



# The Role of Transnasal Endoscopy in Diet Management of Eosinophilic Esophagitis

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## ABSTRACT

The diagnosis and monitoring of eosinophilic esophagitis (EoE) relies on clinical symptoms and histological examination of the esophageal mucosa. Currently, esophagogastroduodenoscopy with biopsy is the standard of care in the diagnosis and monitoring of EoE. Unsedated transnasal endoscopy (TNE) is a less invasive and less costly procedure that can be performed without general anesthesia. Here, we describe the first case of a 15-year-old adolescent girl who underwent TNE exclusively to identify all food triggers for EoE. She underwent 12 TNEs over a period of 4 years to identify food triggers for EoE to ultimately achieve the remission of her disease.

**KEYWORDS:** eosinophilic esophagitis; transnasal endoscopy; food elimination diet

## INTRODUCTION

The diagnosis and monitoring of eosinophilic esophagitis (EoE) relies on clinical symptoms and histological examination of the esophageal mucosa.<sup>1,2</sup> EoE is characterized by symptoms of esophageal dysfunction and esophageal eosinophilia of  $>15$  eosinophils per high-powered field. Currently, esophagogastroduodenoscopy (EGD) with biopsy is the standard of care in the management of EoE as clinical symptoms do not necessarily correlate with histology.<sup>3</sup> EGD is often required more frequently in patients pursuing dietary therapy, as they are done sequentially after food introductions to identify triggers.<sup>4</sup> In pediatrics, EGD is done under general anesthesia. Transnasal endoscopy (TNE) is a less invasive and less costly procedure that can be performed without anesthesia. Here, we describe the first case of a 15-year-old adolescent girl who underwent TNE exclusively to identify all food triggers for EoE. Here, we describe the first case of a teenager who underwent 12 TNEs through the process of diet elimination and reintroduction to identify all food triggers for EoE over a period of 4 years.

## CASE REPORT

A 15-year-old adolescent girl with a history of food allergy to sesame and allergic rhinitis presented with a 1-year history of solid food dysphagia. After the initial evaluation, she was started on omeprazole 20 mg twice daily in accordance with guideline recommendations in 2018.<sup>5</sup> After 3 months, she underwent EGD with biopsy under anesthesia and was diagnosed with EoE (Table 1). Given ongoing symptoms and lack of response to proton-pump inhibitors, she was started on swallowed fluticasone 220 mcg twice daily. After 3 months of the fluticasone therapy, she underwent repeat EGD, which showed improvement (Table 1). At the 6-month follow-up, she expressed interest in dietary therapy given the availability of TNE as this eliminating the risks associated with the repeat exposure to anesthesia. All medications were discontinued, and foods were eliminated for at least 8 weeks before the serial histological evaluation. Four-food elimination diet (4-FED)—avoidance of milk, egg, wheat, and soy was pursued. While on the 4-FED, she had active EoE. Treatment was escalated to 6 food elimination diet (6-FED)—avoidance of milk, egg, wheat, soy, peanut, tree nuts, fish, and shellfish. TNE was performed to assess the response to 6-FED and revealed active but improved inflammation (Table 2). Legumes were removed from her diet based on the diet history and allergy skin prick testing with comanagement with an allergist and immunologist. TNE was performed to assess the response to 6-FED plus legumes and revealed controlled EoE (Table 2).

**Table 1. EoE medication management**

EGD	Medical management	Esophageal biopsy results
1	Omeprazole 20 mg twice daily	Proximal: 20 eos/hpf Distal: 35 eos/hpf
2	Discontinue: Omeprazole Initiated: Swallowed fluticasone 220 mcg twice daily	Proximal: 0 eos/hpf Distal: 0 eos/hpf

Response defined as reduced esophageal eosinophilia < 15 eos/hpf.  
EGD, esophagogastroduodenoscopy; EoE, eosinophilic esophagitis.

Eliminated foods were reintroduced one at a time with serial TNEs (Table 2). The intervals between each TNE relied greatly on the patient's academic schedule. Prior to each procedure, topical 4% aerosolized lidocaine was applied in each nare and 1 spray orally. There were no adverse events, technical difficulties, or patient report of nasal discomfort. All TNEs were performed by 1 gastroenterologist using the Olympus BFXP190 endoscope (Olympus, Shinjuku, Tokyo, Japan) with a 3.2 mm outer diameter and Boston Scientific SpyBite Forceps (Marlborough, MA) to obtain biopsy specimens through a 1.2 mm working channel. Over 4 years, she underwent 12 TNEs to identify food triggers for EoE. Food triggers were identified as wheat, egg, milk, and peanut. She

successfully reintroduced tree nuts, fish, shellfish, low-risk legumes (green bean, pinto bean, etc), and high-risk legumes (chickpea, pea) with a TNE following each introduction which demonstrated the persistent remission. She continues with dietary therapy with avoidance of milk, egg, wheat, and peanut without clinical symptoms or histological evidence of inflammation on repeat TNE.

