

Think Twice: Misleading Food-Induced Respiratory Symptoms in Children with Food Allergy

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Summary. Reported food-related symptoms of patients may sometimes be misleading. A correct delineation of food-induced symptoms is often difficult and various differential diagnoses have to be considered. We report on two cases of food-induced, predominantly respiratory symptoms (in one case life-threatening) in children with food allergy. First, a two-year-old boy with no history of allergies and suspected foreign body aspiration which was finally diagnosed as an anaphylactic reaction to fish, and secondly a six-year-old girl with multiple food allergies and allergic asthma who during an electively performed oral food challenge developed severe respiratory distress, drop in blood pressure, and asphyxia not due to an anaphylactic reaction but due to choking on an unnoticed sweet. These two cases represent challenging, life-threatening symptom constellations involving food-induced reactions in food allergic children, reminding us to question first impressions. *Pediatr Pulmonol.* © 2013 Wiley Periodicals, Inc.

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INTRODUCTION

Patients with allergic food-related reactions may present with a varied pattern of clinical symptoms upon food intake. Food allergy is an adverse immune response to food proteins, and the symptoms often involve the skin, the gastrointestinal tract, or the airways.^{1,2} Particularly problematic are anaphylactic reactions to foods, which are acute and life-threatening.^{3,4} The term “anaphylactic” has recently been redefined as the acute onset of a reaction (minutes to hours) with involvement of the skin, mucosal tissue, or both and at least one of the following:

- a. Respiratory compromise or
- b. Reduced blood pressure or symptoms of end-organ dysfunction;

Two or more of the following also occur rapidly after exposure to a likely allergen for that patient.

- a. Involvement of the skin/mucosal tissue,
- b. Respiratory compromise,
- c. Reduced blood pressure or associated symptoms and/or
- d. Persistent gastrointestinal symptoms,
- e. Reduced blood pressure after exposure to a known allergen.⁵

Respiratory symptoms have been shown to be involved in about 70% of cases, and asthmatic symptoms predominate in fatalities in children with known bronchial asthma.⁶

However, respiratory symptoms in children are generally very common. One typical acute, life-threatening

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[†]In memoriam.

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situation in the emergency department involves aspiration episodes of children, especially affecting infants under 3–4 years of age.^{7,8} Reviews describe that at the time of the accident, children had either been eating (41.1%) or playing (50.0%) and most of them were being supervised by an adult.⁸

As all acute and life-threatening situations place tremendous stress on participants, a correct delineation of (food-induced) symptoms is often difficult and various differential diagnoses have to be considered. The cases reported here represent challenging, life-threatening symptom constellations involving food-induced reactions in food allergic children.

CASE REPORTS

Case 1

M.C. is the only child of parents without known allergic diseases. In the family, only the paternal grandmother suffered from house dust-mite and pollen-related allergies. Pregnancy, delivery and early infancy had been uneventful, with no pronounced infections, no skin symptoms, or atopic eczema, and an uneventful introduction of solids foods. At 21 months of age, the boy ate fish, dark rye bread and Brussels sprouts in the evening and suddenly developed a severe coughing attack, with dyspnea, some reddish facial spots, and he laid himself down on the ground. The parents immediately called an ambulance and the boy was brought to our emergency department with suspected aspiration of fish (bones) or bread. M.C. had suffered from a slight respiratory infection the days before, but without coughing episodes. It was reported to be the first time that M.C. had eaten fish and Brussels sprouts.

Clinical examination revealed a boy in a generally stable condition with no cyanosis, an SaO₂ saturation of 97%, and a breathing frequency of 24–26/min. He resisted physical examination, which made the lung auscultation difficult, he suffered from hoarseness and salivation, a wheezing was noted on both sides of the lungs, and he had light hives on his neck.

The (venous) blood gas analysis was unspectacular (pH 7.38, BE-3.2, glucose 106 mmol/L), the differential blood count showed slight hypochromia and microcytosis (Hb 11.1 g/dl, MCH 22.3 pg, MCV 70 fl), all differential blood counts were in the normal range (including eosinophils 0.20/nl).

A bronchoscopy showed a pronounced oedema of vocal cords and larynx but no foreign body, conformable with mucosal swelling due to an allergic reaction (Fig. 1). The boy received steroids systemically for mucosal detumescence; oxygen was not necessary at any time and he recovered quickly.

