

Chapter 9

Rumination Syndrome



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Case Study

A 25-year-old man is referred for evaluation of refractory gastroesophageal reflux symptoms. His history started 1 year ago when he noted the onset of regurgitation of his meal immediately and for up to 30 min, following eating. This started intermittently, but within months started to occur with every meal. He does not describe the regurgitant as sour or acidic, and he does not experience heartburn. The food would commonly come up into his mouth, at which point he will either expectorate it or re-swallow it. The regurgitation does not appear related to the size of the meal and may occur with as little as a glass of water. There are no nocturnal symptoms, and he has not lost weight. He has become fearful of eating in social situations because of these symptoms. He saw his primary care physician, who prescribed omeprazole 40 mg

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before breakfast, but his symptoms have not abated. A subsequent endoscopy was normal. He was referred to a thoracic surgeon for fundoplication but is coming to you for a second opinion. His past medical history is unremarkable. He denies cigarette use and drinks one beer per week. He is an attorney for the city government and exercises regularly. Physical examination was unremarkable.

Objectives

- Understand the clinical criteria by which rumination syndrome is diagnosed.
- Be able to differentiate rumination syndrome from unresponsive gastroesophageal reflux disease (GERD).
- Understand the pathophysiology of rumination syndrome.
- Understand the use of testing in rumination syndrome, particularly esophageal manometry as an objective means of diagnosis, and administering biofeedback therapy.

Epidemiology

The prevalence of rumination syndrome is unclear, given how few epidemiologic studies have been performed. It is more common in children, young adults, patients with fibromyalgia or eating disorders, and patients with pelvic floor dysfunction and constipation [1–5]. This last group has been termed REDRUM syndrome, representing a combination of rectal evacuation disorder and rumination [6]. Rumination is also more common in patients with learning or developmental delay disorders [7]. The incidence of rumination may also vary geographically. For example, studies from Colombia reported a prevalence of 5% [8], in contrast to Mexico [9] and Australia [1], where prevalence is <1%. Whether this truly represents different racial or geographic predispositions or

more careful or different diagnostic criteria is unclear. Nevertheless, many, if not most, patients with rumination syndrome do not have evident medical or psychologic predisposing factors [10]. Finally, it is also likely that under-recognition of rumination leads to underestimation of its true prevalence.

Etiology and Pathophysiology

The etiology of rumination syndrome is unknown [11]. It appears to be a subconscious learned response, but a clear initiating event is not typically identified. The subconscious nature of this behavior is reinforced by an inability of normal subjects to induce rumination. The abnormal physiology is defined by an augmentation in gastric pressure, and a reduction in both the lower esophageal sphincter (LES) and upper esophageal sphincter (UES) pressures (Fig. 9.1) [12, 13]. With a gastric pressure that is higher than these sphincter pressures, there is a gradient that forces retrograde flow of the

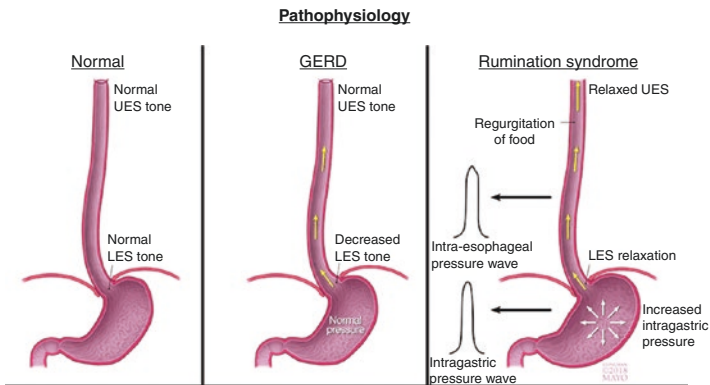


FIGURE 9.1 Pathophysiology of GERD and rumination syndrome. During or after a meal in: (a) normal person, (b) GERD (after 1 h) (c) Rumination syndrome (within 10–30 mins or during a meal). (Used with permission of Mayo Foundation for Medical Education and Research, all rights reserved)

