

# Bariatric Surgery: A Novel Risk Factor for Food Allergy?

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## Established Facts

- Impairment of gastrointestinal digestion (e.g., gastric hypoacidity) was found to be associated with an elevated risk for food allergy induction.

## Novel Insights

- We hypothesize that impairment of gastric digestion due to bariatric surgery might cause a transition from a mild oral allergy syndrome (OAS) to more generalized allergic reactions upon consumption of plant food containing Bet v 1 (*Betula verrucosa*) homologs.

## Key Words

Food allergy · Bariatric surgery · Immunoglobulin E · Oral allergy syndrome

## Abstract

In this case report, we describe a birch pollen-allergic patient in whom a Fobi pouch gastric bypass was associated with the transition from a mild, localized, birch pollen-related oral allergy syndrome to more severe, generalized allergic reactions to peach.

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## Introduction

Plant food allergy is an important health problem and can be acquired directly via genuine sensitization to a plant food allergen but also indirectly via cross-reactivity, called secondary food allergy [1]. In the latter case, sensitization mainly occurs via taxonomically closely or distantly related sources like pollen, *Hevea* latex, and *Cannabis sativa* that contain allergenic components displaying structural homology to the plant food allergens [2]. In northern and central Europe, secondary pollen-associated food allergies generally imply fruits, vegetables, legumes, and tree nuts, and most frequently result from immunoglobulin (IgE) cross-reactivity between food allergens and Bet v 1, the major birch pollen (*Betula verrucosa*) allergen [3].

These Bet v 1 homologs in plant foods are present in the peel and pulp of the fruits and do not resist heating or gastric degradation/digestion [4]. Therefore, most patients with a birch pollen-related food allergy present with local symptoms and discomfort confined to the oropharynx when eating raw fruits and vegetables. Typically, these patients report an itching and tingling of the lips and/or mouth and/or throat, also referred to as oral allergy syndrome (OAS). It is well established that alterations in the gastrointestinal environment due to the intake of reducers of gastric acid production (e.g., proton pump inhibitors) might represent a risk factor for de novo sensitization to food allergens [5–7]. In food-allergic patients, several risk factors and amplifying cofactors of anaphylaxis have been recognized [8], and it has been presumed that gastric acid suppression treatment might influence the extent of allergic symptoms in patients with an existing food allergy [9]. Recently, gastric bypass surgery has also been described as a risk factor for de novo food sensitization; it is being hypothesized that this is due to the impairment of gastric digestion [10, 11].

Here, we present a birch pollen-allergic patient in whom a Fobi pouch gastric bypass was associated with the transition from a mild, localized OAS to more severe, generalized allergic reactions upon eating plant food containing Bet v 1 homologs.

### Case Report

A 48-year-old woman attended our outpatients' clinic mid-2015 because of generalized urticaria, angioedema, and dyspnea immediately after eating fresh peeled peach.

Her history disclosed seasonal rhinoconjunctivitis, and she previously experienced symptoms of OAS to different plants including peach, plum, apple, cherry, pear, hazelnut, peanut, and walnut. Recently, she had not been started on any medication like H<sub>2</sub> antagonists, proton pump inhibitors, and/or antihypertensive drugs (e.g.,  $\beta$ -blockers and angiotensin-converting enzyme inhibitors) [8]. Notably, 3 months before the generalized allergic reaction, the patient underwent Fobi pouch gastric bypass for morbid obesity with a cholecystectomy. Subsequently, her BMI decreased from 35 to 23.

#### *Skin Prick Tests and Specific IgE Antibodies*

Skin tests with pollen allergens and quantification of specific IgE antibodies to pollen extracts (birch, Timothy grass, and mugwort) disclosed a birch and grass pollen sensitization. These sensitizations were further confirmed by component-resolved diagnosis (FEIA ImmunoCAP, Thermo Fisher Scientific, Uppsala, Sweden) with a positive sIgE result to recombinant Bet v 1 from birch pollen and Phl p 1 and Phl p 5b from Timothy grass (*Phleum pratense*) pollen. No sIgE antibodies were found to recombinant profilins (Bet v 2) and/or nonspecific recombinant lipid transfer protein (ns-LTP) from peach (Pru p 3, *Prunus persica*).

### Discussion

We describe a birch pollen-allergic, 48-year-old woman who previously had a mild, pollen-related OAS, and went on to develop a more severe generalized allergic reaction upon eating plant food containing Bet v 1 homologs.

Notably, our patient had undergone a Fobi pouch gastric bypass surgery a few months before experiencing her first anaphylactic reaction. During this procedure, a very small gastric pouch of 20 cm<sup>3</sup> is created, with a silastic Fobi ring around the pouch. A gastroenterostomy to a Roux-en-Y limb of the jejunum completes the operation. It has been hypothesized that this reduction of gastric volume has a major impact on the physiological function of the stomach, and may lead to gastric hypoacidity because of impaired gastric gland secretion [12]. This presumption is supported by the fact that the intake of proton pump inhibitors can frequently be decreased after bariatric surgery [13].

Therefore, we hypothesize that the aggravation of our patients' food allergy was likely due to the fact that gastric pH increases after bariatric surgery. We hypothesize that the presumed hypoacidity of the stomach that occurs due to bariatric surgery might cause a transition from mild OAS to more generalized allergic reactions upon consumption of plant food containing Bet v 1 homologs.

However, it should also be mentioned that 5% of patients with OAS progress spontaneously to a more generalized allergic reaction with systemic symptoms [14]. Therefore, in this patient, we cannot completely rule out a spontaneous aggravation of her food allergy symptoms. With the prevalence of morbid obesity on the rise, and as a consequence also gastric bypass surgery, it might be necessary to set up collaborative prospective studies to evaluate the exact impact of this surgical procedure on the sensitization to food allergens and/or the aggravation of existing IgE-mediated food allergies.

### Disclosure Statement

We have no conflicts of interest to declare. Didier Ebo is a Senior Clinical Researcher of the Research Foundation Flanders (FWO: 1800614N).

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