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Case report

Conservative Management of Esophageal Perforation Due to Foreign Body: A Case Series of Four Patients

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Abstract

Introduction: The most common cause of esophageal perforation today is diagnostic and therapeutic procedures. However, perforation caused by a foreign body accounts for 10% to 35% of cases, with a mortality rate of up to 18%. **Method:** This case series presents patients diagnosed with esophageal perforation who were treated conservatively over a two-year period at the Hospital Regional de Moniquirá, Colombia. **Results:** Six patients experienced esophageal perforation due to a foreign body. Of these, four were successfully managed without the need for surgery. **Conclusions:** Conservative treatment of esophageal perforation is a valid approach for selected patients who meet Cameron's criteria and can undergo strict follow-up.

Keywords

Esophagus, foreign bodies, esophageal perforation, conservative treatment, patient selection.

INTRODUCTION

Esophageal perforation caused by accidentally ingested foreign bodies presents a diagnostic and therapeutic challenge for the medical team. Between 57% and 80% of foreign bodies become impacted in the cervical esophagus, 26% in the thoracic esophagus, and 17% at the esophagogastric junction[1,2]. Foreign bodies account for 10% to 35% of the causes of esophageal perforation[3-5] and are associated with a mortality rate of up to 18%. Currently, the most common cause of esophageal perforation is related to diagnostic and therapeutic procedures[6].

One of the earliest documented descriptions of esophageal perforation corresponds to Hermann Boerhaave, who in 1723 observed the spontaneous rupture of the esophagus of Baron Van Wasserman, Grand Admiral and Commander of the Dutch fleet[6,7]. In 1947, Barrett[8], Olsen and Clagett[9] described the first attempts to repair an esophageal injury.

Foreign bodies pass through the digestive tract without causing damage and without requiring intervention in 80% of cases. Between 10% and 20% of cases require endoscopic removal, and less than 1% require surgical management. In the United States, the ingestion of foreign bodies has an incidence among adults of between 3 and 5.3 per 100,000 inhabitants and is associated with 1,500 deaths per year[10].

The management of esophageal perforation must be individualized, taking into account the third of the esophagus

in which the perforation occurs, the extent of esophageal damage, the cause or mechanism of the injury, the patient's health condition, and the time elapsed between the perforation and medical attention. Based on these factors, treatment may include conservative management, endoscopic management, or surgical management[10].

At the Hospital Regional de Moniquirá, 42 patients with foreign bodies in the esophagus were treated over a two-year period, between December 2021 and November 2023. Six of these patients presented with esophageal perforation. One patient was not considered a candidate for conservative management due to not meeting Cameron's criteria and required surgical management. Another patient with esophageal perforation also did not qualify, as he experienced a massive hemorrhage episode six hours after admission in the intensive care unit (ICU) and died. The remaining four patients, who underwent conservative treatment, had a favorable clinical course. All four patients presented poor dental health as a probable predisposing factor for the accidental ingestion of foreign bodies, being either partially or totally edentulous.

The patients' information was obtained with authorization from the Scientific Submanagement of the Institution, along with approval for its publication.

CLINICAL CASES

Case 1

This is a 59-year-old male patient who, after ingesting chicken, presented to the emergency department with dysphagia and a sensation of a foreign body at the cervical level, with 48 hours of evolution. Clinically, he had normal vital signs and no subcutaneous emphysema. Upper digestive endoscopy revealed a chicken bone impacted in the esophagus, 22 cm from the dental arch (**Figure 1A**). After removal with foreign body forceps, a 3 mm perforation was identified in the esophageal wall (**Figure 1B**). Cervicothoracic computed tomography (CT) showed a small amount of gas and a contained leakage of contrast medium at the periesophageal level (**Figure 1C**).

Conservative treatment was performed, including enteral nutrition through a nasojejunal tube and administration of ampicillin-sulbactam at a dose of 3 g intravenously (IV) every 6 hours.The patient had an adequate clinical course; therefore, oral feeding was resumed on the tenth day, and he was discharged.

Case 2

This is a 75-year-old female patient who, after ingesting chicken, presented to the emergency department with dysphagia for solids and liquids and a sensation of a foreign body at the cervical level, with 96 hours of evolution. On physical examination, her vital signs were normal, and there was no subcutaneous emphysema. During the upper digestive endoscopy, a chicken bone was observed impacted in the esophagus, 16 cm from the dental arch (**Figure 2A**). It was removed using foreign body forceps (**Figure 2B**), and an 8 mm perforation was identified in the esophageal wall (**Figure 2C**). Cervicothoracic computed tomography (**Figure 2D**) showed tissue thickening, with gas at the esophageal level and in the retropharyngeal space.