After explicit questioning, the parents recalled that the boy had eaten fish once before and had developed swollen

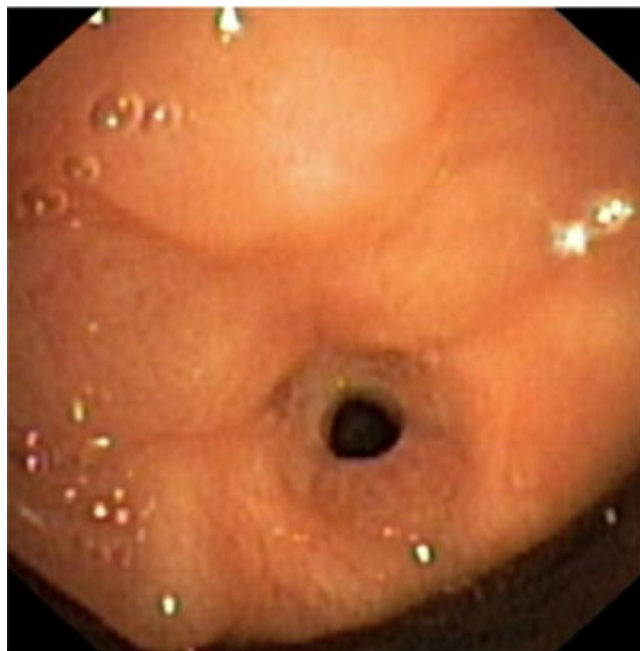


Fig. 1. Boy with anaphylactic reaction after fish showing the larynx with edema.

lips. Therefore they had avoided fish consumption for some time.

The promptly induced allergic diagnostic revealed multiple specific IgE sensitizations against various seafoods, including cod (specific-IgE: 1.68 kUA/L), herring (4.38 kUA/L), crab (1.36 kUA/L), and anchovies (0.35 kUA/L), as well as against soy (0.38 kUA/L) and wheat (0.77 kUA/L).

The parents were given training in handling rescue medication, including an adrenaline autoinjector, nutritional consultation was provided and oral food challenges are scheduled to verify food-allergies.

Case 2

L.H. is a nearly seven-year-old girl (6 $\frac{11}{12}$ years of age) with a classic allergic patient's history including atopic eczema, allergic asthma, and food allergies against peanut, hen's egg and cow's milk. She was admitted to hospital for elective oral food challenges. After an oral food challenge with cow's milk the girl developed mild cutaneous reactions (spontaneous resolving hives), but with no respiratory symptoms. The night was uneventful, the girl felt fine. The next morning, the iv-line was routinely checked in the course of preparation for the following food challenge. During the change of dressing, the girl started to feel uneasy, tried to clear her throat, had a strong salivation, started to choke, and said: "I can't breathe". She cried, lost consciousness, developed lip cyanosis, clenched her fists, and rolled her eyes. Her breathing was hardly audible, the oxygen saturation was

75% without improvement after salbutamol inhalation and oxygen per nasal tube (at first 3 L).

Diazepam was applied rectally for the developed spasm; assuming an anaphylactic reaction, adrenaline intramuscular, steroids, and fluids intravenously were given. The heartbeat was finally 100/min; the circular flow hypotonic (blood pressure 80/30 mmHg), oxygen saturation 60% with metabolic acidosis (BGA arterial: pH 7.2, BE-16, lactate 84 mg/dl, paCO_2 28 mmHg, paO_2 300 mmHg). The girl lost urine and stool. During the intubation process, she vomited a yellow, foamy liquid. At last she showed continuous improvement of vital parameters. Rhonchi on both sides of the lung but no wheezing was noted via chest auscultation. In the ICU, a bronchoscopy showed a sticky, syrup-like secretion in the distal third of the intubation tube and trachea with a mildly inflamed mucosa but no edema. As this sticky secretion was so unusual in the lung of an otherwise healthy child, and as the girl also developed yellowish, foamy vomits during the intubation process, suspicion of an aspiration or choking event came up for the first time. L.H. had indeed eaten big, chewy sweets ("Fruit Chews") right before the event (Fig. 2).

Later on, a chromatographic analysis of a bronchial, sticky secretion sample was performed and compared with a solution of the sweets the girl had eaten (Fig. 3). The analysis showed the same sugar components of the sweets and the aspirated bronchial secretion sample, supporting the assumption of a severe bolus-asphyxiation (choking) event.



Fig. 2. Sweets the girl had been eating.

DISCUSSION

In Case 1, the first assumed diagnosis was a foreign body aspiration of a fish bone due to the pronounced and immediate coughing attack while eating fish. The boy was at a typical age for aspiration episodes, he had no history of allergy/no atopic eczema. The physical examination was difficult due to his struggling; no chest-X-ray was performed. It was remarkable that the boy had "reddish spots" on his neck, which were later described as hives. Therefore two organ symptoms were involved: respiratory and skin, which are typical for anaphylactic reactions.

