

Diagnoses of Eosinophilic Esophagitis in Children Who Underwent Foreign Body Retrieval of Coins

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Although esophageal food impaction is a fairly common presentation of eosinophilic esophagitis (EoE) in adolescents and adults, there are no published case reports on non-food-related foreign body impactions in children as an initial clinical manifestation of EoE. We present 2 cases of EoE diagnosed in children who underwent esophagogastroduodenoscopy (EGD) for retrieval of a coin.

Case #1

A 4-year-old boy who was healthy except for a history of atopy presented to the emergency department after reporting that he had swallowed a coin the previous night. Although he was asymptomatic, a chest radiograph revealed a radiopaque foreign body within the esophagus. The patient underwent an EGD in which a coin was located in the midesophagus (Figure 1). After retrieval of the coin, gross endoscopic inspection noted linear exudates and whitish plaques of the esophagus (Figure 2). Three-level esophageal biopsies were obtained, and histology confirmed active esophagitis with eosinophilic infiltrates (Figure 3). The patient was subsequently placed on lansoprazole (Prevacid, Takeda). A repeat EGD was recommended after 6–8 weeks; however, due to patient noncompliance with lansoprazole, the procedure was delayed and not performed until 3 months after the initial EGD. The repeat EGD findings were unchanged. As biopsy results confirmed the diagnosis of EoE, a swallowed topical steroid was added to the patient's regimen.

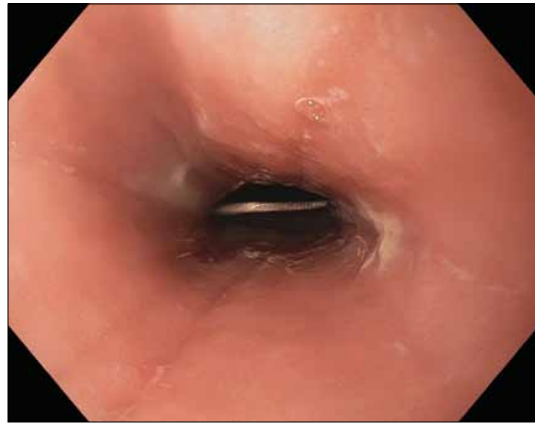


Figure 1. Coin noted in midesophagus.



Figure 2. Linear exudates and furrowing noted on first esophagogastroduodenoscopy.

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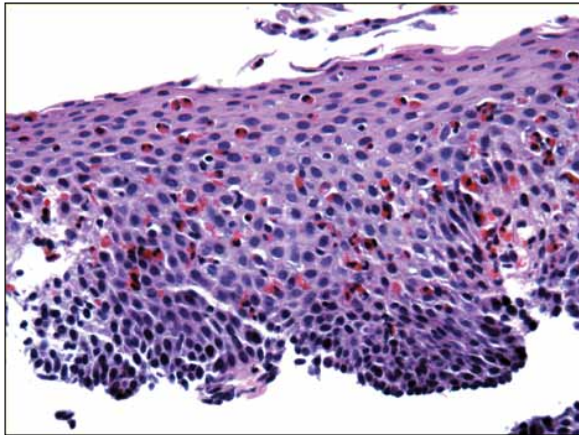


Figure 3. Eosinophilic infiltrates (200 ×) shown on histology from case #1.

Case #2

A 3-year-old healthy boy presented to the emergency department after having reported swallowing a coin 24 hours prior. As with case #1, this patient was asymptomatic and a chest radiograph showed a radiopaque foreign body within the esophagus. This patient also underwent an EGD, which revealed a coin located in the midesophagus. Following coin retrieval, gross endoscopic inspection noted furrowing and whitish plaques of the esophagus (Figure 4), as with the first patient. Similarly, 3-level esophageal biopsies revealed active esophagitis with eosinophilic infiltrates seen on histology (Figure 5). This patient was also subsequently placed on lansoprazole. A repeat EGD performed 6 weeks later showed furrowing of the esophagus on gross endoscopic inspection. Biopsy results also confirmed the diagnosis of EoE, and the patient was placed on a regimen of a swallowed topical steroid.