Due to the patient's stable clinical condition, a conservative treatment approach was chosen. This included enteral feeding through a nasojejunal tube and the administration of ampicillin-sulbactam at a dose of 3 g IV every 6 hours. Given her favorable progress and good oral intake tolerance, she was discharged on the tenth day.

Case 3

This is a 62-year-old female patient who, after consuming rib broth, presented to the emergency department with

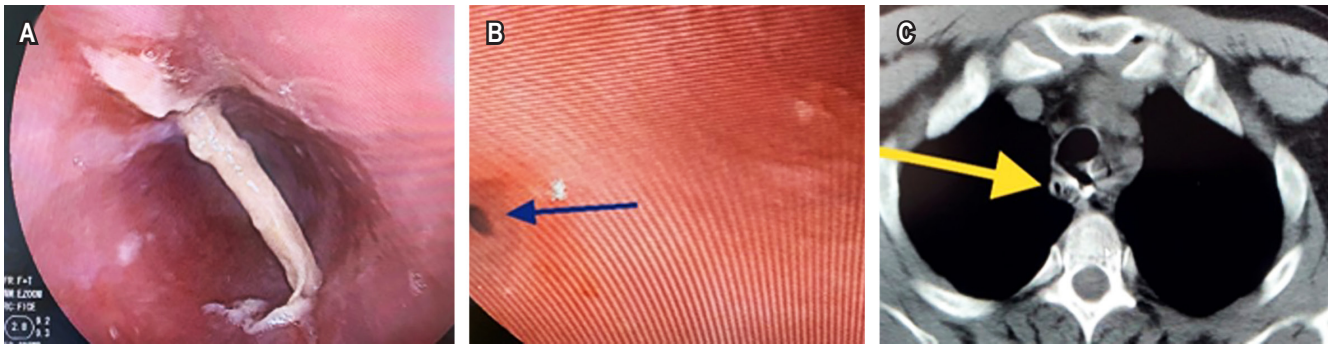

Figure 1. Foreign body located in the esophagus. **A.** Foreign body. **B.** Perforation in the esophageal wall. **C.** CT scan showing gas and contained contrast medium. Images property of the authors.