stomach content proximally into the mouth [12, 13]. Whether this increase in gastric pressure is primary or passively transmitted through a rise in intra-abdominal pressure is unclear. The correlation of increased electromyographic (EMG) changes in the abdominal wall, concordant with rumination episodes, and the favorable response of rumination to diaphragmatic breathing supports the latter [14, 15]. A rumination event will only occur when all three of these pressure changes occur simultaneously. An isolated increase in gastric pressure is unlikely to be of sufficient magnitude to overcome a normal LES pressure. Further study of rumination has proposed three subtypes. Specifically, rumination may follow reflux events, supragastric belches, and classic rumination episodes in isolation. Each of these three types is associated with gastric strain. However, there is no clear data that demonstrates abnormalities of gastric motility, such as poor accommodation or delayed emptying, associated with increased pressure events.

Symptoms

The Rome diagnostic criteria to define rumination are persistent or recurrent regurgitation of recently ingested food into the mouth, with subsequent spitting, or remastication and swallowing. The regurgitation is not preceded by retching [16]. Supportive criteria include the fact that regurgitation events are usually not preceded by nausea, there is cessation of the process when the regurgitated material becomes acidic, and the regurgitant contains recognizable food with a pleasant taste. Using this as a starting template, patients with rumination may present with numerous variations including regurgitation of both liquids and solids, small- or large-volume regurgitation, symptoms that are independent of meal size, a sense of substernal reflux of gastric content, and usually maintenance of weight, although weight loss may be seen in up to 40% of patients. Another striking feature is the consistency of the symptoms occurring with virtually every meal in these patients. This consistency

in symptoms often leads patients to a sense of complacency about their symptoms. Patients with rumination syndrome do not respond to therapy with proton pump inhibitors (PPIs); in fact PPI therapy may worsen symptoms in some patients, as the regurgitant remains non-acid for a longer period after meals. Indeed, rumination syndrome should be considered in the differential diagnosis of PPI refractory GERD. One of the most notable findings lacking in rumination syndrome is the absence of nocturnal symptoms, which is consistent with the need for a daytime unperceived increase in abdominal pressure in order to facilitate regurgitation. In addition to the postprandial regurgitation symptoms, dyspeptic symptoms such as early satiety, bloating, and epigastric discomfort are common among patients with rumination syndrome, and these also appear to lessen with treatment [13].

Diagnostic Evaluation

The diagnosis of rumination syndrome is most commonly made by a history that fulfills the Rome criteria, without concerning warning signs such as weight loss, nocturnal symptoms, chest pain, or severe heartburn (Fig. 9.2). One of the most helpful means of confirming the diagnosis is to observe the patient in your clinic during and after a meal. The clinical appearance of rumination episodes is different than reflux or regurgitation. One may also witness visible air swallowing preceding the regurgitation. Nevertheless, at times it can be difficult to distinguish rumination syndrome from regurgitation secondary to achalasia or GERD (Table 9.1). As a result, a well-performed esophagogram, or high-resolution esophageal manometry, can help exclude achalasia. In addition, adding a postprandial component to a high-resolution esophageal manometry can be used to objectively diagnose rumination. The most common feature is gastric strain >30 mmHg, manifest by a rapid-onset high-amplitude contraction originating from the stomach and migrating proximally with a pan-esophageal distribution [17]. This is typically accompanied by

