CASE STUDIES

Watch it grow: Esophageal impaction with chia seeds

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ABSTRACT

Esophageal obstructions are a medical emergency, due to inability to control secretions and risk of perforation. Epidemiology of esophageal foreign-body impaction has evolved to include increasing incidence of non-meat food causes as well as increasing underlying prevalence of pathologies including eosinophilic esophagitis. Chia seeds, a staple known for health benefits, have an uncanny ability to absorb large quantities of water leading to a hydrated gel-like substance which can cause an obstruction. We report the first case of chia seed impaction in a patient with likely eosinophilic esophagitis.

Key Words: Esophagus, Food obstruction, Eosinophilic esophagitis, Chia seed

1. INTRODUCTION

The incidence of esophageal obstruction has been increasing over the past several decades.[1,2] Considered a medical emergency, esophageal obstruction results in the inability to control oral secretions and the subsequent risk of pulmonary aspiration and esophageal perforation. Esophageal food impaction is the most common cause of obstruction and in most cases, there is also predisposing esophageal pathology.[1] Historically, peptic strictures and esophageal rings have been the most common underlying pathologies, although eosinophilic esophagitis (EE) is becoming more prevalent.[1–3] While various meats have typically been the most common cause of food impaction in the United States, at least prior to 2001,[2] other non-meat foods including beans, vegetables, and fruits are becoming more common.[1,4,5]

2. CASE REPORT

A 39-year-old male with a history of asthma and moderate seasonal allergies presented with the acute onset of persistent, severe dysphagia. The patient had a long history of intermittent dysphagia to solids which had worsened over the preceding two weeks. Twelve hours before presentation, he swallowed a tablespoon of dry chia seeds followed by a glass of water. He immediately experienced epigastric discomfort and was unable to manage his oral secretions. Intravenous glucagon did not relieve his symptoms.

Emergent esophagogastroduodenoscopy (EGD) revealed a complete distal esophageal obstruction with a gel of hydrated chia seeds (see Figure 1). In addition, the esophageal mucosa appeared edematous with mild linear furrows with some white plaques unchanging pre and post resolution (see Figures 1 & 2 arrows). Attempts at traversing or advancing the bolus using an adult diagnostic upper endoscope were unsuccessful. Removal of the seeds using a Roth net and grasping forceps was also unsuccessful due to a semi-solid consistency of the bolus. A neonatal gastroscope was then advanced past the obstruction with no obvious stricture at

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the GE junction. Pushing small amounts of the chia seed gel into the stomach with the neonatal gastroscope eventually resulted in removal of the impaction (see Figure 2). The patient was started on twice daily proton pump inhibitor (PPI), and a liquid diet was recommended until repeat endoscopy with biopsies could be performed. Unfortunately, the patient was lost to follow-up, therefore the suspected diagnosis of eosinophilic esophagitis could not be confirmed.

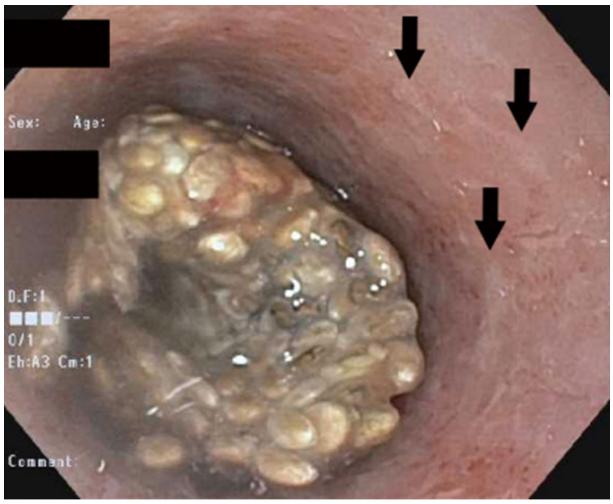

Figure 1. Proximal view of chia seed obstruction in mid-distal esophagus. White plaques and linear furrows of suspected EE delineated (arrows).