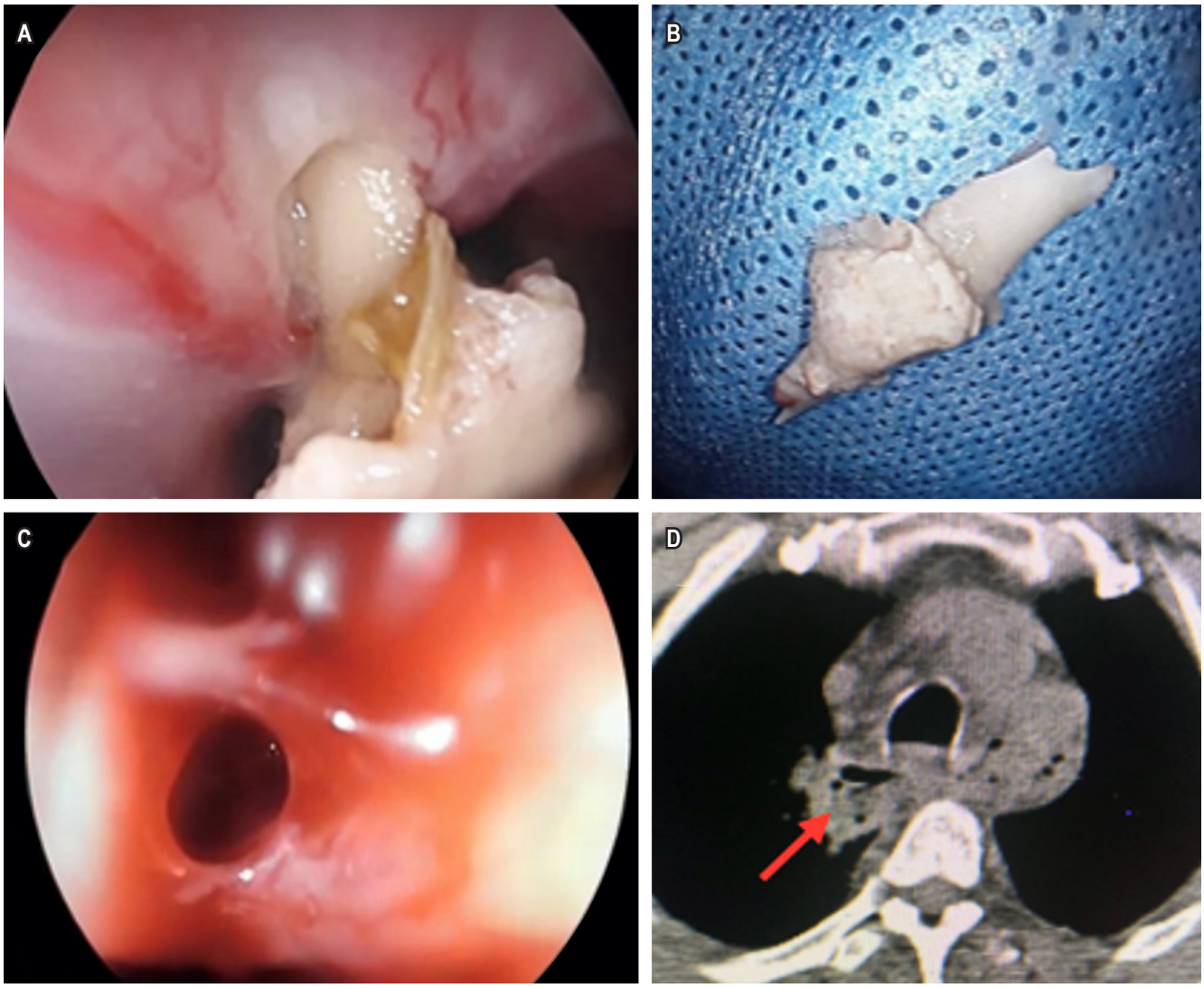

Figure 2. Presence of a foreign body in the esophagus. **A.** Impacted foreign body. **B.** Foreign body. **C.** Perforation in the esophageal wall. **D.** Gas at the esophageal level and in the retropharyngeal space on CT scan. Images property of the authors.

dysphagia and a sensation of a foreign body at the cervical level, with 24 hours of evolution. Vital signs were normal, and there was no evidence of subcutaneous emphysema. During the upper gastrointestinal endoscopy, a beef bone spicule impacted in the esophagus was observed at 14 cm from the dental arch (**Figure 3A**), and it was extracted using foreign body forceps (**Figure 3B**). A mirror-image perforation of 3 mm, caused by the ends of the foreign body, was identified in the esophageal wall (**Figure 3C**). Cervicothoracic computed tomography showed the presence of gas at the mediastinal and periesophageal levels.

A nasoenteral feeding tube was placed, and broad-spectrum antibiotic therapy was initiated with piperacillin/tazobactam at a dose of 4.5 g IV every 8 hours. Given the patient's good oral intake tolerance and favorable clinical progress, she was discharged on the eighth day.

Case 4

This is a 60-year-old male patient who presented to the emergency department with progressive dysphagia and a sensation of a foreign body at the cervical level, 120 hours after ingesting fish. He had no subcutaneous emphysema, and his vital signs were normal. The esophagogastroduodenoscopy revealed a deep longitudinal tear in the esophageal wall with signs of perforation (**Figure 4A**), but the foreign

