pediátrica

www.elsevier.es/ai

EDITORIAL

From rhinitis to asthma: Is small airway disfunction the clue?

Several epidemiological studies have consistently shown the coexistence of rhinitis and asthma in the same individual. The International Study of Asthma and Allergies in Childhood (ISAAC) in its phase One demonstrated, in spite a wide variety of prevalence rates of rhinitis and asthma, that there is a significant correlation between both conditions.[1,2]

Currently, the upper and lower airways are considered the same anatomical and physiological unit as it has robust evidence both epidemiologically, pathophysiologically, genetically and even therapeutically. It is known that many patients with rhinitis suffer from unspecific bronchial hyperresponsiveness (BHR) without asthma symptoms. This is part of the so-called ''atopic march'' which has resulted in the paradigm called ''one airway disease'' or ''one airway, one disease''.[3,4]

Rhinitis precedes asthma inception in many individuals and can contribute to asthma ill-control. It is also an independent risk factor for asthma. However, and despite this connection probably multifaceted, not all patients with rhinitis have asthma and *vice versa*.[1,3,4] Garcia-Marcos et al.[5] using ISAAC phase Two methodology, analysed a sample of 739 children sensitised exclusively to *Dermatophagoides pteronyssinus* and/or *farinae* and looked at their family history of asthma or rhinitis. Their findings show that the organ concerned in children tended to be also involved in their parents. Thus, the term ''one airway'' (for upper and lower) is probably not totally correct.

As rhinitis is a heterogeneous condition, it is of interest to analyse this association from the angle of different phenotypes. Lee et al.[6] studied a group of 512 children 6–8 years of age prospectively by means of the cluster analysis to identify subgroups of those with atopic rhinitis who were followed up for 4 years to detect new asthma and BHR cases. One of those clusters (number three) was characterised for having high prevalence of atopy and low lung function (most cases had FEF 25–75% < 80%). No difference was found between clusters in terms of family history of allergic diseases. Cluster number three had a significantly higher incidence rates of asthma and BHR. This suggests that school children who are highly atopic and have lower lung function have higher likelihood of following the ''atopic march'' than children in other clusters. The authors of this study suggest that there might be specific factors which could act on children with rhinitis leading to asthma (maybe via small airway dysfunction – SAD) and which might be used as predictive diagnostic factors for asthma.

There are different available techniques for assessing the airway although none seems to be a good tool for measuring SAD.[7] It has been suggested that SDA maybe present when there are low values of FEF 27–75% with normal values of FEV1, FVC y FEV1/FVC together with symptoms and high levels of eosinophils.

Recently, Haccuria et al.[8] have shown, by means of the analysis of inert gas ventilation heterogeneity and the measurement of exhaled nitric oxide, that patients with allergic rhinitis without asthma have similar SAD than patients with asthma. Other authors had previously shown SAD in children with rhinitis but with not so sophisticated measurement approaches such as impulse oscillometry after methacholine challenge and after bronchodilation.[9] All these findings might support SAD as the link between allergic rhinitis and allergic asthma under the paradigm of ''one airway, one disease''.

In this issue of Allergologia et Immunopathologia, Skylogianni et al.[10] describe the first longitudinal study in which SAD is investigated by means of forced oscillometry (FOT) to predict asthma inception in children with rhinitis. The authors follow up 73 children with allergic rhinitis from 6 to 11 years of age. They define SAD as ΔRrs at 608 Hz $\geq -30\%$ and/or ΔXrs at 808 Hz $\geq 50\%$ after bronchodilation. SAD in the context of a rhinitis attack is the only independent predictive factor for asthma inception, masquerading other factors such as asthma in parents or eczema in the children.

If SAD is the link between rhinitis and asthma inception, there are two questions that we should ask and try and answer: In which patients with rhinitis should we assess SAD and how would we do it? And, once SAD is diagnosed which strategies should we follow to stop its progression to asthma?

The ARIA (Allergic Rhinitis and its Impact on Asthma) guide considers all patients with persistent rhinitis should

https://doi.org/10.1016/j.aller.2018.06.001

be routinely investigated for asthma,[1] although it is possible that apart from the rhinitis type and severity, other biomarkers should be investigated in patients with rhinitis without asthma symptoms.[6] A different question (still to be answered) is how SAD should be diagnosed.[7]

If SAD is an independent risk factor for asthma development[10] we could probably develop strategies to prevent that development, especially during the first years of life, when immune system plasticity is higher. The study published in this issue of the journal sheds some light on the prognostic value of altered lung function tests without symptoms in children, although more longitudinal studies are needed to confirm the role of SAD in asthma development in patients with rhinitis. The potential of an early intervention with the objective of modifying the natural history of allergic diseases continues to be attractive and promising, however, too many aspects are still unclear.

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