Although the involvement of the skin is the most frequently described symptom in anaphylaxis (80–90% of reported episodes), skin symptoms are absent or not recognized in 10–20% of the patients.^{9,10}

Previous history of anaphylaxis is suggested to be a reliable predictor of future anaphylaxis.¹¹ However, at least 65% of children presenting with anaphylaxis do not report a previous episode.^{12,13} Furthermore, there are studies indicating that "atopy" does not confer an additional risk of anaphylaxis.^{11,13} All these factors complicate finding the right diagnosis.

In Case 2, the first differential diagnosis was an anaphylactic reaction in the context of the food challenge the day before. The girl had the typical history of allergies, and even suffered from bronchial asthma. No allergic food had yet been given on the day of the event. Critically it should be noted that although late (allergic) reactions are known, the girl had mild, cutaneous symptoms (three hives) more than 19 hr before. On the day of the respiratory distress itself, no other symptoms typical for anaphylactic reactions were noticed, e.g., skin symptoms or the gastrointestinal symptoms.

The spasm or convulsion could also suggest epileptic seizure, but normal laboratory-parameters for creatin-kinase, an unusual clinical presentation, as well as unremarkable EEG findings did not support this diagnosis either. Alternatively, convulsions might indicate asphyxia! Other typical signs for asphyxia are tachycardia, breathing difficulties, high blood pressure, or cyanosis, symptoms, which were in part present. As cardiological examinations (echocardiography, ECG) were unremarkable, pulmonary embolism or cardiological causes were also discounted.

Because of the similarity between the secretion sample from the lungs and the sweet analysis, a choking event was shown to be the final cause of the severe respiratory distress. One may take into account that choking is the leading cause of death in children under 3 years of age, but it also plays a considerable role up to the age of 14 years.^{14–16}

In summary, the two cases represent challenging, life-threatening symptom constellations involving food-induced reactions in food allergic children and remind

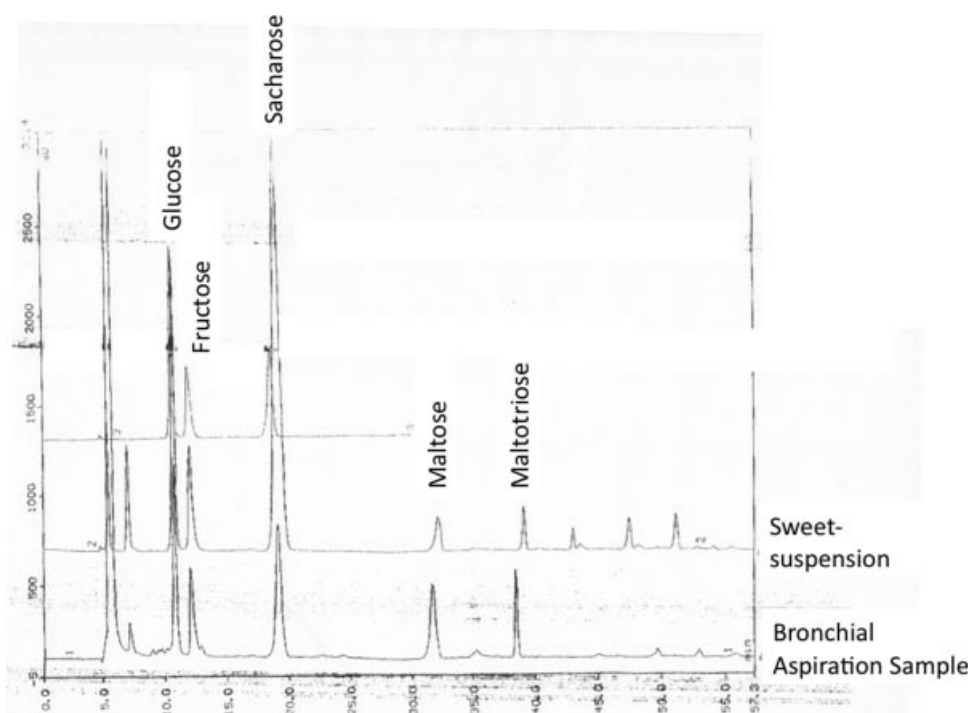


Fig. 3. Chromatographic analysis of bronchial aspiration sample and sweet suspension.

us to question first impressions of symptoms. This is also true for respiratory reactions, which seem to represent objective clinical signs and which usually indicate diagnosis-specific symptoms.

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