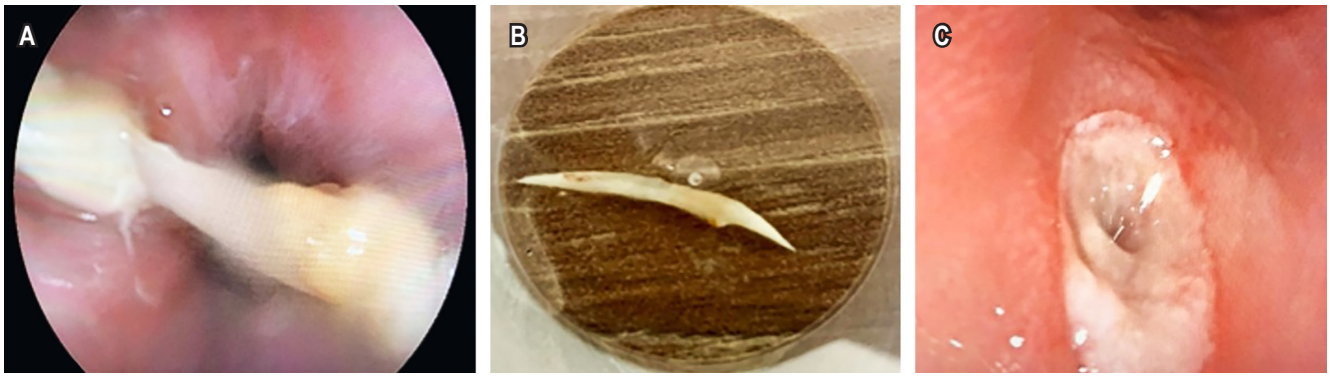

Figure 3. Presence of a foreign body in the esophagus. **A.** Foreign body impacted on both sides of the esophageal wall. **B.** Foreign body extracted. **C.** Perforation in the esophageal wall. Images property of the authors.

body was not identified. Cervicothoracic CT showed gas at the mediastinal and periesophageal levels, with a foreign body located at the periesophageal level (**Figure 4B**). A cervical X-ray also showed the foreign body at the periesophageal level (**Figure 4C**).

The patient was treated with enteral nutrition via a nasojejunal tube and broad-spectrum antibiotic therapy with piperacillin-tazobactam at a dose of 4.5 g IV every 8 hours. The progress was satisfactory, and on the ninth day, a follow-up endoscopy showed a longitudinal scar at the level of the cervical esophagus with adequate re-epithelialization (**Figure 4D**). The patient was discharged on the tenth day. Two weeks later, the patient underwent left anterolateral cervicotomy due to persistent pain in the cervical region. The foreign body was successfully extracted (**Figure 4E**). The patient was discharged 48 hours postoperatively with satisfactory recovery.

Table 1 shows the paraclinical results of the four patients, who were monitored through outpatient consultations at 4 and 8 weeks, remaining asymptomatic.

DISCUSSION

Esophageal perforation is a rare condition, with causes including endoscopic instrumentation (59%), spontaneous occurrence (15%), foreign bodies (12%), trauma (9%), surgical lesions (2%), neoplastic conditions (2%), and other causes (2%)[11]. A retrospective descriptive study published in 2022 identified a total of 15 patients with this condition between 2000 and 2019, of whom 80% required surgical treatment[12]. In our institution, a higher percentage of cases occurred within a shorter period, with six patients diagnosed with esophageal perforation over two years. Four of these patients were treated conservatively, the fifth required surgery due to not meeting Cameron's criteria, and the remaining patient presented with massive hemorrhage six hours after admission to the ICU and died.

The symptoms most commonly presented after the ingestion of foreign bodies are dysphagia, cervical pain, the sensation of a foreign body in the pharynx or cervical esophagus, hypersalivation, chest pain, dyspnea, subcuta-

Table 1. Paraclinical tests of patients

Patient	Admission paraclinical tests			Discharge paraclinical tests		
	Leukocytes	Neutrophils (%)	CRP	Leukocytes	Neutrophils (%)	CRP
Case 1	16.060	85,1	48	6090	60,3	<6
Case 2	16.970	92,1	192	8180	59,6	48
Case 3	8070	83,7	101	3630	38,0	24
Case 4	10.700	82,4	98	5780	50,5	27

