

Nasal peak-flow-rate recording is useful in detecting allergic nasal reactions – a case report

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Serial nasal peak-expiratory-flow-rate recordings have been used to detect changes in nasal patency. A hospital nurse with allergy to latex showed a marked decrease in nasal flow when exposed to latex gloves in a challenge test and in her work environment. We propose using the method as a diagnostic tool for allergic rhinitis in occupational and other exposure situations in which nasal blockage is a prominent symptom.

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Nasal peak-flow-rate (PEFR_N) recordings have been used to detect changes in nasal patency in pharmacologic treatment of rhinitis (10), allergen challenges (8, 10), and occupational exposure (11). The PEFR_N correlates closely with nasal airway resistance and has therefore been proposed as a simple method to assess the degree of nasal obstruction (4, 7). A blockage index (BI), calculated as a function of bronchial PEFR (PEFR_B) by the formula (PEFR_B–PEFR_N)/PEFR_B, also correlates closely with nasal airway resistance and is less dependent on the total expiratory effort, and it may therefore be a better measure of nasal patency than PEFR_N (7). In this case report of allergy to latex gloves, the method detected a significant nasal obstruction in exposure situations.

Case report

The patient was a 30-year-old nurse with heredity of eczema and asthma. In 1984, she had an allergic skin reaction to penicillin but otherwise no history of allergy. She started to work with inpatients in 1980, and since 1984 as a hospital nurse in an operation ward, using surgical gloves daily in patient care. Her sterilization tasks also involved frequent contact with aldehydes (formaldehyde, glutaraldehyde, and succinic acid aldehyde). She handled several types of instruments and catheters made of rubber.

In the beginning of the 1990s, the patient experi-

enced localized contact urticaria when wearing latex gloves; therefore, she began to wear nonlatex gloves. Despite this, she experienced more sneezing, nasal running and blockage, cough, skin rash, and itching, initially during the sterilization tasks but gradually also whenever she was in the operation ward. After work, the symptoms disappeared quickly, but for the last 2 years she had had slight nasal blockage even on days off work.

Examinations

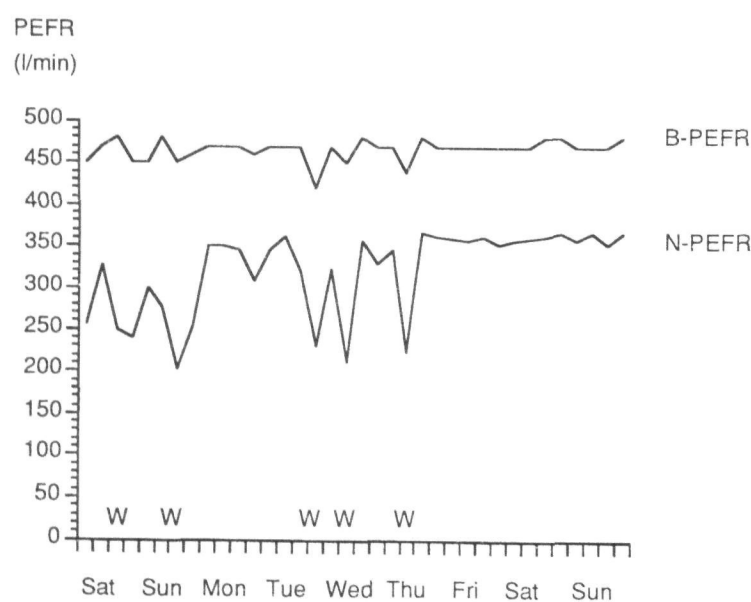
Physical examination revealed no abnormalities in the skin or mucous membranes, or at lung auscultation. Laboratory tests showed a normal blood cell count. Phadiatop was negative, and total IgE was normal (53 kU/l). RAST was weakly positive to latex (0.6 kU/l) but negative to cat, dog, mite (*Dermatophagoides pteronyssinus*), birch, timothy, mugwort, four types of molds, penicillin, formaldehyde, and glutaraldehyde. Skin prick tests were positive to cat (1+) and latex extract (2+).

