Integrated approach to diagnosis of associated occupational asthma and rhinitis

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Patients with coexisting work-related rhinitis and asthma would benefit from an adequate and simultaneous recognition of both diseases. The present case illustrates the advantages and importance of using an integrated approach to confirm a diagnosis of occupational rhinitis (OR) and occupational asthma (OA).

A 38-year-old woman, who worked as an animal laboratory technician since 2004, first noticed the appearance of rhinitis and conjunctivitis symptoms in 2007 when she was exposed to rats. A skin-prick test with rat extract was strongly positive. A specific inhalation challenge with parallel assessment of nasal and bronchial responses was conducted. After 10 min of exposure, she developed rhinitis and conjunctivitis symptoms, her forced expiratory volume in 1 s (FEV1) dropped by 27.5% and her nasal volume, measured by acoustic rhinometry, decreased by 80% from baseline values. After allergen exposure, induced sputum and nasal lavage examination demonstrated an increase in eosinophils (11% and 20%, respectively). A diagnosis of associated allergic OA and OR was confirmed and she was advised to stop working with rats.

A systematic and parallel diagnostic approach enables confirmation of a diagnosis of OA and OR in patients complaining of work-related rhinitis and asthma symptoms.

Key Words: Occupational asthma; Occupational rhinitis; Specific inhalation challenge; United airway disease

Lung function tests showed a forced expiratory volume in 1 s (FEV1) of 2.69 L (89% predicted), a forced vital capacity (FVC) of 3.11 L (87% predicted) and a provocative concentration of methacholine causing a 20% decline in FEV1 of 4.1 mg/mL. Specific inhalation challenge (SIC) by the realistic method, using an exposure chamber with supplementary assessment of nasal responses, was conducted at the hospital following the usual protocol. The exposure method was the same on control and active challenge days. Working conditions were simulated by manipulating the control substance as well as rat litters used at the workplace. She was not on any medication except a short-acting inhaled beta-agonist, which she seldom took and which was withheld for 24 h before challenge. On the first day, she was exposed to a control substance, similar in nature to the suspected agent, for 30 min to assess nonspecific bronchial and nasal responses and to assess whether asthma and rhinitis were stable. The assessment of lung function involved monitoring FEV1 before exposure and then every 10 min for 1 h, every 30 min for 2 h, then hourly for a total of 8 h. Because she was challenged with a high molecular weight agent, exposure was performed on a single day because this category of agents causes immediate or dual reactions (1). The metacholine challenge test and induced sputum (IS) examination were performed at the end of control and active challenge days. The assessment of nasal responses during SIC was performed in parallel with the assessment of lung responses. During each SIC session, nasal responses were objectively monitored by acoustic rhinometry adhering to a method previously described (2) to assess changes in nasal volume and by nasal lavage.
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![Figure 1](image)

**Figure 1** Changes in forced expiratory volume in 1 s (FEV1) (left panel) and total nasal volume (right panel) after control and allergen challenge. Provocation day (circle) and control day (triangle).

(NAL) to assess changes in inflammatory cells (3). On the control day, there was no significant change in FEV1 or nasal volume after exposure to lactose, which was used as the control agent. At the end of the control day, IS and NAL eosinophils were 4.0% and 3.4%, respectively. The following day, after exposure to rat allergens, she developed rhinitis and conjunctivitis symptoms and her FEV1 dropped by 27.5% and her nasal volume by 80% from baseline after 10 min of exposure (Figure 1). After exposure, IS and NAL examination at 6 h and 30 min, respectively, demonstrated an increase in eosinophil counts (11% and 20%, respectively) compared with baseline (NAL) and to values on the control day (IS). A diagnosis of associated OA and OR was made, and she was advised to stop working with rats and to continue treatment for her rhinitis and asthma symptoms.

**DISCUSSION**

During the past few years, the global pathogenic view of respiratory allergy has changed. Asthma and rhinitis often coexist, suggesting the concept of a ‘united airway disease’ (4). Occupational respiratory diseases represent an interesting model to study the relationship between rhinitis and asthma. Indeed, evidence is increasing showing the frequent coexistence of both diseases at the workplace (5,6). The definition of OA is widely accepted and defined as:

...a disease characterized by variable airflow limitation and/or hyperresponsiveness and/or inflammation due to causes and conditions attributable to a particular occupational environment and not to stimuli encountered outside the workplace.

A recent definition of OR modelled in that of OA has been proposed:

OR is an inflammatory disease of the nose which is characterized by intermittent or persistent symptoms (i.e. nasal congestion, sneezing, rhinorrhea, itching), and/or variable nasal airflow limitation and/or hypersecretion due to causes and conditions attributable to a particular work environment and not to stimuli encountered outside the workplace (7).

Moreover, guidelines for the diagnosis of this condition using objective means have been proposed (7). The key issue in the above definitions is the objective demonstration of changes in functional lung and nasal parameters. In the context of work-related symptoms, a diagnosis of both OR and OA have medicolegal consequences, making a comprehensive investigation using objective diagnostic tools imperative.

The present case illustrates the diagnostic approach followed at our institution to assess a suspected case of associated OR and OA due to laboratory animal allergens, which is a frequent cause of work-related rhinitis and asthma (8). The investigation of OR and OA includes both assessing the presence of rhinitis and asthma, and demonstrating their work-relatedness. A detailed medical and occupational history is the first step in the investigation; however, the clinical history has a low specificity to establish a diagnosis, which should be confirmed by objective tests (9,10). Once the diagnosis of OA and/or OR is suspected by the clinical history, it can be confirmed by performing SIC. This test is considered to be the ‘gold standard’ for confirming OA. In contrast, there is no standardized procedure to confirm OR; however, assessment of changes in clinical and functional parameters by means of objective and subjective methods during nasal provocation testing represents the current recommended approach for confirming OR (7). In summary, the present case illustrates the feasibility of an integrated diagnostic approach for patients complaining of work-related respiratory symptoms suggestive of OR and OA. Such an approach is feasible, convenient and, therefore, recommended because there are known implications for therapy. In fact, it has been shown that treatment of allergic rhinitis with intranasal corticosteroids has the capacity to modulate different aspects of the inflammatory cascade, which may lead to improvement in asthma symptoms and lung functional parameters (11). Ultimately, the results of an optimal ‘united’ diagnosis and management of rhinitis and asthma could translate into better outcomes in addition to fair compensation for patients with OA and OR.

**Post-test**

- A detailed medical and occupational history and physical examination is the first step in the investigation. This should be followed by immunological tests to assess sensitization to common inhalants and specific occupational allergens. The diagnosis of OA and OR is confirmed by specific inhalation challenge with objective monitoring of lung and nasal functional and inflammatory parameters.
REFERENCES