The Ochsner Journal 7:125–128, 2007

Calcium Multimineral Complex Induced Esophageal Stricture

Russell Wardlaw, MD, David Victor, MD, Jacob Feagans, MD, James Smith, MD

Department of Gastroenterology, Ochsner Clinic Foundation, New Orleans, LA

ABSTRACT

Pill-induced esophageal injury remains an under-recognized event despite its potentially devastating consequences. Most cases are due to nonsteroidal anti-inflammatory drugs, antibiotics, or bisphosphonates, and symptoms usually resolve upon discontinuation of the medication. Reported herein is the case of an elderly woman who experienced prolonged impaction of a calcium tablet in the upper esophagus. She reported breaking the nonprescription pill in half prior to ingestion due to its large size. Subsequently, a severe esophageal stricture developed. We are unaware of any previous cases of esophageal stricture due to an impacted tablet containing primarily calcium, among other minerals. This is relevant, as patients are being advised by both their physicians and the lay press to increase calcium intake. It also highlights the importance of proper instruction and cautions for taking both prescription and over-the-counter preparations. Management of patients with suspected pill impaction is discussed.

INTRODUCTION

Pill-induced esophageal injury (PIEI) is an under-recognized event, with the first case (reported by Pemberton in 1970) demonstrating esophageal injury secondary to potassium chloride (1). Since that time, the medical literature has vastly expanded, with reports of approximately 1,000 cases of pill esophagitis due to nearly 100 medications (2). We are unaware of any previous cases of esophageal stricture formation secondary to an impacted tablet containing primarily calcium, among other minerals. This case is unique in the extent to which the esophagitis led to a severe stricture of the upper esophagus.

Address correspondence to:
James Smith, MD
Department of Gastroenterology
Ochsner Clinic Foundation
1514 Jefferson Highway
New Orleans, LA 70121
Tel: (504) 842-4015
Fax: (504) 842-0098
Email: jsmith@ochsner.org

Key Words: Esophageal injury, pill impaction

CASE REPORT

A 73-year-old woman presented with severe upper chest pain and inability to swallow liquids, including saliva. The symptoms developed suddenly after ingestion of half of a KAL Amino Max™ tablet (3) (Table 1). She described taking the broken tablet in the evening with a small amount of water while in the upright position. She had no prior history of dysphagia, although she had experienced occasional heartburn for which she had never sought medical attention. Her past medical history was significant for anxiety and neck pain due to degenerative joint disease. For the latter, she would occasionally take propoxyphene, but avoided nonsteroidal anti-inflammatory drugs (NSAIDs).

Urgent management consisted of intravenous fluids and endoscopy that revealed an impacted tablet 17 cm from the incisors. Multiple attempts by an endoscopist to remove the obstructing tablet were unsuccessful that evening. The following morning, the tablet was broken apart and pushed into the stomach. The endoscopist noted edematous mucosa and circumferential white necrotic tissue isolated to the region of impaction. The distal esophagus and stomach appeared normal. At this point, the patient was still experiencing severe chest pain and odynophagia with an attempt at liquid ingestion.

The patient was referred to the Ochsner Foundation Hospital for attempted dilation. A Savary-Gillard guidewire (Cook Endoscopy, Winston-Salem, NC) was passed under fluoroscopy through a tight stricture of the cervical esophagus. The initial dilation was successful to 30 F (10 mm). Over the next three weeks, the patient had six esophageal dilations, ultimately to a diameter of 48 F (16 mm). Subsequent dilations did not require fluoroscopy, as the Olympus GIF-N30 endoscope (Olympus America, Melville, NY) could pass through the stricture, allowing guide wire placement. The esophagus was otherwise noted to be normal. The patient obtained minimal relief from the dilations, experiencing approximately three days of being able to swallow liquids and soft solids after each session.

Subsequent dilations were performed with through-the-scope, balloon dilators up to 18 mm diameter, again with brief relief of dysphagia. Under

Table 1. Composition of KAL Amino Max tablet (percentage based on 2,000-calorie diet) (3).

