CASE REPORT

Sixteen-year-old Female With Acute Abdominal Pain: A Case Report

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Abstract

A 16-y-old girl presented with abdominal pain in the lower right quadrant, ranging in intensity from 2 to 10 on a visual analog scale (VAS) that prevented her from attending school. The pain was not associated with reflux, a fever, or blood in her stools. Eosinophilic esophagitis (EE) had been previously diagnosed, but treatment with a proton pump inhibitor (PPI) was not successful. The patient's medical history was significant for allergies to fruit; trees, including birch; weeds; and pollen. She had also suffered an anaphylactic reaction to a raw apple. The treatment approach commonly used for EE is suppression of inflammation with steroid therapy with short-term removal of offending foods. However, an attempt to reduce allergic bias and inflammation and treat intestinal permeability is not a part of the standard approach and may explain the high rate of relapse with the condition. Treatment included an elimination diet paired with a supplement regimen designed to reduce inflammation, support healing of the gut and reduce type 2 helper T (T_h2) bias of her allergic response. As a result of treatment, the patient's severe pain episodes abated and she was thereafter able to resume attendance at school.

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Eosinophilic esophagitis (EE) was first characterized in 1993 as an allergic inflammatory condition that is biased toward type 2 helper T (T_h2) cells. It presents most commonly with heartburn, epigastric pain, dysphagia, and nausea and vomiting. Laboratory findings commonly identify eosinophilia concurrently with elevated total immunoglobulin E (IgE). More than 50% of those suffering from EE also have a history of atopic and allergic disease, particularly food allergies; however, airborne allergens have also been identified as triggers for EE.

EE does not generally respond to antireflux therapy. Diagnosis is difficult, but key signs and symptoms are a lack of a favorable response to acid-blocking therapy and a history of allergic disease. Diagnosis can be confirmed with an esophageal biopsy, identifying eosinophil infiltration. Interventions include use of steroids and avoidance of trigger foods. A high degree of relapse exists with the condition because of poor dietary compliance.[1-3]

Eosinophilic gastroenteritis (EG) is considered relatively rare and often is misdiagnosed, although it is rising in incidence. The most common complaint of patients is nonspecific abdominal pain. Diagnosis involves a positive identification of eosinophil infiltration of mucosa—which is most common—or of the muscularis or serosal layers of the stomach and/or intestinal tract, with eosinophilia and elevated IgE on laboratory evaluation. EG is also strongly associated with atopic and allergic disease, particularly food allergies.

EE patients often present with polysensitization, including allergies not only to multiple foods but also environmental allergies. Further, an increased incidence of EE onset occurs during allergy season.[4] In 2013, van Rhijn et al[5] showed that food sensitizations in EE patients are mainly caused by cross-reactivity to food allergens after primary birch-pollen sensitization, which appeared to be the case with the patient in the current case study. In addition, a small study conducted in 2014 identifying the presence of immunoglobulin G4 (IgG4)

food-immune complexes deposited at the site of esophageal inflammation and in the serum of adult EE patients suggests a pathogenic role.[6]

The treatment approach commonly used for EE or EG is suppression of inflammation with steroid therapy with short-term removal of offending foods. However, an attempt to reduce allergic bias and inflammation, balance the gastrointestinal (GI) microbiome, and treat intestinal permeability is not a part of the standard approach and may explain the high rate of relapse with the condition. In theory, if a treatment restores the intestinal mucosa and reduces allergic bias, certain foods can at some point be reintroduced and tolerated. It makes mechanistic sense that successful desensitization to environmental allergens using immunotherapy would also reduce food cross-reactions. Therefore, treatment should take this into account with the goal being to remove all offending foods during early treatment, with the expectation that careful challenge and reintroduction of nonanaphylactic foods may be attempted later in treatment, after underlying immune imbalances have been favorably augmented.

Presenting Concerns

The patient was 16 years old when she presented to the author's clinic with constant pain in the right lower quadrant of her abdomen, which ranged from 2 to 10 on a visual analog scale (VAS) for pain, where 0 = no pain and 10 = worst possible pain. She had had 3 previous episodes, with pain ranging from 8-10/10; none of those episodes were associated with reflux, a fever, or blood in her stools. The patient was unable to attend school because of the pain and was feeling depressed and anxious given the lack of successful treatment.

