Reactive airways dysfunction syndrome from acute inhalation of dishwasher detergent powder

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CASE REPORT

Reactive airways dysfunction syndrome from acute inhalation of dishwasher detergent powder


Reactive airways dysfunction syndrome, a type of occupational asthma without a latency period, is induced by irritating vapour, fumes or smoke. The present report is the first to describe a case of reactive airways dysfunction syndrome caused by acute exposure to dishwashing powder containing sodium metasilicate and sodium dichloroisocyanurate. The diagnosis was based on exposure data, clinical symptoms and signs, as well as respiratory function tests. A 43-year-old non-atopic male apprentice cook developed respiratory symptoms immediately after exposure to a cloud of detergent powder that was made airborne by vigorous shaking of the package. In spirometry, combined obstructive and restrictive ventilatory impairment developed, and the histamine challenge test revealed bronchial hyper-responsiveness. Even routine handling of a strongly caustic detergent, such as filling a dishwasher container, is not entirely risk free and should be performed with caution.

Key Words: Cleansing; Occupational exposure; Occupational lung disease; Sodium dichloroisocyanurate; Sodium metasilicate

Reactive airways dysfunction syndrome (RADS) is characterized by the immediate onset of asthma that follows a single exposure to irritating vapour, fumes or smoke (1). More than 30 different substances have been associated with the onset of RADS (2).

It is well-known from paediatric practice that ingestion or inhalation of strongly alkaline laundry or dishwasher powders by toddlers may cause serious respiratory and esophageal injury (3). To our knowledge, this association has not been previously reported in a pediatric setting.

CASE PRESENTATION

The patient was a 43-year-old man who worked for 25 years as a carpet layer without exposure to known respiratory sensitizers. At the time of the incident, he was, because of nonrespiratory health problems, undergoing retraining to become a cook within a vocational rehabilitation program. His medical history revealed neither atopic dermatitis nor perennial rhinitis in his childhood. He was an occasional, sporadic smoker, at most smoking one pack in a week. Before the incident, he was, because of nonrespiratory health problems, showing slight bronchial hyper-reactivity (Table 1). Because the patient did not find employment as a cook after the vocational rehabilitation, he returned to his former trade as a carpet layer approximately 18 months after the incident.

Spirometry performed two days after the incident suggested mild obstruction based on a slightly decreased maximal expiratory flow of 50% of vital capacity (58% of the predicted value) (4) (Table 1). At discharge, inhaled beclomethasone dipropionate medication (2000 μg/day) was continued with salbutamol inhalations on demand.

After the incident, the patient was taken without a delay to the emergency unit of a central hospital situated in the community. He still experienced cough but not dyspnea. Lung auscultation was normal and his peak expiratory flow rate was 380 L/min. A chest x-ray was normal. He was treated with nebulized salbutamol and beclomethasone dipropionate (4000 μg/day) aerosol inhalations. The cough subsided during the course of two days of observation in the hospital. Spirometry performed two days after the incident suggested mild obstruction based on a slightly decreased maximal expiratory flow of 50% of vital capacity (58% of the predicted value) (4) (Table 1). At discharge, inhaled beclomethasone dipropionate medication (2000 μg/day in the first week, 1000 μg/day thereafter) was continued with salbutamol inhalations on demand.

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Five years after the incident, the patient’s insurance company retrospectively requested the Finnish Institute of Occupational Health (FIOH) to re-evaluate the patient’s health status for the qualification process of an occupational accident. He continued to occasionally experience dyspnea and used salbutamol on demand, despite regular beclomethasone medication (400 μg/day). At the FIOH, spirometry continued to show mild obstruction. The diagnosis of RADS was made based on the following: acute inhalation of dishwasher detergent powder; the concurrent emergence of persistent respiratory symptoms; chronic occurrence of mild bronchial obstruction (both obstruction and restriction); and persistent bronchial hyper-reactivity in follow-up lung examinations (Table 1). After the examinations, the patient was advised to continue using inhaled, on-demand beclomethasone dipropionate medication with salbutamol on demand.

**DISCUSSION**

The criteria of RADS suggested by Brooks et al (1) are commonly used. These criteria include a documented absence of preceding respiratory complaints and onset of symptoms after a single specific exposure incident to an irritating gas, smoke, fumes or vapour present in very high concentrations. Furthermore, the onset of symptoms should occur within 24 h after the exposure and persist for at least three months, the symptoms should be consistent with asthma (cough, wheezing, chest tightness and dyspnea) and while pulmonary function tests might show airflow obstruction, methacholine challenge testing should be positive and other types of pulmonary disease should be ruled out. The obstructive lung disease in our patient fulfilled these criteria, except he developed a combined (both restrictive and obstructive) ventilatory impairment.

Cleaning agents are typically composed of active ingredients that depend on the technical function of the cleaning agent, additives and, usually, water (6). Active components include surfactants, complexing agents or water softeners, disinfectants, and acidic or alkaline substances. Alkaline agents dissolve calcium and fatty substances, improve the effect of surfactants by regulating the pH of the solution and inhibit the corrosion of metal surfaces (6). Active components include surfactants, complexing agents or water softeners, disinfectants, and acidic or alkaline substances. Alkaline agents dissolve calcium and fatty substances, improve the effect of surfactants by regulating the pH of the solution and inhibit the corrosion of metal surfaces (6). The continuous use of beclomethasone dipropionate medication with salbutamol on demand.

A case of RADS induced by acute inhalation of dishwasher detergent containing sodium metasilicate and sodium dichloroisocyanurate is described for the first time. Typical for our patient was the development of respiratory symptoms. The continuous use of beclomethasone dipropionate medication with salbutamol on demand.

**CONCLUSION**

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**REFERENCES**