Discussion

In the United States, coins are the most common ingested foreign body in children, accounting for 27–70% of cases, and spontaneous passage occurs in up to one third of patients.¹ Out of all the foreign bodies that become lodged in the esophagus, approximately 10–20% become lodged in the midesophagus.² Retained esophageal coins occur most commonly in patients who are small and those with underlying esophageal pathology.³ EoE is defined as a primary clinicopathologic disorder of the esophagus⁴ and is a rapidly emerging diagnosis. It affects both children and adults, with a presentation that varies depending upon the age of the patient.⁵ Infants and toddlers often present with feed-



Figure 4. Furrowing of midesophagus.

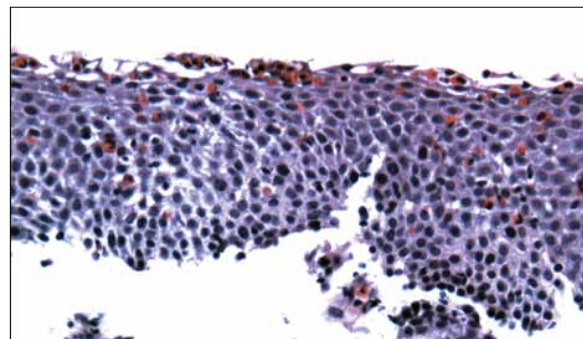


Figure 5. Eosinophilic infiltrates (200 ×) shown on histology from case #2.

ing difficulties, and preschool- and school-age children often have vague complaints of nausea and emesis. In contrast, pre-adolescents, adolescents, and adults tend to experience symptoms of dysphagia, and it is common for these patients to present with esophageal food impactions requiring endoscopic removal. Khan and associates⁶ reported on 12 children (median age of 9 years) who were diagnosed with EoE after presenting with symptoms of an obstructed esophagus. The authors found that food impaction was the initial presentation in 6 of the 12 children, and 8 of the children reported having dysphagia as well. Although esophageal food impaction is a fairly common presentation of EoE in older children and adults, there are no published case reports on non-food-related foreign body impactions in children as an initial clinical manifestation of EoE. We have presented 2 cases of EoE diagnosed in preschool-aged children who underwent EGD for retrieval of a coin and did not have any prior history of feeding difficulties or complaints of nausea or emesis.

EoE was first described in 1978 by Landres and colleagues⁷ in a patient with eosinophilic infiltrates of

the esophagus. According to the recent consensus recommendations by the American Gastroenterological Association,⁴ EoE is characterized by esophageal and/or upper gastrointestinal tract symptoms in association with esophageal mucosal biopsy specimens containing at least 15 intraepithelial eosinophils per high-power field in 1 or more biopsy specimens and absence of pathologic gastroesophageal reflux disease (GERD), as evidenced by a normal pH monitoring study of the distal esophagus or lack of response to high-dose proton pump inhibitor (PPI) medication. As esophageal eosinophilia may represent both GERD and EoE, distinguishing between these two conditions can be challenging. Spechler and coworkers⁸ concluded that a clinical PPI trial is appropriate in a patient suspected of having EoE, as there are plausible mechanisms in which GERD results in esophageal eosinophilia. It is, therefore, recommended that at least 6–8 weeks of acid suppression with twice-daily PPI be undertaken between biopsies in order to confirm the diagnosis of EoE.⁹ Each of our patients underwent PPI therapy for at least 6 weeks, with no change noted on repeat EGD, confirming their diagnoses of EoE.

The pathogenesis of EoE is unknown and perhaps multifactorial. Bohm and colleagues¹⁰ recently reported on two hypotheses that potentially explain pathogenesis: food and aeroallergen hypersensitivity and GERD-mediated structural changes. For the former hypothesis, the authors discussed a possible allergic amelioration of gene expression and cytokine production, which results in immune reactions and responses. For the latter hypothesis, the authors discussed acid-peptic damage, which results in the recruitment and exposure of inflammatory cells. This hypothesis supports the histopathologic similarity between GERD and EoE, as they both result from esophageal tissue injury with nonspecific pathologic findings of increased intraepithelial eosinophils. This, in turn, supports the role of initial PPI therapy followed by repeat EGD to confirm the diagnosis of EoE.