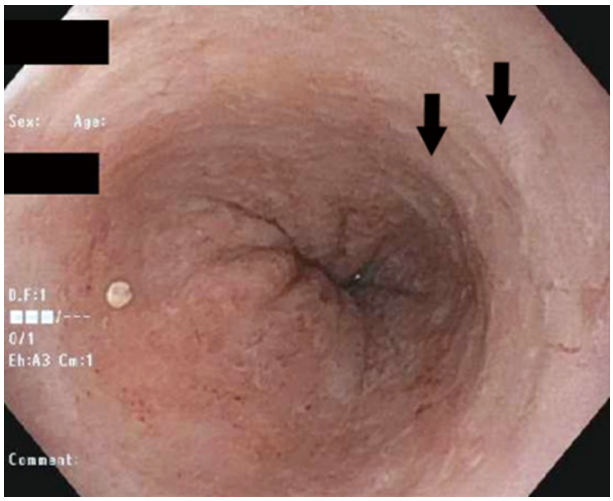

Figure 2. Proximal view of distal esophagus after resolved chia seed obstruction. White plaques and linear furrows of suspected EE delineated (arrows).

3. DISCUSSION

To our knowledge, this is the first report of chia seed impaction of the esophagus. Chia seeds (*Salvia hispanica*) are small (1.5 mm × 2 mm), oval seeds native to southern Mexico and northern Guatemala.[6] They have been used for food, medicine, and paint since Aztec civilization, initially introduced to the United States by terracotta "pets" on which the seeds would grow.[7,8] Over the last 5 years, their use as a food product has been growing in popularity due to high protein, omega-3 fatty acid, and fiber content.[7,8] They can also be used as a food replacement for eggs or oil in cake formulations thus reducing risk to allergic patients.[9] Other miscellaneous industrial uses have also been reported.[10–12]

Chia seeds have been marketed to improve cardiovascular health, promote weight loss, and improve glycemic control.[13] Now with recent peer-reviewed evidence, chia seeds have been associated with possible effectiveness for allergies, angina, athletic performance enhancement, diabetes, cancer, coronary artery disease, myocardial infarctions, hormonal and endocrine disorders, hyperlipidemia, hypertension, stroke, vasodilatation, anticoagulant, and antiviral effects.[7,8,13–16] Up until now, there have been no studies or analyses documenting adverse harms from chia seeds, specifically with obstruction as described above.[17–19]

When added to liquid at room temperature (see Figure 3), dry chia seeds immediately begin to form a hydrogel gum capsule absorbing up to 27 times their weight in water,[6] which exhibits a non-Newtonian fluid behavior.[11] The seed has two fundamental characteristics which increase its ability to hold onto water. First is the structure's aptitude to spontaneously absorb water when placed in contact with a constantly moist surface or when immersed in water, and second is the structure's ability to spontaneously adsorb water when exposed to an atmosphere of constant relative humidity. Chia seeds overall have very similar hydrophilic profiles compared to other gums used in industry such as xanthum gums.[11] The seeds' high water absorption and adsorption capacities are felt to be the contributing factor of satiety when ingested in the stomach.

The underlying esophageal pathologies associated with bolus obstruction include peptic strictures, Schatzki's rings, EE, motility disorders such as achalasia, and rarely malignancy.[1] The type of bolus obstruction is related to the patient's culture, age, the presence of mental illness, and whether the ingestion was deliberate or not.[1,3] Regarding esophageal food bolus impactions, the most common offender historically has been various meats.[2] However, a more recent study noted that non-meat foods may now be more common than meats.[1]

Figure 3. One tablespoon of dry chia seeds (L). Comparison of one tablespoon of chia seeds immersed in 80 ml water with one tablespoon of dry chia seeds in a standard 100 ml graduated cylinder elucidating chia seed's high water absorption and adsorption properties (R).

Based on our patient's age, sex, allergy history and esophageal appearance, we suspected that he had EE. Our patient exhibited linear furrows and small white plaques in his esophagus, which are consistent with the well-known endoscopic findings of EE (see Figures 1 & 2 arrows). Other endoscopic findings of EE may include rings, strictures, edema, and mucosal fragility.[4] Unfortunately, no biopsies were obtained in our patient and the patient was subsequently lost to follow-up. Current standard of care treatment utilizes the push technique under direct visualization, while routine biopsy of the underlying pathology is not standard practice for an initial food bolus investigation.[1,3] It is well known now that EE is a strong predictor of multiple esophageal food bolus obstructions (odds ratio 3.5; 95% CI, 1.8-7.0).[1,3,20] The combination of our patient's presumed EE and the hydrogel properties of chia seeds literally became a "recipe" for disaster. With the increasing popularity of chia seeds, patients with any history of underlying esophageal pathology should be cautioned about their use, especially in their dry form.

Conflicts of Interest Disclosure

The authors have declared no conflicts of interest.

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