1 tablet contains:	Amount	% RDI (recommended daily intake)
1. Calcium (as calcium carbonate, calcium amino acid chelate)	167 mg	17%
2. Vitamin D (as cholecalciferol)	67 IU	17%
3. Iron (as iron amino acid chelate)	3 mg	19%
4. Iodine (from kelp)	38 mcg	25%
5. Magnesium (as magnesium oxide and magnesium amino acid chelate)	83 mg	21%
6. Zinc (as zinc amino acid chelate)	4 mg	25%
7. Selenium (as l-selenomethionine)	1 mcg	2%
8. Copper (as copper amino acid chelate)	0.2 mg	8%
9. Manganese (as manganese amino)	2 mg	83%
10. Chromium (as chromium citrate)	17 mcg	14%
11. Potassium (as potassium amino acid chelate)	16 mg	0.2%
12. Boron (as calcium borate)	0.5 mg	*
13. Silicon (from silica, horsetail)	2 mg	*
14. Glutamic acid HCl	17 mg	56%
15. Betaine HCl	17 mcg	17%

Other ingredients: cellulose, stearic acid, and magnesium stearate.

* Daily value not established.

a protocol for refractory esophageal strictures, the patient received endoscopic triamcinolone injections into the stricture after balloon dilation on three occasions. This method did prolong the beneficial effects of the dilation for several weeks.

After 18 dilations over the course of several months, the patient was not satisfied with the degree of symptomatic relief and requested alternative therapy for the refractory stricture. After extensive discussion, surgery was performed 10 months after the original tablet impaction. Cervical esophagoplasty was performed through a neck incision. The patient had a prolonged hospitalization for recovery; however, she has done well since the surgery. She has required only one dilation in the two years since the surgery. She reports a dramatic improvement in her ability to swallow.

DISCUSSION

The stricture was caused by the impacted calcium multimineral complex tablet. This is a unique case for two reasons. Although PIEI has been reported many times, it generally causes a self-limited syndrome that rarely leads to severe stricture formation. It usually resolves with discontinuation of the offending medication and requires only supportive care (2–5).

Pill impaction should be suspected when retrosternal pain and odynophagia occur suddenly after pill ingestion, especially if one of the commonly offending medications is involved. Classic examples include a teenager who develops severe chest pain following doxycycline ingestion for acne or an elderly patient who takes bisphosphonates with little water and lies recumbent. In these cases, a clinical diagnosis can be made without the need for endoscopy or barium studies. The treatment involves stopping the offending agent and providing supportive measures. A primary care physician's role includes early recognition as well as prevention by teaching proper pill-taking techniques. However, if the pain is atypical or particularly severe, consultation with a gastroenterologist is appropriate.

In addition to the above measures, upper endoscopy is the procedure of choice. In acute impaction, the pills will be identified and can be removed by withdrawal or advancement of the offending pills into the stomach. The endoscopy reveals mucosal abnormalities in virtually all cases of severe PIEI. Typical endoscopic features include focal areas of ulceration, erythema, and edema, and occasionally the offending pill lodged in the esophagus. Urgent evaluation is needed in cases where impaction is suspected in order to remove the offending agent and decrease exposure time. There is a direct correlation between contact time and long-term complications. In general, directed biopsies are not helpful, as they reveal nonspecific inflammation. However, they may be necessary when the clinical history is suggestive of an underlying infection or malignancy.

No known specific therapy offers a clear advantage, although medications are often given, such as a local anesthetic, antacids, H2-receptor blocker, proton pump inhibitors, and sucralfate. There is at

Table 2. Major etiology of pill-induced esophageal injury.

Doxycycline
Tetracycline HCl
NSAIDs
Alendronate
Potassium chloride
Quinidine
Ferrous sulfate

Table 3. Risk factors that predispose to pill-induced esophageal injury.

1 Xerostomia (decreased salivary flow): aging, sicca symptoms, anticholinergic medications
2 Disordered esophageal motility: achalasia, stricture, ineffective esophageal motility
3 Disordered local anatomy: stricture from any cause
4 Medication formulations: capsules, sustained release formulations, large tablets, odd-shaped pills

least a theoretical role in acid suppression if reflux is suspected to be exacerbating the clinical situation. Intravenous fluids are appropriate when the physician's orders are nothing by mouth because of severe odynophagia.

This case demonstrates that not all cases of PIEI are without major sequelae. The esophagitis may lead to complex strictures that are extremely difficult to manage. The medical literature includes only 69 reports of patients who developed stricture. This represents less than 10% of the reported cases of PIEI, and is likely an overrepresentation of the frequency due to the number of self-limited cases that go unreported. Secondly, most cases of PIEI are related to antibiotics, NSAIDs, or bisphosphonates (2,4,6–13) (Table 2). Of the three reports of injury from multivitamins (14–16), none were specifically due to a predominantly calcium-containing multimineral complex.

