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Letter to the editor

Nasal decongestion testing and lung function in patients with allergic rhinitis

Test de décongestion nasale et fonction pulmonaire chez des patients avec rhinite allergique

Keywords: Allergic rhinitis; Decongestion test; Nasal obstruction; Rhinomanometry; Spirometry

Mots clés : Rhinite allergique ; Test de décongestion ; Obstruction nasale ; Rhinomanométrie ; Spirométrie

To the Editor,

Allergic rhinitis (AR) is characterized by mucosal inflammation that may be considered a *condicio sine qua non* of AR [1]. Asthma is also defined a chronic inflammatory disorder of lower airways. Therefore, allergic airway inflammation may induce airflow limitation both at nasal and bronchial level. A close link between AR and asthma has been also widely reported [2].

Bronchial airflow may be easily assessed by spirometry that measures some parameters, including the forced expiratory volume at one second (FEV₁) that is considered the gold standard to define bronchial obstruction. Likewise, nasal obstruction has been defined as the key symptom in AR patients [3] and may be objectively measured using rhinomanometry. Moreover, the nasal decongestion testing evaluates the potential reversibility of nasal airflow obstruction consequent to the administration of an intranasal vasoconstrictor [4]. It was demonstrated that the response to decongestion depends on the severity of allergic inflammation [4].

On the other hand, there is no study that investigated the possible effect of nasal decongestion testing on lung function in AR patients. Therefore, the aim of this preliminary study was to evaluate a group of AR patients for investigating the effect of nasal decongestion testing on lung function, mainly concerning FEV₁.

Study design: the study included 22 male patients (mean age 27 years) with AR. All of them were evaluated performing rhinomanometry, nasal decongestion testing, and spirometry. All of them were Navy sailors who had to refer to Navy Hospital for mandatory periodic visit for maintaining the qualification. The Navy Review Board approved the procedure and all patients gave their informed written consent. The patients were included in the study on the basis of AR diagnosis according to validated criteria

[2]. We excluded subjects who met the following exclusion criteria: any prior history of asthma or presence of asthma symptoms, including cough, wheezing, dyspnea, and breathlessness, abnormal spirometry (e.g. FEV₁ < 80% of predicted and FEV₁/forced vital capacity [FVC] < 0.75), acute or chronic upper respiratory infections, nasal polyps, previous or current specific immunotherapy, and use of nasal or oral corticosteroids, nasal or oral vasoconstrictors, antileukotrienes, and antihistamines during the previous 4 weeks (if they assumed pharmacologic treatment, they were asked to return after stopping medications for 4 weeks).

Spirometry was performed with a computer-assisted spirometer (Pulmolab 435-spiro 235, Morgan, England). Briefly, three blows (every 5 min) and the best result were considered.

Nasal airflow was measured by active anterior electronic rhinomanometry (ZAN 100 Rhino Flow Handy II, ZAN, Messgeraete GmbH, Germany) according to validated criteria [5]. Nasal airflow was considered as the sum of recorded airflow through the right and left nostrils, measured in milliliter per second at a pressure difference of 150 Pa across the nasal passage.

Decongestion testing was performed following validated criteria [4]. After baseline rhinomanometry, two sprays of naphazoline (1 mg/mL) were applied per nostril. This drug is a potent α -adrenostimulator that induces rapid vasoconstriction. Rhinomanometry was performed 5 and 10 min later. The higher response was considered.

Statistical analysis was performed considering mean and standard deviation (SD) reported for continuous features. Spearman's rank correlation coefficient was used to evaluate correlation between baseline rhinomanometric characteristics and Δ of rhinomanometric characteristics. A *P*-value of 0.05 was considered statistically significant and SPSS version 18 (IBM Corp.) was used for analysis.

All patients suffered from AR due to pollen allergy: six were monosensitized to *Parietaria judaica*, five were monosensitized to birch, and 11 were sensitized to both. FEV₁ (expressed as percent of predicted value) had a mean value of 110 and a SD of 7.90. The basal nasal airflow was significantly and moderately related with basal FEV₁ ($r = 0.47$) as shown in Fig. 1, whereas it was strongly and negatively related with Δ airflow after decongestion ($r = -0.69$), as reported in Table 1. The Δ nasal airflow after decongestion was moderately and negatively related to basal FEV₁ ($r = -0.46$).

AR and asthma are closely related [2]. The present study investigated the response to decongestion tests in AR patients.

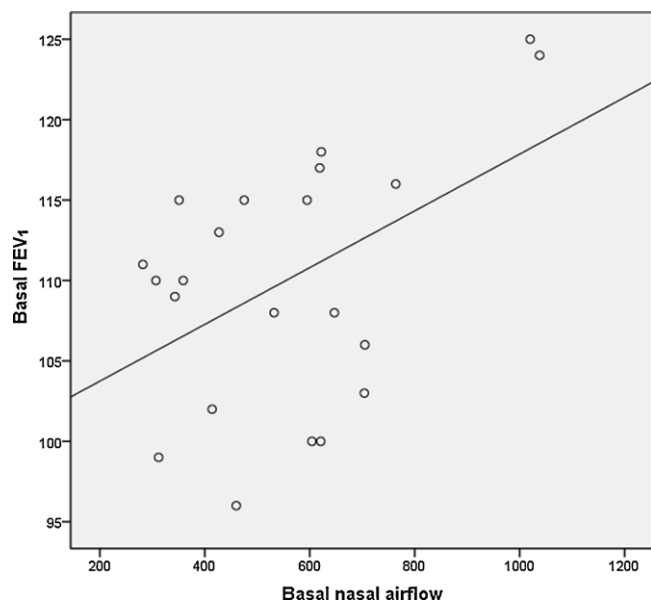


Fig. 1. Relationship between forced expiratory volume at one second (FEV_1) values (expressed as percent of predicted) and nasal airflow at baseline.

First, this study demonstrated that FEV_1 significantly correlated with the basal nasal airflow; these findings underline the close relationship between nasal and lung function. In other words, this result means that more air passes through the nose more air goes out the bronchi. Therefore, nasal patency may significantly affect bronchial airflow.

Second, the basal nasal airflow is inversely and strongly related to the variation (Δ) after decongestion testing: it means that more is elevated the nasal airflow, more is reduced the response to decongestion. In other words, if the nasal airflow is normal, there is no room for increasing the quantity of air passing through the nasal cavity.

Third, the variation of nasal airflow after decongestion (Δ) is negatively related with FEV_1 (Δ). This result suggests that a low nasal airflow response to nasal decongestion could be associated with normal FEV_1 value. In other words, this finding suggests that a poor response to decongestion testing could be associated with normal lung function.

The possible clinical implication of this study could be that nasal decongestion testing may suggest also information on lung function. The present study shows that both basal and after decongestion nasal airflow seem to be related with lung function.

However, this preliminary has some limitations: it was performed in a restricted group of AR patients and they were all males. Thus, further studies should be conducted to confirm these findings.

Table 1

Relationships between nasal airflow and lung function before and after decongestion testing.

	Basal nasal airflow	Δ nasal airflow after decongestion
<i>Basal FEV₁</i>		
<i>r</i>	0.47	−0.46
<i>P</i> -value	0.027	0.032
<i>Δ nasal airflow post decongestion</i>		
<i>r</i>	−0.69	–
<i>P</i> -value	< 0.001	

FEV_1 : forced expiratory volume at one second.

In conclusion, this preliminary study provides the first evidence that nasal decongestion testing could suggest information also on lung function.

Disclosure of interest

The authors declare that they have no conflicts of interest concerning this article.

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