Clinical Findings

History

The first of the episodes had taken place 6 weeks before her first visit to the author's clinic and had followed a large meal, which was associated with vomiting and diarrhea. The pain woke her from sleep and was 10/10. She was taken to her local hospital's emergency department, where an abdominal computed tomography (CT) scan showed no radiographic evidence of appendicitis but did show some gastric thickening. Laboratory studies showed an elevated white blood cell count (18.0) and an increased sedimentation rate. Ibuprofen offered some pain relief, and she was referred to a gastroenterologist. He performed an endoscopy and colonoscopy, diagnosed EE, and prescribed a proton pump inhibitor (PPI). The PPI provided no relief.

The patient also noted that menstrual cramping precipitated a pain attack; however, a gynecological examination was unremarkable, and the gynecologist believed that the pain was likely to be of GI origin.

The patient's medical history was significant for allergies to fruit; trees, including Birch; weeds; and pollen. Two to 3 years prior to her visit to the clinic, she had experienced an anaphylactic reaction while eating a raw apple, but she did not have the same reaction to cooked apples. She then developed a similar reaction to most fruit, including bananas and melons but not berries and grapes. As for other food sensitivities, she reported that wheat and tomato were the primary foods that triggered symptoms, and both of those foods have been associated with EE.[7] The patient's family members also suffered from severe allergies and atopic disease.

In a review of her systems, the patient reported ongoing constipation and flatulence. Her medications included cetirizine hydrochloride, ibuprofen, and an EpiPEN. She had no history of excessive antibiotic or steroid use.

The patient was a picky eater, drank an occasional soda, loved pizza, and primarily ate a standard American diet (SAD). She did not drink coffee (Table 1).

Table 1. Timeline

Family History	Mother, siblings: seasonal environmental allergies, food allergies, atopic disease.
Childhood	Seasonal environmental allergies; R_x: cetirizine.
Early Teens	Anaphylaxis to fruits: bananas, melons, apples. R_x: EpiPEN.
16 y	Abdominal pain diagnosed as eosinophilic esophagitis. Onset of EE coincided with birch-tree allergy season; unable to attend school for 6 wk; R_x: ibuprofen.
16 y	Prescribed elimination diet based on IgE ELISA testing and known fruit allergens; also prescribed probiotics, intestinal permeability combination formula, EPA/DHA, and vitamin D; pain reported as significantly reduced after start of plan; returned to school.

Abbreviations: EE, eosinophilic esophagitis; IgE, immunoglobulin E; ELISA, enzyme-linked immunosorbent assay; EPA, eicosapentaenoic acid; DHA, docosahexaenoic acid.

Physical Exam

The patient experienced pain when the right lower quadrant of her abdomen was palpated, although she had no rebound tenderness or guarding. She also experienced pain during a straight leg raise (SLR) exam for her right leg. She had keratosis pilaris on the posterior aspect of her upper arms, and she had mild macroglossia.

Diagnostic Focus and Assessment

Laboratory Tests

The initial laboratory evaluations focused on GI and immune function, including deficiencies commonly associated with immune dysfunction, such as deficiencies in vitamin D, zinc, and magnesium. At the patient's first visit, the author ordered the following tests: (1) a complete blood count (CBC), with a manual differential (5.6 [4.0-10.0]); (2) celiac profile (immunoglobulin A [IgA] total, antigliadin antibody, and tissue transglutaminase) (negative); (3) sedimentation rate (ESR) (normal); (4) C-reactive protein (CRP) (normal); (5) urinary analysis (UA) (normal); (6) complete metabolic panel (CMP) (normal); (7) vitamin D; (8) red blood count (RBC) essential elements; (9) ferritin; (10) microbiota imbalance (ie, a GI function stool test [GIfX]); and (11) food allergy and sensitivity panels for IgE (positive for wheat, rye, corn, rice, tomato, oat, orange, strawberry, apple, peach, grape, melon) and IgG4. The patient did not complete all of the lab work, including IgG4 food sensitivities panel, vitamin D, ferritin, RBC essential elements, and the stool test.

Based on the examination and testing, the author diagnosed (1) EE, (2) constipation, (3) atopic disease, (4) food and environmental allergies, (5) premenstrual syndrome, (6) intestinal permeability, and (7) possibly EG.

