

Clinical Communications

Gastric bypass surgery: Risk for food allergy?

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Clinical Implications

- Gastric bypass does not seem to be a significant risk factor for new food allergies and/or aggravation of existing food allergies.

TO THE EDITOR:

As recently described in this journal, in northern European countries food allergies in adolescents and adults predominantly result from an IgE cross-reactivity between food allergens and aeroallergens, especially pollen.¹ The best-known representative of pollen-related food allergies is the “birch-fruit-vegetable syndrome,” which originates from a cross-reactivity between the major allergen Bet v 1 from birch pollen (*Betula verrucosa*) and its homologues in fruits, vegetables, and nuts. Another cross-reactive allergen is profilin, mainly involved in cross-reactivity between grass pollen and vegetables and fruits such as (water)melon, tomato, banana, pineapple, and orange. Because Bet v 1 homologues and profilins do not resist thermal processing nor gastric digestion, pollen-related food allergies generally present as an oral allergy syndrome (OAS) to raw fruits and vegetables.^{1,2} Alternatively, it has been assumed that the inhibition of gastric acid secretion by proton pump inhibitors and bariatric surgery, by lowering gastric digestion, might involve a risk for novel food allergies and/or worsening existing food allergies. We were the first to describe a patient with a birch pollen-associated OAS transiting to more generalized allergic reactions after gastric bypass surgery.³ Similar observations were recently reported in 8 Dutch patients, all sensitized to Bet v 1.⁴

Here, we report 13 pollen-sensitized patients (female patients $n = 12$) reporting the emergence of new food allergies or aggravation of their formerly mild allergic reactions after their gastric bypass surgery. Patients attended the outpatients' clinic of the Allergology/Immunology Department of the Antwerp University Hospital. Diagnosis of plant food allergy rested on history complemented with skin prick tests and specific IgE quantification (ImmunoCAP, Thermo Fisher Scientific, Uppsala, Sweden). Specific IgE level was considered positive if greater than or equal to 0.35 kUa/L. In 1 patient, an open oral food challenge test was performed because of equivocal test results.

As shown in Table 1, we included 12 patients with a Roux-en-Y gastric bypass (RYGB) and 1 with a total gastrectomy for morbid obesity. Four patients were operated in our university center; all other patients had their bariatric surgery in different medical centers and were referred to our allergy department for their allergy symptoms. All patients were sensitized to Bet v 1,

except 1 patient who was solely sensitized to Bet v 2 (profilin). Besides that, 3 of 13 (23.1%) patients showed sensitization for Pru p 3 (*Prunus persica*), the nonspecific lipid transfer protein of peach. This prevalence of nonspecific lipid transfer protein sensitization is in line with our earlier findings in pollen- and/or food-allergic patients in our region of whom 25% demonstrated a sensitization to nonspecific lipid transfer protein.⁵

After bariatric surgery, 5 patients transited from an OAS to a generalized allergic reaction and 8 patients developed novel food allergies. Median interval between surgery and onset/aggravation of food allergic symptoms was 2 years (0.5-13 years). As reported earlier, most of these generalized reactions appear to result from a sensitization to Bet v 1 homologues. However, from our data it appears that *de novo* food allergy after RYGB surgery can also emerge in patients monosensitized to profilin. Interestingly, next to sensitization to Bet v 1 and/or Bet v 2, 3 patients with *de novo* food allergies after their surgery did show sensitization to Pru p 3.

On the basis of our observational data and a recent publication from a Dutch study group,⁴ we further investigated whether bariatric surgery really constitutes a risk factor for novel or worsening food allergies. Therefore, we retrospectively studied 916 patients who underwent an RYGB surgery between 2012 and 2017 in the Department of Abdominal Surgery of the Antwerp University Hospital. This study was approved by the local ethics committee (B300201731909). A total of 544 patients gave their permission to participate in the study and completed the standardized questionnaire by telephone (response rate, 59.4%; mean age, 48.7 years; number of female patients = 374 of 544 [69.0 %]). The mean interval between surgery and completing the questionnaire was 3.7 years. Questions focused on atopic background, intake of medication, and food allergy. All patients who reported new food allergies and/or aggravation of symptoms were invited to visit our Allergology Department for additional history taking, skin tests, quantification of specific IgE (ImmunoCAP, Thermo Fisher Scientific), and, if indicated, a food challenge test.

As shown in Figure 1, 21 patients did report novel food-related symptoms after their gastric bypass surgery. However, in only 2 patients an IgE-mediated food allergy could be documented (2 of 544 [0.4%]; 95% CI, 0.01%-1.42%). Median time between RYGB surgery and developing generalized IgE-mediated food allergic symptoms was 2 years.

A total of 134 patients experienced symptoms of pollinosis (134 of 544 [24.6%]) before the gastric bypass surgery, of which 18 patients reported experiencing an OAS on raw plant food (18 of 134 [13.4%]; 95% CI, 8.58%-20.32%). After gastric bypass surgery, pollinosis was reported more frequently (151 of 544 [27.8%]) by our patients. This latest observation confirms the observation of Shakeri-Leidenmuhler et al⁶; in this study, sensitization to inhalant allergens was more frequently described postsurgery. In our population, 2 patients reported transition of OAS to more generalized allergic symptoms after gastric bypass surgery (2 of 18 [11.1%]; 95% CI, 1.86%-34.1%).