## DISCUSSION

Dietary therapy, particularly extensive elimination diets, has historically been associated with a high number of EGDs to identify trigger foods.<sup>4</sup> Here, we highlight an adolescent girl who required 12 endoscopies to identify food triggers for EoE.

**Table 2. Histological response to food elimination diet obtained through TNE**

TNE number	Elimination diet	Esophageal biopsy results
1 10/29/2019	4-Food elimination diet Elimination of milk, egg, wheat, and soy	Proximal: 26 eos/hpf Distal: 75 eos/hpf
2 1/8/2020	6-Food elimination diet Elimination of milk, egg, wheat, soy, peanut, tree nuts, fish, and shellfish	Proximal: 10 eos/hpf Distal: 25 eos/hpf
3 6/10/2020	Legumes removed	Proximal: 1 eos/hpf Distal: 1 eos/hpf
4 9/2/2020	Wheat introduced	Proximal: 9 eos/hpf Distal: 28 eos/hpf
5 12/9/2020	Egg introduced	Proximal: 1 eos/hpf Distal: 20 eos/hpf
6 6/2/2021	Milk introduced	Proximal: 46 eos/hpf Distal: 87 eos/hpf
7 8/25/2021	Fish/Shellfish introduced	Proximal: 2 eos/hpf Distal: 0 eos/hpf
8 11/23/2021	Low-risk legumes introduced	Proximal: 0 eos/hpf Distal: 0 eos/hpf
9 1/18/2022	Tree nuts introduced	Proximal: 0 eos/hpf Distal: 0 eos/hpf
10 3/23/2022	Soy introduced	Proximal: 0 eos/hpf Distal: 0 eos/hpf
11 8/23/2022	High-risk legumes	Proximal: 4 eos/hpf Distal: 6 eos/hpf
12 1/6/2023	Peanut	Proximal: 23 eos/hpf Distal: 5 eos/hpf

Response defined as reduced esophageal eosinophilia < 15 eos/hpf.  
TNE, transnasal endoscopy.

She is the first to undergo unsedated TNE for the entire process rather than multiple EGDs under anesthesia. This decreases the amount of time to identify food triggers as patients are more likely to undergo TNE at more frequent intervals than EGD with biopsy under anesthesia given the reduced risks associated with anesthesia and reduced cost and time away from work and school. This case report suggests that in the pediatric population, TNE is a safe and effective alternative to conventional EGD.

There has been increasing growth and interest in unsedated TNE in pediatrics with the use of virtual reality as a distraction technique.<sup>6</sup> Perhaps, this is because general anesthesia is used more commonly for endoscopies in pediatrics when compared with adults who may use conscious sedation.<sup>6</sup> In addition, the US Food and Drug Administration issued a warning that repeated use of anesthetics may affect young children's neurodevelopment.<sup>7</sup> Previous reports have shown unsedated TNE has shorter visit times as there is a shorter fasting time of 2 hours and no postanesthesia recovery.<sup>8–10</sup> Although the procedure time for TNE without anesthesia and EGD under anesthesia is similar, the total time to complete a TNE without anesthesia is much shorter.<sup>10</sup> This case report demonstrates that TNE can be done every 2–3 months to assess the response after diet changes. In the pediatric population, there has been a reported over 50% reduction in charges for a TNE with biopsy when compared with an EGD with biopsy. This reduction in cost is primarily attributed to the elimination of need for anesthesia.<sup>9</sup> The average charge for a TNE in 2019 was \$4,400 in contrast to traditional EGD charges amounting to \$9,400. In this scenario, this is an estimated charge reduction of \$60,000 as she underwent 12 TNEs. TNE allows for cost savings related to reduced anesthesia charges, operating room monitoring, and postanesthesia care, thereby reducing the overall economic burden on the healthcare system.<sup>9</sup>

In summary, our case suggests that TNE is a safe and effective alternative to conventional EGD under anesthesia and has the potential to be used more widely in clinical practice. TNE may be particularly useful for patients who require extensive elimination diets, and it simultaneously offers a way to optimize disease monitoring with reduced risks and healthcare costs.

## DISCLOSURES

**Author contributions:** All authors have read and approved the manuscript. The authors have met the following requirements

for authorship: (1) made substantial contributions to conception and design, acquisition of data, or analysis and interpretation of data; (2) drafted the article or reviewed it critically for important intellectual content; and (3) given final approval of the version to be published. S. Eid is the article guarantor.

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