Therapeutic Focus and Outcomes

The approach in the patient's case was straightforward. She needed to (1) eliminate foods associated with her IgE food allergies, which are known triggers and mediators of EE/gastroenteritis, and (2) reduce her T_h2 allergic bias and inflammatory response by treating her intestinal permeability and balancing her GI microbiota using probiotics, vitamin D, glutamine, zinc carnosine, eicosapentaenoic acid (EPA), docosahexaenoic acid (DHA), and an elimination diet.[8-12]

The author suggested the following regimen for the patient: (1) an elimination diet based on the laboratory results for IgE and known allergens; (2) 2.5 mL per day of a probiotic powder at 200-billion colony forming units (CFUs), mixed in juice or water; (3) a mixture of glutamine, zinc carnosine, slippery elm, and deglycyrrhizinated licorice (DGL), as directed, with the ability to mix it with juice or water; (4) 2 capsules once per day of EPA/DHA 360/250; and (5) 2 drops daily of vitamin D, at 2000 IU per drop.

Follow-up and Outcomes

At the patient's 2-month follow-up, she had returned to school; seen improvement in her symptoms when she avoided antigenic foods, especially the wheat and tomatoes in pizza; found probiotics to be helpful with pain and constipation; and had no severe pain episodes. She continued, however, to experience sporadic pain, admitting that she was not perfect in following her diet.

Discussion

In the current case study, the patient was diagnosed with EE, although she did not present with heartburn, which is the main symptom associated with the condition. Her chief complaint was pain in the right lower quadrant of her abdomen. Endoscopy demonstrated eosinophilic infiltration of the esophagus but apparently not of the stomach or small intestine. The patient's abdominal CT scan identified the gastric thickening that has been associated with eosinophilic gastritis. The patient also had peripheral eosinophilia and a number of IgE food allergies, the identification of which was based on an enzyme-linked immunosorbent assay (ELISA). Although the author did not request a second endoscopy, her suspicion was that the patient may have had eosinophilic infiltration of both the esophagus and stomach or small intestines. The latter diagnosis is difficult to make, given the patchy distribution of eosinophils. EE and EG can present together.[13]

The patient had a strong personal and family history of atopic and allergic disease, including a recent-onset anaphylaxis to a number of fruits, including raw apples. She also had significant environmental allergies, including to birch pollen, weeds, and grasses. Thus, her heightened state of allergic inflammation increased her risk for development of EE or EG. Her fruit allergy and apple anaphylaxis specifically suggested cross-reactivity to an environmental allergen. Up to 70% of those individuals with a birch allergy have a cross-reaction to fruits, most commonly apples and other stone fruits (ie, fruits with a large, hard seed).[8,14,15]

The patient had experienced anaphylaxis to raw apples but could tolerate them when they were cooked. That fact shows that an antigenic peptide was no longer a problem for her when it was altered by cooking. Termed *conformational epitopes*, reaction to heat-labile peptides can be outgrown. Insufficient stomach acid, as is encountered with acid-blocking therapy, can contribute to this type of IgE food allergy, however, and may explain why the incidence of anaphylaxis is on the rise in adults.[18] Tolerance to cooked apples and other cooked, cross-reactive fruits in a birch-allergic individual also suggests that the antigenic proteins are both of the PR-10 family.[19] Other protein families shown to be associated with EE include profilins and lipid transfer proteins.[20]

Conclusions

Probably the most important thing to remember when working with teenagers is that the plan must be straightforward, and the teen must be in agreement with the approach. Although the author can think of a number of laboratory evaluations and treatment interventions that may have resulted in a fuller resolution, the patient was not willing to adhere to the entire plan. Without the patient's cooperation, nothing can be accomplished.

In hindsight, the author could have opted for collection of a blood-spot specimen for IgG4 food testing and dysbiosis markers for urinary organic acids, as the ease of collection for both of these tests may have improved compliance. Further, research identifying the presence of IgG4 food-immune complexes deposited at the site of inflammation and in the serum of adult EE patients suggests that the IgG4 blood spot test may have been useful in identifying primary trigger foods. With the laboratory data and clinical history that the author did have, a sound and largely successful treatment plan was designed.

Author Disclosure Statement

The author has no conflicts of interest to declare.

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