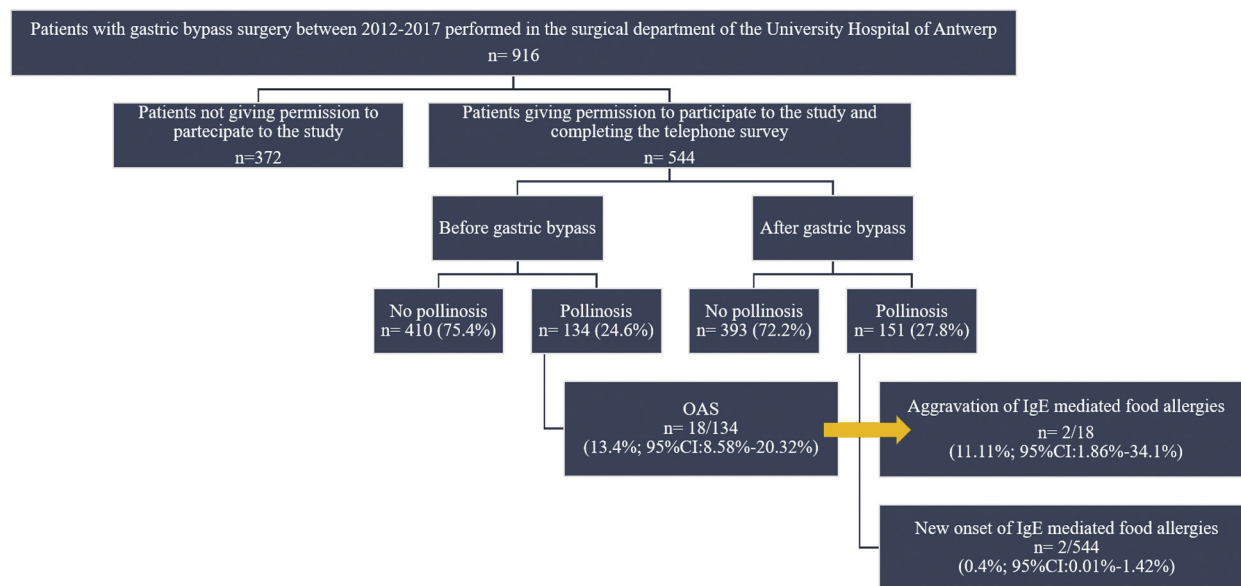
In summary, in our population approximately 0.4% of patients report the onset of new food allergies after gastric bypass. Furthermore, approximately 11.1% of patients with a former

TABLE I. Clinical details of all patients included in the observational study

ID	Age (y), sex	PPI	Onset symptoms after RYGB (y)	Specific IgE			Clinical symptoms before RYGB	Clinical symptoms after RYGB (GR)
				Bet v 1	Bet v 2	Pru p 3		
1	62, F	0	2	14.2	<0.10	<0.10	OAS: apple, hazelnut	Apple,* hazelnut*
2	38, F	0	3	0.63	0.90	<0.10	OAS: tangerine	Tangerine
3	42, F	1	0.5	16.60	<0.10	<0.10	OAS: hazelnut, peach, apple, cherry, pear, peanut, walnut, plum	Peach, hazelnut
4	50, F	—	—	25.40	<0.10	<0.10	TOL: pear	Pear
5	45, F	0	13	43.20	2.16	<0.10	TOL: hazelnut, fig	Nutmix (including hazelnut), fig
6	55, F	0	2	1.09	<0.10	<0.10	OAS: apple, pear, kiwi, peach, plum, carrot, peas TOL: strawberry	Strawberry
7	48, F	1	1	7.72	<0.10	<0.10	TOL: apple	Apple
8	39, F	1	0.5	8.52	—	—	OAS: apple, pear, kiwi	Pear
9	35, F	0	2.5	13.00	<0.10	<0.10	OAS: hazelnut, walnut, pine nuts, macadamia nuts, pistachio	Hazelnut
10	48, F	0	1.5	58.70	0.15	2.09	OAS: kiwi TOL: hazelnut	Hazelnut
11	30, F	1	0.5	6.03	<0.10	0.94	OAS: peach TOL: hazelnut	Hazelnut
12	49, M	0	2	<0.10	0.64	1.25	TOL: peanut	Peanut
13	38, F	1	0.8	2.72	<0.10	<0.10	TOL: nuts, apple, watermelon	GR: nutmix (peanut, hazelnut, cashewnut, almond), watermelon OAS: apple

—, Missing information; F, female; GR, generalized allergic reaction; M, male; PPI, proton pump inhibitor; TOL, tolerant.

*Confirmation by provocation test.

**FIGURE 1.** Results of our retrospective study.

OAS do develop more systemic allergic symptoms after their gastric bypass surgery.

IgE-mediated food allergy has been estimated to affect nearly 5% to 10% of adults^{7,8} and as described by Kamdar et al,⁷ approximately 15% of these food allergies in adults in the

Northwestern part of the United States initiated after age 18 years.⁷ Similarly, a recent population-based survey study of Gupta et al⁸ reports that 26.9% of adults did develop their first food allergic symptoms in adulthood. Therefore, we assume that frequencies seen in our gastric bypass patients do not exceed the

percentages of adult-onset food allergies in the general population.

Furthermore, it has been estimated that approximately 5% of patients with an OAS transit to generalized allergic reactions⁹; also, this percentage does not seem to be significantly different from our findings. In conclusion, we report 13 patients experiencing new or aggravated food allergies after gastric bypass surgery. However, out of our retrospective study, RYGB surgery seems not to entail an elevated risk for the development of new food allergies or aggravation of existing pollen-related food allergies, though large-scale prospective studies are needed to confirm this assumption. Moreover, one should keep in mind the principle: *post hoc ergo propter hoc* (after this, therefore because of this).

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