

## The role of provocative maneuvers in high-resolution esophageal manometry for diagnosing rumination syndrome



### Rol de las maniobras provocativas en la manometría esofágica de alta resolución para diagnosticar el síndrome de rumiación

Rumination syndrome is a condition characterized by repetitive, effortless regurgitation into the mouth of recently ingested food, followed by rechewing and swallowing or expulsion of the food bolus.<sup>1</sup>

Rumination episodes are produced in the immediate postprandial period and are due to a deliberate increase in intragastric pressure resulting from the contraction of the abdominal wall musculature. This increased pressure surpasses that of the lower esophageal sphincter, facilitating the passage of gastric content into the esophagus. Once the gastric content reaches the esophagus, upper esophageal sphincter relaxation is produced, enabling the later passage of the gastric content into the pharynx and mouth, where it can be newly chewed and swallowed.<sup>2</sup>

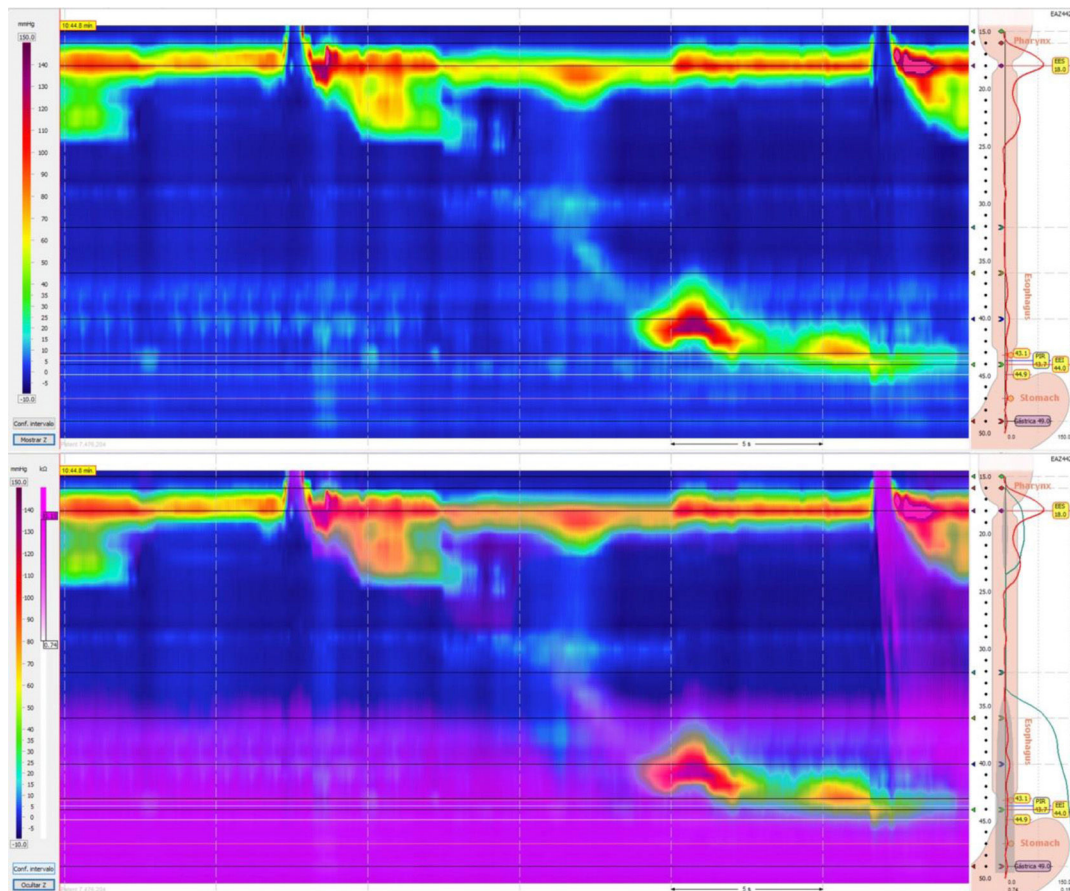
The current diagnosis of rumination syndrome is clinical and based on the Rome IV criteria. However, distinguishing

this syndrome from gastroesophageal reflux disease (GERD) can be challenging.<sup>1</sup> High-resolution esophageal manometry with impedance monitoring, followed by a solid food challenge, can confirm the diagnosis.<sup>2-4</sup> This intervention is particularly useful in patients in whom the differential diagnosis with GERD is needed or in those with poor acceptance of the diagnosis.