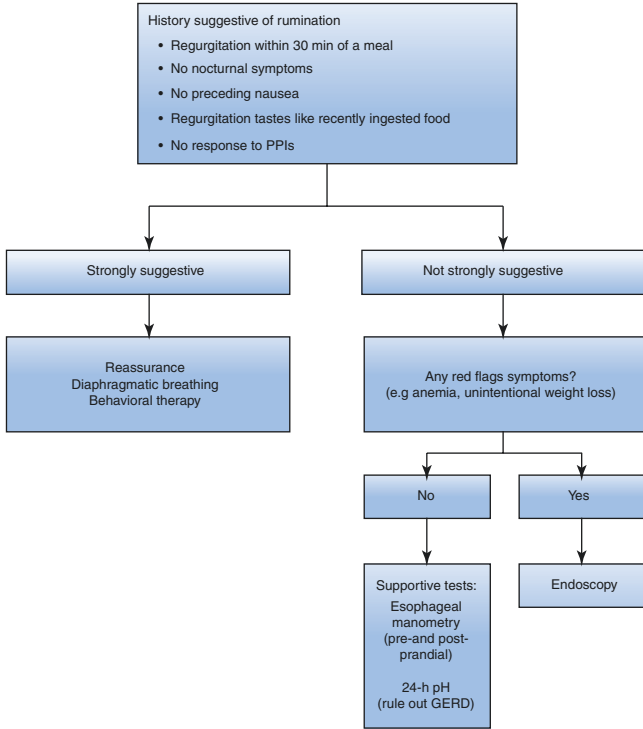


FIGURE 9.2 Diagnostic algorithm for rumination syndrome. (Used with permission of Mayo Foundation for Medical Education and Research, all rights reserved)

TABLE 9.1 Comparison of symptoms of rumination syndrome and disorders that may be confused with rumination

Etiology	Symptoms
Rumination syndrome	Regurgitation of normal tasting food during a meal or within 30 min of eating a meal, no nocturnal symptoms, halitosis
GERD	Regurgitation of sour/bitter tasting food after 1 h of eating a meal, nausea, nocturnal symptoms
Gastroparesis	Nausea, vomiting, and abdominal pain
Achalasia	Postprandial regurgitation, dysphagia, usually without re-swallowing

a retrograde flow of gastric contents into the esophagus, which can be detected by impedance [18, 19]. In addition to rapid increases in gastric pressure, other findings typically noted during this type of study during rumination events include a marked reduction in both LES and UES pressure [12], allowing regurgitation of content into the mouth. Although esophageal manometry is uncomfortable, and adding a meal challenge with the catheter in situ even more so, this provides the best opportunity to correlate symptoms with abnormal gastroesophageal physiology [12].

Treatment

Several treatments are used for rumination syndrome (Table 9.2). The most common is behavioral therapy with diaphragmatic breathing. The conversation starts with an explanation of the mechanism of rumination as an abnormal postprandial reflex of increased gastric pressure occurring with an increase in abdominal muscle tone, simultaneous with relaxation of the esophageal sphincters, allowing retrograde flow of gastric content. The main goal of diaphragmatic therapy is to reduce abdominal wall tone and increase the crural component of the LES during and after eating [12, 15]. Diaphragmatic breathing may be taught formally through biofeedback with EMG monitoring of the abdominal musculature [15], for the patient to see when they are successfully relaxing the abdominal wall, but as this technique is confined

TABLE 9.2 Rumination syndrome treatment options

Treatment of rumination syndrome

Behavioral therapy: diaphragmatic breathing is very effective, with good results noted within hours to weeks

Refractory symptoms: baclofen 10 mg thrice daily increases LES tone. Dose adjustment may be needed, based on central nervous system side effects, including drowsiness and dizziness