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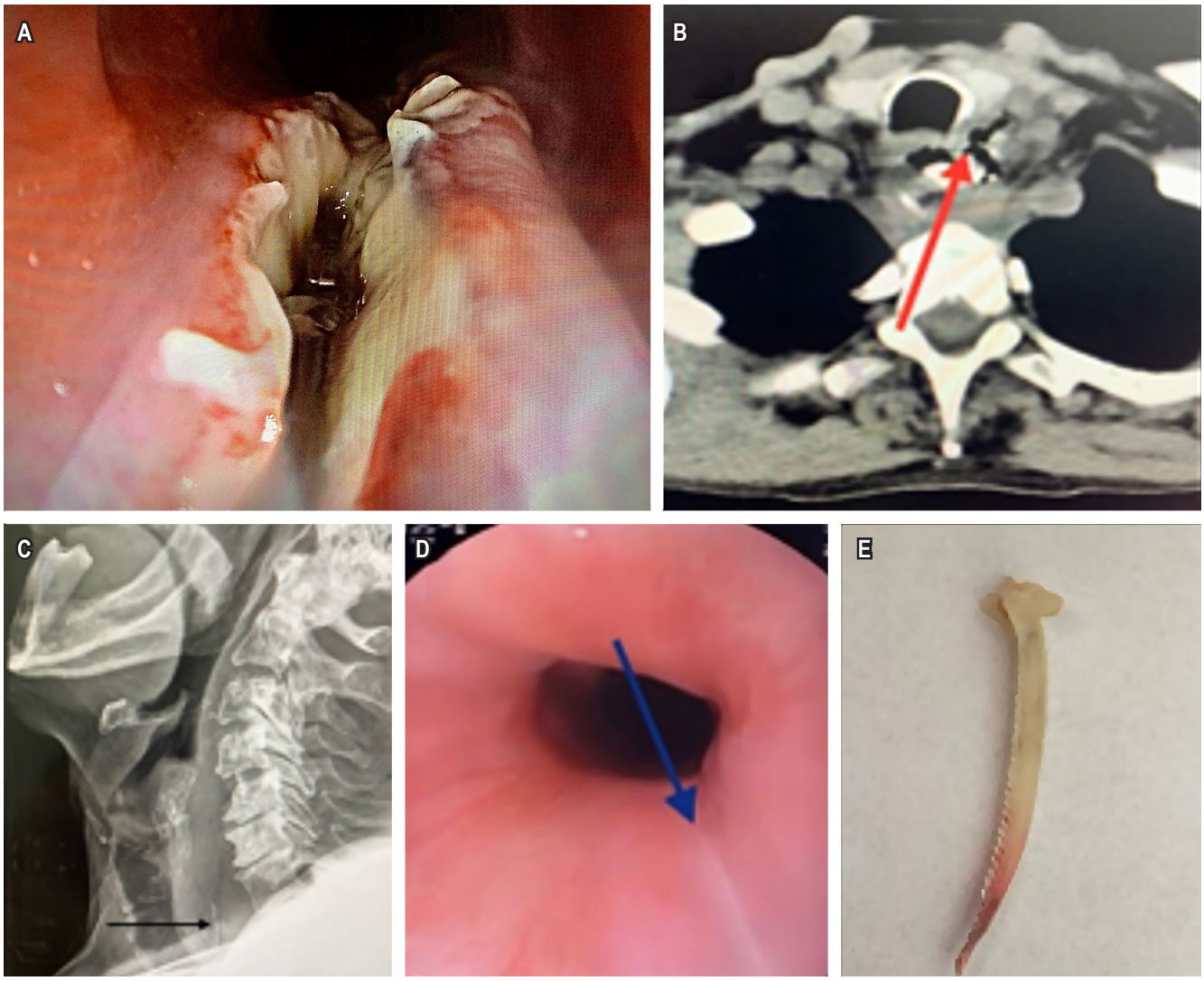

Figure 4. Foreign body located in the esophagus. **A.** Longitudinal perforation of the esophagus. **B** and **C.** CT scan and X-ray showing the foreign body in the retropharyngeal space. **D.** Healing wound observed during follow-up endoscopy. **E.** Foreign body extracted. Images property of the authors.

neous emphysema, fever, tachycardia, and tachypnea[12]. All the patients included in this series presented dysphagia and the sensation of a foreign body, with no tachycardia and no subcutaneous emphysema, so clinically, perforation was not suspected upon admission.

The diagnosis is aimed at establishing the presence of the foreign body in the upper digestive tract, or signs of perforation such as dissection of the periesophageal or mediastinal spaces by gas, or indirect signs of the presence of the foreign body at this level, such as rectification of the cervical spine due to antalgic positioning and increased retropharyngeal or retroesophageal space on cervical X-rays. Paraclinical tests help assess criteria for systemic inflammatory response, and a complete blood count, C-reactive protein, and other relevant tests should be requested depending on the patient's condition[13].

Due to the risk of perforation or aspiration, an endoscopic examination should be performed on all patients suspected of having a foreign body in the upper digestive tract, as was the case with all the patients presented. The examination should systematically assess the base of the tongue, soft palate, tonsillar fossae and their pillars, palatine tonsils, the supra-epiglottic space, pyriform sinuses, anterior commissure, posterior commissure, vocal folds, hypopharynx, cricopharynx, esophageal lumen along its entire length, the gastric chamber, and the duodenum[14-16].

