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Nasal allergen challenge in clinical practice – A real life study

Maciej Kupczyk *, Kamila Malewska, Aleksandra Pyziak, Aleksandra Szostakowska, Piotr Kuna

Division of Internal Medicine, Asthma and Allergy, Medical University of Lodz, Poland

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ABSTRACT

Nasal allergen challenge represents, together with skin tests and specific IgE, one of the basic diagnostic tools used in allergology. The goals of the study were to evaluate types of allergens used, the clinical picture of the challenge, and its safety in our daily clinical practice. In total 136 challenges in 109 patients were analyzed. The study group included 60 women and 49 men, with an average age of 34 years. In 15 patients (13.8% of the study group), apart from allergic rhinitis, bronchial asthma was also diagnosed. Eighty-two patients (75.23%) were challenged with 1, and 27 subjects (24.77%) with 2 allergens. The majority of challenges were performed with house dust mites (58 challenges, 42.6%), followed by *Alternaria*, mugwort, grasses, birch, hazel, and alder. The clinical picture mimicked the symptoms reported after the natural exposure to the specific allergen. The mean score after the allergen challenge in the group with the positive result was 154.95 points ($p < 0.05$ vs control solution), and in those with negative challenge 36.67 points. Side effects after the challenge, including itchy throat, cough, dyspnea and facial pruritus, were reported by 21 patients. None of side effects was serious or required any medical intervention. Among evaluated factors only female sex (OR 3.59, 95% CI 1.33–9.68, $p = 0.012$), but not diagnosis of asthma, 2 challenges per day or the type of allergen used, was associated with a higher risk of adverse events. In conclusions, nasal allergen challenge represents safe and valuable diagnostic tool in our clinical practice.

Introduction

Controlled allergen exposure tests represent, together with skin tests and specific IgE levels, one of the basic diagnostic methods used in allergology. We can distinguish specific challenges (exposure to suspected allergen, symptoms develop typically in IgE dependent mechanism) and non-specific challenges (e.g., with histamine, methacholine, capsaicin and other stimuli). Due to the way of exposure, we distinguish

* *Corresponding author at*: Division of Internal Medicine, Asthma and Allergy, Medical University of Lodz, ul. Kopcińskiego 22, 90-153 Łódź, Poland. Tel.: +48 426776950; fax: +48 426776950.
E-mail address: maciej.kupczyk@umed.pl (M. Kupczyk).

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nasal, conjunctival, bronchial, oral and intravenous challenges. It seems that due to the simplicity of implementation into the clinical practice, the nasal challenge is the most common. The standards, the mechanisms and the rules of the evaluation of the challenge results are broadly presented in the guidelines of the Polish Society of Allergology [1] and the European Academy of Allergology and Clinical Immunology [2]. The primary indications for nasal challenge with allergen include: confirmation of clinical diagnosis in case of interpretation difficulties and discrepancies in other tests results and in comparison to clinical picture, qualification for specific immunotherapy, monitoring of pharmacotherapy [3] and specific immunotherapy [4], and in scientific research. An interesting modification of the controlled exposure trial is the chamber exposure challenge (e.g. Vienna chamber [5]) in which patients are exposed to a specific type and dose of allergen. The basis for evaluating the challenge is the presence of typical clinical symptoms. In the case of nasal provocation, the most typical symptoms include itching, sneezing, the appearance of secretion and swelling of the nasal mucosa. The point or analog scales represent the main tool for symptom evaluation. It seems that the assessment of clinical symptoms is sufficient in daily practice. It is recommended to add the assessment of objective parameters such as rhinometry, acoustic rhinometry [6], assessment of peak inspiratory flow (PNIF). Other studies, including the assessment of cell influx into nasal washings, levels of proinflammatory mediators [7], the measurement of nitric oxide in the exhaled air are of importance in scientific research.