For visualization of the respiratory complaints at work, serial PEFR_Bs and PEFR_Ns were recorded. A mini-Wright peak-expiratory-flow meter (Airmed) was used for PEFR_B recording, and by connecting it to an anesthetic mask by an adapter, PEFR_N could be recorded by forced expiration through the nose into the mask with closed lips. The PEFRs were

recorded directly after the patient woke in the morning and at 1100, 1500, and 2000 for 9 consecutive days. Three $PEFR_B$ s, followed by three $PEFR_N$ s, were recorded each time, and of the three recordings the highest $PEFR_B$ and the mean of the $PEFR_N$ s were used. The main reasons for using the mean $PEFR_N$ value were the possibility of false high records because of mouth leakage and false low values because of mask leakage in the uncontrolled situation of a self-administered test. For further details, we refer readers to previous method descriptions (9, 11). In the more controlled situation of the challenge test, the best $PEFR_B$ and the best $PEFR_N$ records were used.

Immediately before each $PEFR$ recording, the patient rated her subjectively perceived degree of nasal symptoms (running, blocked, and itching nose) as well as cough, dyspnea, and skin itch on a psychophysical scale ranging from 0 (= no complaint at all) to 10 (= greatest complaint) (3). Fig. 1 shows her symptom increase (especially nasal symptoms) and concomitant $PEFR$ decrease (especially $PEFR_N$) at work. The correlation between $PEFR_N$ and the calculated BI was high ($r = -0.994$; $P < 0.001$), verifying that a nasal obstruction was measured.

Challenge tests were done with the patient wearing powdered general purpose latex gloves, which she repeatedly took off and put on, and alternatively smelled and shook in front of her nose for 15 min. Skin itch, cough, and nasal blockage started within



Maximum rating score per day:

Running nose	4	3	0	3	3	3	0	0	0
Blocked nose	3	4	1	4	4	4	1	1	1
Itching nose	3	3	0	4	4	5	0	0	0
Cough	0	0	0	2	2	2	0	0	0
Dyspnea	0	1	0	1	2	2	0	0	0
Skin itch	3	0	0	2	2	5	0	0	0

Fig. 1. Serial bronchial and nasal $PEFR$ recording and symptom rating scores on 9 consecutive days. W = working day.

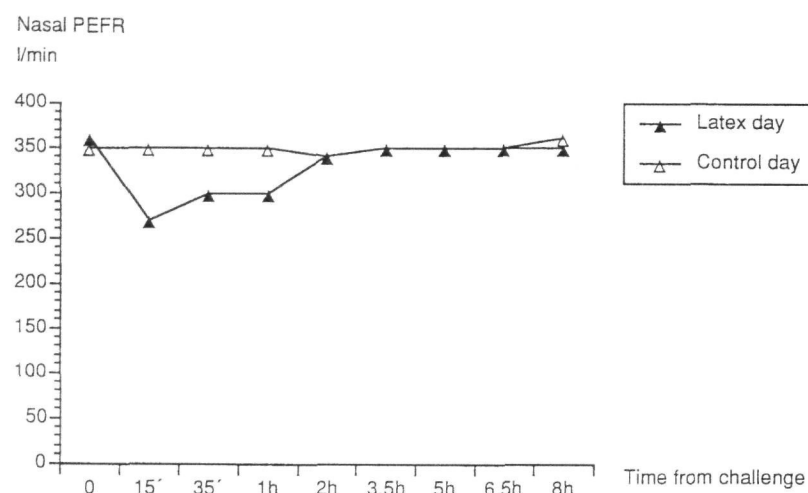


Fig. 2. $PEFR$ recordings after challenge test with latex gloves and during control day with no exposure.

the first 5 min, and serial $PEFR$ s showed an immediate moderate nasal obstructive reaction but no late reaction (Fig. 2). Challenge by handling latex-free gloves was not done, but serial $PEFR_N$ recordings during a control day with no exposure showed little variability. A $PEFR_N$ decrease was observed also after a similar challenge by smelling the sterilizing liquid (Gigasept®) containing 11% succinic acid aldehyde. No $PEFR_B$ decrease was observed during these challenges.

Discussion

Exposure to latex may cause contact urticaria, rhinoconjunctivitis, asthma, and anaphylaxis (6). In our case, sensitization to latex was confirmed by positive RAST and skin prick test, supported by an immediate nasal reaction after challenge with latex gloves. However, it is possible that the irritating properties of the aldehydes and other airborne irritants may have contributed to the nasal symptoms by nonspecific mechanisms. Serial measurements of $PEFR_N$ clearly visualized the work-related nasal blockage. Examination of the workplace revealed several sources of latex; for example, catheters and latex gloves used by the other employees, and airborne latex exposure from contaminated glove powder probably had contributed to her symptoms, as proposed by other authors (1, 2, 5). We propose using serial $PEFR_N$ recordings as a diagnostic tool in work-related allergic or nonallergic rhinitis, especially when nasal blockage is a prominent symptom and bronchial symptoms are weak or absent.

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