Several risk factors implicated in PIEI include decreased salivary flow, disordered esophageal motility, disordered local anatomy, and medication formulation (2,17) (Table 3). The patient in this case was an elderly woman who had swallowed an odd-shaped pill after breaking it in half prior to ingestion. It is likely that it lodged in her upper esophagus due to its shape and caused destruction by local reaction and prolonged impaction. The tablet included potassium and iron amino acid chelates, which are known to cause esophageal injury with prolonged stasis (1–4,6). There is no way to determine whether the course would have been altered if the initial endoscopist had been successful in removing the impacted tablet. It is possible that even early in the sequence, significant damage was done and that a severe stricture would form. However, it seems more probable that the additional hours of the impaction led to both pressure necrosis and dissolution of irritating chemicals that contributed to the severity.

Physician awareness of PIEI is of paramount importance in reducing the incidence of these occurrences. Offending pills should be discontinued if there is any suspicion of potential esophageal injury. In addition, Kikendall has proposed the following instructions to increase the likelihood that pills will pass rapidly through the esophagus into the stomach (6). Although these steps will reduce the frequency of PIEI, they will not completely eliminate it.

1. Drink at least four (4) ounces of fluid with any pill, and twice this amount with pills that are likely to cause serious injury.
2. Take pills in the upright posture.
3. Remain upright for at least 10 minutes after taking pills, and for 30 or more minutes after taking pills that have a higher frequency of causing frequent or severe esophageal injury.
4. Bedridden patients should avoid pills that have been implicated as causing frequent or severe esophageal injury.

We feel this case is especially pertinent as patients, especially women, are being advised by their physicians and the lay press to increase the amount of calcium intake per day. Many oral supplements are available with increasing amounts of calcium, with a larger amount of calcium corresponding to larger tablet size. There is the potential for more cases of PIEI caused by these supplements. Therefore, patients should receive the appropriate cautions for both prescription and over-the-counter preparations.

REFERENCES

1. Boyce HW. Drug-induced esophageal damage: diseases of medical progress. Gastrointest Endosc 1998;47:547–550.
2. Arora AS, Murray JA. Iatrogenic esophagitis. Curr Gastroenterol Rep 2000;2:224–229.
3. Nutraceutical Corporation. Amino Max Product Information. 2006. http://www.nutraceutical.com/search/view_product.cfm?product_index=1533845.
4. Kikendall JW. Pill-induced esophageal injury. In: Castell DO, Richter JE, eds. The Esophagus. 3rd ed. Philadelphia: Lippincott, Williams & Wilkins, 1999:527–537.
5. Buyukberber M, Demirci F, Savas MC, et al. Pill esophagitis caused by telithromycin: a case report. Turk J Gastroenterol 2006;17:113–115.
6. Kikendall JW. Pill esophagitis. J Clin Gastroenterol 1999;28:298–305.
7. El-Serag HB, Sonnenberg A. Association of esophagitis and esophageal strictures with diseases treated with nonsteroidal anti-inflammatory drugs. Am J Gastroenterol 1997;92:52–56.

8. de Groen PC, Lubbe DF, Hirsch LJ, et al. Esophagitis associated with the use of aledronate. New Engl J Med 1996;335:1016–1021.
9. Cryer B. NSAID gastrointestinal toxicity. Curr Opin Gastroenterol 2000;16:495–502.
10. Sia KK, Iser D, Heng R, et al. Images of interest. Esophagitis caused by alendronate. J Gastroenterol Hepatol 2004;19:936.
11. Perry PA, Dean BS, Krenzelok EP. Drug induced esophageal injury. J Toxicol Clin Toxicol 1989;27:281–286.
12. Bova JG, Dutton NE, Goldstein HM, et al. Medication-induced esophagitis: diagnosis by double-contrast esophagography. AJR Am J Roentgenol 1987;148:731–732.
13. Ewert B, Ewert G, Glas GE, et al. Medikamentell hypofarynxskada. Lakartidningen 1979;76:739–740.
14. Graham DY. What the gastroenterologist should know about the gastrointestinal safety profiles of bisphosphonates. Dig Dis Sci 2002;47:1665–1678.
15. Batres LA, Gabriel CA, Tsou VM. Methotrexate-induced esophagitis in a child with Crohn disease. J Pediatr Gastroenterol Nutr 2003;37:514–516.
16. Kadayifci A, Gulsen MT, Koruk M, et al. Doxycycline-induced pill esophagitis. Dis Esophagus 2004;17:168–171.
17. Berkelhammer C, Gutti P. Pill-induced esophagitis within esophageal diverticulae. J Gastroenterol Hepatol 2007;22:287.