Treatment with uncertain benefit: surgery, with Nissen fundoplication

to a few expert centers, most patients are given simple instructions. The technique can be taught by the physician or any member of the physician care team [20]. Reinforcement of the technique is available through multiple Internet and multidisciplinary sources (e.g., yoga instructors, psychologists, voice therapists). The basic maneuver is teaching the patient to breathe with their diaphragm, rather than their chest. This is done by asking them to sit in a relaxed position, placing one hand on their abdomen and the other on their chest. The patient breathes by allowing the hand on the abdomen to move out with inspiration, while the hand on the chest remains still. Inspirations should be steady and deep, aiming for six to eight per minute. Sometimes it is helpful to ask patients to use a similar breathing pattern to when they are trying to go to sleep. Ideally the patient should learn to do this breathing while eating, and in the postprandial period, for as long as they feel rumination might occur. Alternatively, some patients can use the breathing when they sense the onset of regurgitation of food. At the beginning of therapy, patients are also instructed to practice diaphragmatic breathing as much as they can, whether eating or not. For some patients, where either confirmation of the diagnosis or proof of proper performance of the technique is needed, esophageal manometry may be performed during, and after, the postprandial period for therapy [12]. The patient is asked to alternate periods of regular and diaphragmatic breathing with observation of gastric pressure. The decrease in gastric pressurizations with proper diaphragmatic breathing can be easily seen by the patient and physician and appreciated when the favorable effects of the breathing are accompanied by a reduction in rumination episodes during monitoring.

There has been little experimentation with medications. One randomized trial demonstrated that preprandial baclofen may reduce rumination episodes [21]. Agents that enhance gastric accommodation, such as buspirone [22], may be tried, but there are no specific data determining their efficacy. Fundoplication has been tried in patients who are refractory to all other therapies [23].

Case Study: Follow-Up

This patient was diagnosed with rumination syndrome by the history and by observing the patient ruminate and re-swallow food in front of the physician multiple times. As a result, it was determined that no further diagnostic evaluation was needed. The patient was scheduled for a return appointment and asked to bring a meal. At this time, more detail was given on the pathophysiology of rumination syndrome and the principals by which diaphragmatic breathing can be effective. He was then taught over a 10-min period how to breathe with his diaphragm. After he learned this technique successfully, he was instructed to eat his meal and continue the breathing technique for 15 min. It was immediately noticeable to the patient that the episodes of regurgitation ceased. The patient was sent home and asked to continue to assiduously practice diaphragmatic breathing both while fasting and with meals, for the next 2 months. At follow-up, the patient noted a 90% reduction in the number of rumination episodes and was satisfied.

Clinical Pearls

- Rumination syndrome is likely a subconscious learned reflex of the patient during, and after, a meal in which there is an increase in gastric pressure transmitted through the abdominal wall, which is of sufficient magnitude to push gastric content against gravity through a hypotonic LES and UES.
- Rumination syndrome is best diagnosed by a careful history, but occasionally objective testing is needed to rule out other disorders and/or to confirm the diagnosis.
- Rumination differs from other disorders of regurgitation, such as achalasia or GERD, in that it is not dependent on the size of the meal, does not worsen in the supine position, is consistent at most meals, and is often not bothersome to the patient.

- The best treatment for rumination syndrome is diaphragmatic breathing to reverse the gastroesophageal pressure gradient. It is easily taught, and is highly effective, but requires practice.

Self-Test

Question 1. In order for an episode of rumination to occur, which of the following events must occur?

- A. Decrease in UES pressure
- B. Decrease in LES pressure
- C. Increase in gastric pressure
- D. All of the above

Question 2. The diagnosis of rumination is best made by which of the following?

- A. A careful history
- B. Barium esophagography
- C. Ambulatory pH/impedance monitoring
- D. Endoscopy

Question 3. Which of the following medications have been demonstrated to be effective in rumination syndrome?

- A. Omeprazole
- B. Hyoscyamine
- C. Baclofen
- D. Buspirone

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Essential Reading

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- Chitkara DK, Tilburg M, Whitehead WE, Talley NJ. Teaching diaphragmatic breathing for rumination syndrome. *Am J Gastroenterol.* 2006;101(11):2449–52. This article instructs clinicians how to teach diaphragmatic breathing in the office.
- Halland M, Parthasarathy G, Bharucha AE, Katzka DA. Diaphragmatic breathing for rumination syndrome: efficacy and mechanisms of action. *Neurogastroenterol Motil.* 2016;28(3):384–91. This study demonstrates the pathophysiology of rumination syndrome and how diaphragmatic breathing works.