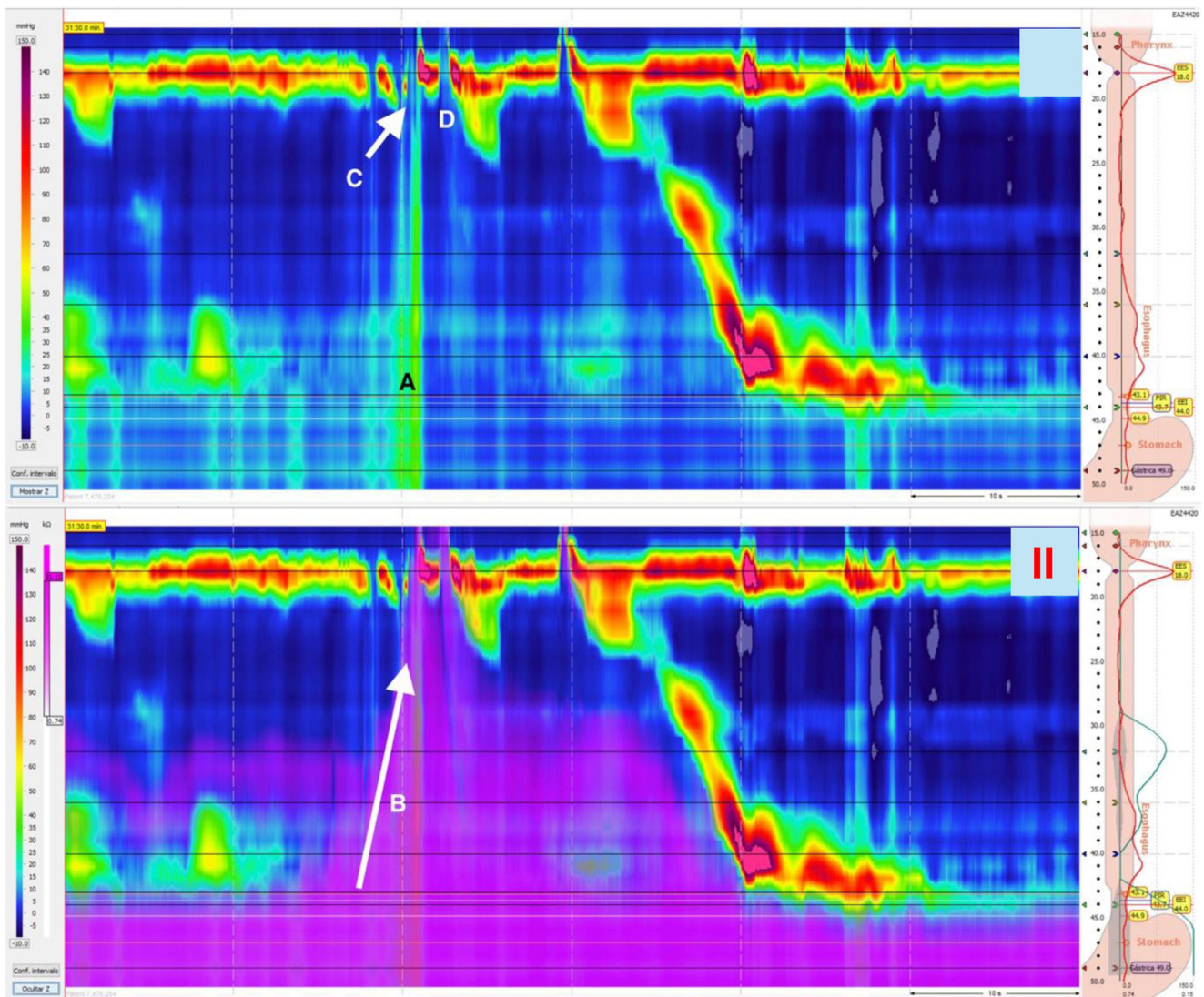
We report herein the manometric findings of an 18-year-old female patient with a history of anorexia nervosa at 14 years of age and clinical symptoms of six-month progression characterized by heartburn, regurgitation, swallowing the regurgitated content, and occasional vomiting of the food content, all occurring exclusively in the postprandial period. Treatment with metoclopramide, omeprazole, and magaldrate did not improve her symptoms. Upper gastrointestinal endoscopy identified no alterations in the esophageal lumen or the esophagogastric junction.

In high-resolution esophageal manometry with impedance monitoring (Fig. 1), ineffective motility, in the context of the Chicago classification 4.0 protocol, was observed, as well as no increase in intragastric pressure or retrograde flow of food content into the esophagus or pharynx.

As part of the diagnostic evaluation, a diet consisting of a sandwich and apple juice (250 ml) was provided, enabling us to document several episodes of an increase above 30 mmHg



**Figure 1** A 5 ml wet swallow in high-resolution manometry/impedance in a patient with suspected rumination. No data suggesting the diagnosis of rumination syndrome are observed.