The diagnosis of EoE requires esophageal biopsies from multiple levels of the esophagus, regardless of the gross appearance of the mucosa, to demonstrate eosinophilic infiltration. Endoscopic features of EoE, as described by Furuta and associates,⁴ include longitudinal furrowing, friability, edema, longitudinal shearing, raised white specks, whitish exudates, esophageal rings, and caliber narrowing. None of these features are pathognomonic for EoE, but they may be suggestive of EoE if taken in the proper clinical context. Odze¹¹ reported that the key defining feature of EoE is the influx of eosinophils into the squamous epithelium of the esophagus. Histologic features include increased intraepithelial eosinophils, eosinophil microabscesses, surface layering of eosinophils,

lengthening of lamina propria papillae, and basal-cell hyperplasia. In our 2 cases, each child presented with a retained esophageal coin that normally would have been expected to pass, were it not for their underlying esophageal pathology. Their gross endoscopic findings showed whitish plaques, linear furrowing, and whitish exudates, and they both had eosinophilic infiltrates on all esophageal biopsies obtained at 3 different levels.

Treatment of EoE involves first confirming the diagnosis by initiating therapy with at least 6 weeks of a PPI followed by repeat EGD. Once the diagnosis is confirmed, referral to an allergist is recommended because of the association with atopy in EoE patients.⁴ Consensus recommendations⁴ outline treatment for EoE as elimination of food allergens; corticosteroids; leukotriene receptor antagonists; mast-cell stabilizers; and biologics. However, controversy remains regarding acute versus chronic therapy, as the natural history of EoE remains unknown. Bohm and colleagues¹⁰ reviewed the current treatment regimens, which are also controversial due to little data and a lack of long-term studies. In both of our patients, a swallowed topical corticosteroid regimen was instituted.

Review of the foreign body ingestion literature revealed that previous publications^{2,12} in children have mainly focused on endoscopic management of foreign bodies and not on the utility of biopsy at the time of EGD. Kay and Wyllie² discussed the types and symptoms of foreign body ingestions and explored management based upon the type of foreign body. The authors reported that patients at increased risk for esophageal coin impactions typically have underlying esophageal pathology such as strictures, previous esophageal surgery, or EoE. Recently, Putnam⁵ recognized that EoE may be found in children who present with esophageal impactions with nonobstructing foreign bodies and suggested that endoscopic retrievals for foreign bodies lodged in the esophagus should prompt mucosal biopsies from the esophagus for assessment of EoE. In our patients, both of whom presented with a nonobstructing foreign body, EoE was suspected because of the presenting history and gross endoscopic abnormalities, prompting 3-level esophageal biopsies notable for eosinophilic infiltrates.

Our cases illustrate 2 important points regarding EoE and esophageal foreign body impactions. First, the presentation of a non-food-related foreign body impaction may be the first clinical manifestation of EoE in an otherwise healthy child with no previous symptoms of abdominal pain, vomiting, dysphagia, or food impaction. Second, when a foreign body is impacted in the esophagus, obtaining biopsies in all children undergoing EGD for foreign body retrieval should be considered.

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Review

Curious Elements of Esophageal Foreign Body Impaction and Eosinophilic Esophagitis

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Esophageal eosinophilia is increasingly being recognized as a histologic finding in a number of diseases, including gastroesophageal reflux disease (GERD), eosinophilic esophagitis (EoE), celiac disease, and Crohn's disease.¹ Critical to the interpretation of this pathology is the clinical context in which it was obtained. Jordan and associates describe an increasingly common clinical scenario in which 2 otherwise healthy children presented with accidental coin ingestions.² No apparent structural obstructions were present. Gross mucosal appearance suggested inflammation, and mucosal biopsies demonstrated dense esophageal eosinophilia. The authors ruled out GERD as

an underlying cause of the inflammation and treated the patients with a topical corticosteroid.