The purpose of the study was to evaluate the course of nasal challenges with specific allergens, the analysis of the types of allergens used, the clinical picture of the challenge and its safety in our daily clinical practice.

Methods

The study was performed at the Department of Internal Diseases, Asthma and Allergy, Medical University of Lodz and medical histories of all patients who had nasal allergen challenge performed in 1 year (2012) were analyzed. The allergen type, symptoms (collected using the analog scale, VAS (Fig. 1)), symptoms variability depending on the applied allergen and potential side effects reported by the patient within 30 min after the challenge were studied. Clinical manifestations usually include watery, runny nose, blockage and itching of the nose, sneezing, runny discharge on the back of the throat, and itchy eyes. Symptoms after challenge were assessed using the analog scale (VAS). The score for each symptom on the analog scale is 0–100. The maximum possible score is 600 points. At the same time, the patient was encouraged to add, if needed, the presence of other symptoms, not reported on the scale (e.g. dyspnea).

Methodology of performing intranasal challenge

Intranasal challenge was performed in line with the standards of the Polish Society of Allergology [1]. Patients qualified for challenge by the referring physician, after discontinuation of drugs that affect nasal mucosa reactivity, after 10–20 min of adaptation to environmental conditions, had performed a rhinoscopic examination and baseline clinical evaluation using the VAS scale. The control fluid solution (allergen carrier) was administered to both nostrils, followed by re-assessment of VAS symptoms after 15–20 min. The allergen was administered with a standardized atomizer. Volume of the administered dose equal to 0.2 ml of the allergen solution. The standard allergen extracts (Allergopharma-Nexter, Przyszowice, Poland) were used at the concentration of 5000 SBE/ml. In the case of suspected severe allergy to a given allergen, it was possible to reduce the dose by preparing further dilutions. The allergen application was performed after deep inspiration when the patient was holding on his breath. This procedure is recommended to reduce the risk of aspiration of the allergen to the lower respiratory tract. After 15–20 min, symptoms were reassessed with the VAS scale. A positive test result was defined as an increase in symptom severity by at least 20% compared to the value after administration of the control solution. In case the symptom severity after administration of the control solution was over 20% compared to placebo, the further allergen challenge was abandoned. In selected cases, due to medical indications, 2 challenges were performed on 1 day, only when the result of the first attempt was negative. After the challenge patient was observed for 30 min. In case of any distressing symptoms after the challenge from the upper or lower respiratory tract, rescue drugs were available.

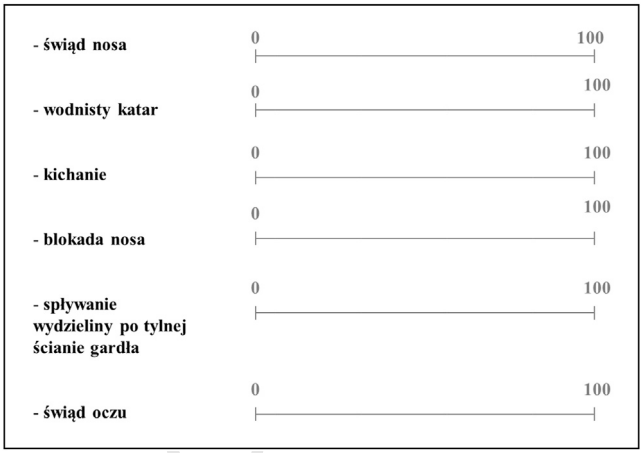

Fig. 1 – Visual analog scale (in Polish) used for the determination of the symptoms after the challenge

Statistical analysis

Descriptive statistic was used to analyze the study results. Wilcoxon's test was used for paired data. To study factors potentially associated with risk of adverse events after the allergen challenge odds ratios (OR) and relative risk (RR) in univariate analysis were calculated. Chi-square test (or Fisher's exact test wherever appropriate) was applied. Multivariate logistic regression model including all potential predictors was built and adjusted for sex, age and asthma

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