**Figure 2** A rumination episode in high-resolution manometry/impedance. Image I shows an elevation in intragastric pressure (A) that precedes the retrograde flow of the bolus into the esophagus (B), the simultaneous opening of the upper esophageal sphincter (C), and subsequent swallowing (D). Image II shows the retrograde movement through impedance during the rumination episode.

in the intragastric baseline pressure and relaxation of the upper and lower esophageal sphincters, with the passage of gastric content into the pharynx, and subsequent swallows with complete clearance of the bolus, demonstrated by the decrease in impedance (Fig. 2). Thus, we reinforce the need to carry out provocative maneuvers directed at diagnostic suspicion, during high-resolution esophageal manometry. With respect to rumination syndrome, the administration of a solid and liquid food that the patient says causes his/her symptoms<sup>5,6</sup> and monitoring beyond the complete Chicago 4.0 protocol have been shown to aid in making the differential diagnosis with regurgitation episodes in GERD and belching associated with regurgitation.<sup>3,4</sup>

### Ethical considerations

The present work meets the current research and bioethics regulations of the Research and Ethics Committee of the *Instituto Nacional de Ciencias Médicas y Nutrición Salvador*

*Zubirán*, and given the nature of the publication, did not require its authorization. In addition, the authors declare that this article contains no personal information that could identify the patient.

### Financial disclosure

No financial support was received in relation to this article.

### Conflict of interest

The authors declare that there is no conflict of interest.

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## Indocyanine green-guided video-assisted retroperitoneal drainage in pancreatic necrosis: a case report



### Drenaje retroperitoneal videoasistido guiado con verde de indocianina en necrosis pancreática: reporte de un caso

Approximately 20% of patients with acute pancreatitis will have a serious or severe episode. Pancreatic necrosis is the complication with the highest mortality rate of up to 17%, and it reaches 19.8% in patients with infected necrosis and organ failure.<sup>1</sup>

“Step-up” management is standardized for encapsulated pancreatic necrosis, in which the minimally invasive approach is ideal because of its efficacy and validation.<sup>2</sup>

The surgical approach depends on the site of the peripancreatic collections, and can be endoscopic transgastric drainage, percutaneous drainage, or video-assisted retroperitoneal debridement (VARD). The decision to start minimally invasive management allows more aggressive interventions to be delayed, enabling the necrotic collection to mature, and in some cases, be reversed, consequently reducing complications.<sup>3</sup>

VARD is a minimally invasive procedure, with direct visualization of the collection, but with a narrow surgical manipulation field. Its main complication is vascular injury and the development of pancreatic fistulas.<sup>4</sup>

Indocyanine green is a fluorescent dye that is visible with near-infrared light. It is detected by special cameras that transmit a signal to a monitor, where the structures taking up the dye are visualized. It is used in oncologic surgery with

fluorescent markers, in lymphatic drainage identification, bile duct visualization, or tissue dissection.<sup>5</sup> In pancreatic necrosis, adjuvant use of indocyanine green during VARD is suggested, to guide the debridement.<sup>6</sup>

A 32-year-old man was admitted to the hospital due to painful abdominal symptoms. At admission, the laboratory work-up reported triglycerides of 5,020 mg/dl, cholesterol of 417 mg/dl, serum amylase of 930 U/l, and serum lipase of 3,357 U/l, and a tomography scan revealed acute edematous pancreatitis. The patient then presented with clinical deterioration, compartment syndrome, and multiple organ failure. Three laparotomies were performed. The first was carried out due to compartment syndrome and the second because of the patient’s clinical deterioration, during which necrosis of the tail of the pancreas was found intraoperatively, resulting in the performance of open necrosectomy. In the third laparotomy, partial omentectomy secondary to infarction was carried out. A postoperative grade C distal pancreatic fistula secondary to the necrosectomy was diagnosed and treated with a somatostatin analogue. A control tomography scan identified fluid collections along the left parietocolic gutter extending to the pelvic excavation, for which a three-week regimen of antibiotics was started. Afterwards, percutaneous drainage was performed, following the “step-up” management of pancreatic necrosis, placing two pigtail catheters in said collections.

Fifteen days later, the patient’s torpid progression persisted. A control tomography scan revealed an encapsulated collection at the level of the tail of the pancreas and the left parietocolic gutter (Fig. 1). The decision to carry out VARD was made. Forty-five minutes before the surgery, 2.5 ml of indocyanine green was administered, diluted in 5 cc of saline solution. A pigtail catheter was placed at the left mid-