This case report emphasizes several important and timely clinical points. First, despite the fact that the patients presented with foreign body impaction, linear furrows, white exudates, and dense esophageal eosinophilia, the pediatric gastroenterologists did not make the virtually reflexive diagnosis of EoE. Linear furrows are a nonspecific representation of inflammation that likely represent edema of the esophageal mucosa.³ Whitish material on the esophageal mucosa can represent *Candida*, swallowed food, anesthetic spray, and eosinophilic pus.⁴ The physicians recognized a growing body of literature supporting the fact that all of these features can be seen in any inflammatory esophageal disease, including GERD and EoE.⁵ Thus, the exclusion of the more common disease, GERD, with 2 months of high-dose proton pump inhibition was appropriate and indicated.⁶

Second, the pediatric gastroenterologists knew that the diagnosis of EoE was a possibility and, thus, obtained biopsies. EoE is an increasingly common disease. Young children typically present with the chronic symptoms of vomiting, feeding dysfunction, or abdominal pain,⁷ whereas adults, most often males, present with the stereotypical pattern of dysphagia and food impaction.⁸ In some circumstances, patients may present acutely, as in these cases, with esophageal foreign body impaction. Our work, and that of others, has shown that a significant number of patients presenting with food impaction, particularly when recurrent, have histopathologic features of EoE.⁹⁻¹³ The importance of obtaining a mucosal sample at the time of foreign body removal cannot be overemphasized, even though the procedure may be inconvenient, as it is frequently performed in the middle of the night and often without nursing assistance. In many institutions, includ-

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ing our own, the responsibility of extraction rotates daily between the surgeon and the gastroenterologist. In other institutions, this duty lies only in the hands of the surgeon. In these circumstances, the foreign body is typically extracted without pausing to obtain biopsies to determine the underlying cause. If this occurs, the diagnosis may be missed and patients may go untreated for years, potentially leading to complications such as esophageal stricture, small-caliber esophagus, or crepe-paper esophagus. In our institution, surgeons have agreed to obtain biopsies to entertain the possibility of EoE as a potential diagnosis.

Third, prior to presentation, both of these children were reportedly asymptomatic and without obvious eating problems. It is frequently wondered how children can be asymptomatic with this degree of esophageal inflammation and whether these children could be underweight or have unidentified feeding dysfunction. Our experience, and that of others, suggests that children and adults with EoE frequently have adapted to esophageal malfunction with a variety of changes in the manner in which they eat. Identification of this adaptive behavior requires asking probing questions.¹⁴⁻¹⁷ For instance, the simple question “Do you have any problems swallowing or eating?” will frequently be met with the immediate answer of “No.” More revealing would be a series of additional, more specific questions such as: “How long does it take you to finish a meal?”; “How long do you chew your food?”; “Do you need a glass of water to finish a meal?”; “Do you cut your food into small bites?”; “Are you the last person to leave the table?”; “Do you avoid eating foods such as bagels or meats?”; and “Do you feel isolated because it takes you a long time to eat?” Answers to these questions will often be in the affirmative and represent evidence of significant lifestyle accommodations that have been made to compensate for esophageal dysfunction.

Finally, the pathophysiology of this presentation has been debated in the literature. Esophageal dysmotility leading to esophageal spasm¹⁸⁻²⁰ and mucosal remodeling^{21,22} resulting in fixed anatomic lesions have both been suggested. An alternative theory relies on the concept that EoE is a food allergic disease.^{23,24} In this light, one wonders whether the acute impaction of a coin could be related to a hypersensitivity reaction to the metal in the coin. It would be interesting to obtain skin testing for zinc and copper to determine whether the children in this case report showed reactivity. Taking this idea one step further, one wonders whether children who suffer from food impaction should undergo skin testing for impacted food proteins. For instance, if a patient develops a food impaction with a piece of beef steak, it may be possible that this represents an acute hypersensitivity response to beef proteins that led to esophageal edema. In addition, it could be possible that a break in the esophageal mucosa

contributed to the initiation of this illness. Acid, trauma, or other agents could contribute to increasing mucosal permeability and exposure of the local immunologic milieu to luminal antigens.^{25,26} Alternatively, could the use of proton pump inhibitors (PPIs) actually contribute to the generation of this disease?²⁷ Interestingly, the widespread use of PPIs has increased in parallel with the prevalence of EoE, though a causative relationship has not been identified.

Appropriate recognition of esophageal inflammation is critical to the health and well-being of our patients. As the field of esophagology has entered into a new phase of procuring mucosal samples to assess for inflammatory changes, one hopes that this trend will continue, not only with adult gastroenterologists, but with our surgical colleagues as well.²⁸

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