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**Brief
Reports**



USE OF PROTEOLYTIC ENZYMES IN THE TREATMENT OF PROTEINACEOUS ESOPHAGEAL FOOD IMPACTION

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□ Abstract—Background: Proteinaceous esophageal food impaction typically requires endoscopic intervention. An alternative approach is the use of proteolytic enzymes. Concerns regarding the use of proteolytic enzymes include the risk of perforation and aspiration pneumonitis. **Objective:** We retrospectively reviewed our series of 69 patients treated with papain to determine the safety and efficacy of proteolytic enzymes. **Methods:** Patients were retrospectively reviewed if treated for an esophageal food impaction from 1999 through 2008. **Results:** Median age was 56 years (range 19–91 years), with 46 male and 23 female patients. In 27 patients (39%) this was their first presentation, in 14 (20%) it was the second, and 28 (41%) had multiple previous episodes. Meat was the cause in 49 (71%), chicken in 6 (9%), fish in 3 (4%), and unspecified in 11 (16%). All patients presented with dysphagia for solids, 56 (81%) could not tolerate liquids. Papain solution, 1 tsp in 8 oz of water, was given to patients in an unlimited quantity. Papain was successful in relieving the obstruction in 60 patients (87%). The remaining 9 patients (13%) underwent endoscopy with successful retrieval. No patient suffered a perforation, either with papain ingestion or endoscopy. There were no episodes of pneumonitis or pneumonia. **Conclusions:** We have used proteolytic enzymes with a high success rate and with minimal complication. Further, if proteolytic enzymes fail, endoscopy can be performed safely and effectively. We recommend the use of proteolytic enzymes as the initial management in all patients with proteinaceous food impaction of the esophagus. **Published by Elsevier Inc.**

□ Keywords—papain; esophageal foreign body; food impaction

INTRODUCTION

Esophageal obstruction due to food impaction is an emergency that can require endoscopic intervention, but can often be managed by pharmacologic means. We present an experience demonstrating the safety of proteolytic enzymes in the management of proteinaceous food impaction.

Patients who present with food impaction tend to be adults who have esophageal pathology such as Schatzki ring, peptic stricture, esophageal web, and esophageal dysmotility, with the food bolus often located in the distal esophagus (1). Presenting symptoms can include dysphagia to solids and liquids, an inability to swallow saliva, and chest pain or discomfort.

Often, the treatment of choice for esophageal food impaction is flexible or rigid endoscopy (1,2). Despite the reported success rates of endoscopic treatments, proteolytic enzymes (papain) offer a less labor intensive and potentially a more cost-effective alternative.

Papain is obtained from the leaves of the Carica papaya tree. Its use as a treatment for esophageal obstruction was first suggested by Richardson in 1945 (3). Although proteolytic enzymes have been used for

this purpose for many years, the currently available literature presents an inconclusive verdict on both its efficacy and safety. The most comprehensive review of outcomes of proteolytic enzyme treatment was published in 1977 by Cavo and Grayboski (4). The review summarized 89 reported cases of successful passage of food bolus with the use of proteolytic enzymes. However, the authors also noted two published cases of esophageal perforation as potential complications with the use of enzymes and advised for caution when performing endoscopy after a failed papain attempt (4). Other reported adverse effects are based on two separate case reports. They include aspiration pneumonitis and hemorrhagic pulmonary edema (5,6). In addition to the safety issues raised by these reports, papain's intrinsic ability to break down meat bolus was also called into question by the results of an animal model study performed by Goldner and Danley (7). In light of both evidence for and against the use of proteolytic enzymes for esophageal obstruction and the scarcity of data available, we reviewed our series of 69 patients treated with papain with the purpose of evaluating its efficacy and safety in managing patients with esophageal food impaction.

MATERIAL AND METHODS

A retrospective study of patients with esophageal obstruction due to foreign bodies during the period of 1999 to 2008 was performed with the approval of the Institutional Review Board. Patients who received endoscopy as their primary treatment and those with nonproteinaceous foreign bodies were excluded. Patients with esophageal food impaction who were treated with papain as the primary treatment were included in the case series. Their records were reviewed to assess the success of their primary papain treatment and that of secondary endoscopic treatment in the event of failed treatment with papain. Papain treatment was delivered per protocol, 1 tsp in 8 oz of water, with multiple cups given to the patients. Papain was given to patients in

Table 1. Baseline Characteristics of Patients Presenting with Proteinaceous Food Impaction

Characteristic	Result, n (%)
First presentation	27 (39)
Second presentation	14 (20)
Multiple presentations	28 (41)
Type of proteinaceous impaction	
Meat	49 (71)
Chicken	6 (9)
Fish	3 (4)
Other	11 (16)

Table 2. Symptoms on Presentation and Initial Evaluation

Duration (Median)	6 Hours (1–36 h)
Dysphagia for solids	69 (100)
Dysphagia for liquids	56 (81)
Difficulty with saliva	39 (57)
Chest x-ray study	45 (65)
Barium swallow	5 (7)

unlimited quantities as there was no finite amount specified. Endpoints were either passage of the food bolus or intervention. Endoscopic treatment after papain included the use of either flexible and rigid endoscopy or both.

RESULTS

Papain treatment was the initial treatment in 69 patients, 46 males and 23 females. Median age was 56 years, with an age range between 19 and 91 years. All patients received papain therapy initiated in the emergency department (ED). In 27 patients (39%), this was their first presentation; in 14 (20%) it was the second, and 28 (41%) had multiple previous episodes. Red meat was the cause in 49 (71%), chicken in 6 (9%), fish in 3 (4%), and other in 11 (16%) (Table 1).

In regard to underlying esophageal pathology, 28 (41%) had a known esophageal stricture, and one patient had a known motility disorder. No patients treated with papain had an esophageal malignancy. The median duration of symptoms prior to presentation was 6 h (1–36 h). All patients presented with dysphagia for solids, 56 (81%) could not tolerate liquids and 39 (57%) could not handle their saliva. In the initial evaluation, 5 (7%) had a barium swallow, and 45 (65%) had a chest radiograph (Table 2).

Papain was given to all patients included in this study, and 13 patients (19%) were given sublingual nitroglycerin and 30 (43%) received glucagon in addition to papain. The median time of papain delivery was 3 h, with a range of 20 min to 48 h (Table 3).

Papain was successful in relieving the obstruction in 60 patients (87%). The remaining 9 patients (13%) underwent endoscopy with successful retrieval. In one patient, the foreign body was pushed into the stomach, and in 8 (89%), it was extracted with a combination of flexible and rigid esophagoscopy. Three patients (33%) who

Table 3. Management

Papain	69 (100)
Glucagon	30 (43)
Sublingual nitroglycerin	13 (19)
Duration of papain delivery, median (min)	180 (20–2880)

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