The extraction of the foreign body should be performed very carefully to avoid further tissue damage from improper traction, in order to prevent inadvertent perforation. Excessive bleeding, which could indicate vascular injury, subcutaneous emphysema, respiratory difficulty, or a decrease in pulse oximetry, should always be monitored, as it may suggest pleural or airway injury. During the foreign body extraction, proper fixation is essential to prevent loss of the foreign body and possible migration into the airway. After the foreign body is removed, a thorough reassessment of the esophageal wall should be conducted to rule out potential perforations[15,16].

In the case of perforation or suspected perforation, performing a cervicothoracic computed tomography allows for the assessment of the extent of gas dissection in the mediastinal and cervical tissues, the presence of cervical or thoracic collections, and potential injury to neighboring structures or organs. This will help determine the management approach to be followed[17], as was done with the patients presented.

The factors for determining the conservative management of esophageal perforation in the middle or thoracic third were established in 1979 by Cameron[18] and are known as Cameron's criteria:

- Early diagnosis
- Contained fistula in the neck, mediastinum, or between the mediastinum and the visceral pleura
- Drainage of the perforation into the esophageal lumen
- Availability of diagnostic imaging and a surgical specialist
- Injury not occurring on neoplastic tissue, nor associated with distal obstruction
- Absence of symptoms of sepsis

In 1997, Altorjay[19] published his 15-year experience with conservative management in 20 out of 86 patients with esophageal perforation, with a mortality rate of 10%. In 2020, Liao[20] published a retrospective review of 270 patients with esophageal perforation caused by a foreign body over an 8-year period, treated conservatively, with a healing rate of 94.8% and a mortality rate of 1.1%.

Complications that can arise when conservative management is implemented include mediastinitis, the formation of abscesses or mediastinal collections, and empyema, when the perforation site does not maintain adequate drainage into the esophageal lumen, leading to infection spread. Active bleeding can also occur due to vascular injury or an aortoesophageal fistula[21].

Endoscopic treatment requires proper supplies and trained personnel. It includes defect closure with the placement of traditional TTS (through the scope) and OTSC (over the scope clip) clips, which have generally been used for lesions up to 10 mm in size. However, there are reports of successful closure for larger lesions with a success rate of 89% when the perforation is identified early (i.e., within the first 24 hours). Early identification allows for leakage control and reduces the risk of mediastinitis[7, 22, 23]. The placement of fully covered self-expanding esophageal stents shows a healing rate ranging from 13% to 69%, with mortality rates between 0% and 33%, and stent migration between 6% and 35%. These stents should be removed after 4 to 6 weeks to prevent bleeding or tissue penetration, which could complicate their removal[22, 24].

Vacuum therapy in patients with a periesophageal cavity that needs drainage allows for closure by granulation with healing rates of 70% to 100%. It is recommended to change the sponge every 5 to 7 days[24, 25]. Tissue glue has been successfully used for 2 mm perforations resulting from the removal of food impacted in the esophageal lumen[7].

Based on the clinical characteristics of the presented patients and the endoscopic findings, these alternative therapeutic approaches for initial management were not considered and were reserved as second-line treatment options, which were ultimately not used.

According to the guidelines from the *World Journal of Emergency Surgery*, patients without transmural necrosis of the esophageal wall are candidates for non-surgical management but require close clinical, laboratory, and imaging monitoring if necessary. Once the perforation is documented, nasoenteral feeding should be administered. Oral intake can be resumed as soon as proper swallowing is restored, pain is reduced, and it is deemed that the esophageal lesion has healed[26]. These guidelines were followed for the patients presented.

Surgical treatment is aimed at draining the periesophageal spaces, suturing the perforation with or without the placement of reinforcement muscle patches, or performing derivational surgeries with partial or total esophageal resection. The mortality associated with esophageal perforation can range from 12% to 36%[27, 28].

CONCLUSIONS

In every patient diagnosed with a foreign body, esophageal perforation should be ruled out, even if clinical signs such as tachycardia or subcutaneous emphysema are not present. Conservative management of esophageal perforation is a valid option for selected patients who meet Cameron's criteria and can be closely monitored, allowing for the detection of changes that may indicate the need for definitive surgical management.

We consider it highly important that future studies be conducted with methodological designs that allow for stronger recommendations regarding the treatment of these patients.

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Manejo conservador de la perforación esofágica por cuerpo extraño: a propósito de una serie de cuatro casos

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