Current Diagnosis and Management of the Rumination Syndrome

Boudewijn F. Kessing, MD, André J.P.M. Smout, MD, PhD, and Albert J. Bredenoord, MD, PhD

Abstract: The rumination syndrome is a behavioral condition characterized by postprandial regurgitation. In contrast to what many think, the disorder does not exclusively occur in mentally disabled patients or children but also in otherwise healthy adults. As symptoms of postprandial regurgitation are often mistaken for gastroesophageal reflux disease or vomiting, the rumination syndrome is an underappreciated condition. Rumination episodes are caused by an intragastric pressure increases which forces the gastric content into the esophagus and mouth and occurs during 3 distinct mechanisms: primary rumination, secondary rumination, and supragastric belch-associated rumination. Combined manometry-impedance can distinguish rumination from gastroesophageal reflux disease. Treatment of the rumination syndrome consists of a thorough explanation of the mechanisms underlying the rumination episodes and behavioral therapy. As behavioral therapy is a time-consuming and often expensive treatment, we propose that a clinical suspicion of the disorder is always confirmed by a manometry-impedance measurement.

Key Words: rumination, functional, regurgitation, vomiting, gastroesophageal reflux disease, pH-monitoring, impedance, manometry, behavioral therapy

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Rumination is defined as the regurgitation of recently ingested food and the rechewing and reswallowing of the food.[1] In animals, this is a physiological process which aids in the digestion and absorption of food. However, if rumination occurs repetitively in humans, this is considered pathologic and the condition is known as the rumination syndrome. Historically, the rumination syndrome was considered to be a syndrome which occurred exclusively in children and infants and in mentally and developmental disabled patients.[2–6] However, the rumination syndrome has now also been recognized as a syndrome which can occur in otherwise healthy adults.[7,8] The rumination syndrome is defined by the ROME III criteria as a functional gastroduodenal disorder which is characterized by persistent or recurrent regurgitation of recently ingested food into the mouth.[9–11] The rumination syndrome shows a predisposition to the female sex, however, recent reports demonstrate that the rumination syndrome can also occur in males.[12,13] Although a relation with eating disorders such as anorexia has previously been suggested, rumination most often occurs in those with no history of an eating disorder.

Patients frequently have symptoms for several years and often have consulted many different physicians before the rumination syndrome is diagnosed.[13,14] This is partly because the clinical presentation of the rumination syndrome shows many similarities with other diseases such as gastroesophageal reflux disease (GERD) with primarily symptoms of regurgitation and gastroparesis with vomiting. Furthermore, the rumination syndrome is a relatively rare disorder, which contributes to a lack of awareness among physicians.

This review aims to provide an overview of our current understanding of the pathophysiology, diagnosis, and treatment of the rumination syndrome in the hope that this will improve recognition and treatment among gastroenterologists.

PATHOPHYSIOLOGY

Rumination episodes are induced by a rise in intragastric pressure which is generated by a voluntary, but often not intentional, contraction of the abdominal wall musculature (Fig. 1).[15–18] When this increase in gastric pressure overcomes the pressure of the lower esophageal sphincter (LES), gastric content can flow into the esophagus. Notably, when the gastric content flows into the esophagus, relaxation of the upper esophageal sphincter occurs[15] and gastric content can subsequently flow from the esophagus into the pharynx and the mouth after which it can be spat out or remasticated. The contraction of the abdominal wall musculature has already been described in children with the rumination syndrome during clinical observation long before it had been demonstrated with physiological measurements.[1]

Small studies have suggested that stressful life events can trigger the rumination behavior.[19] However, in our experience, a specific event at the onset of the rumination behavior is also not often identified. Although it is currently unclear why most patients start their rumination behavior, several patients mention that an unpleasant abdominal sensation triggers their behavior, as they search for a relief. The latter is also suggested by a report by Weusten and colleagues who described a phenomenon which they called secondary rumination. In patients with secondary rumination, a reflux episode precedes the rumination episode and appears to trigger the rumination behavior.[18] Furthermore, other authors have described that rumination episodes can

From the Department of Gastroenterology and Hepatology, Academic Medical Center, Amsterdam, The Netherlands.

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Reprints: Albert J. Bredenoord, MD, PhD, Department of Gastroenterology and Hepatology, Academic Medical Center Amsterdam, Meibergdreef 9, Amsterdam 1105 AZ, The Netherlands (e-mail: a.j.bredenoord@amc.uva.nl).

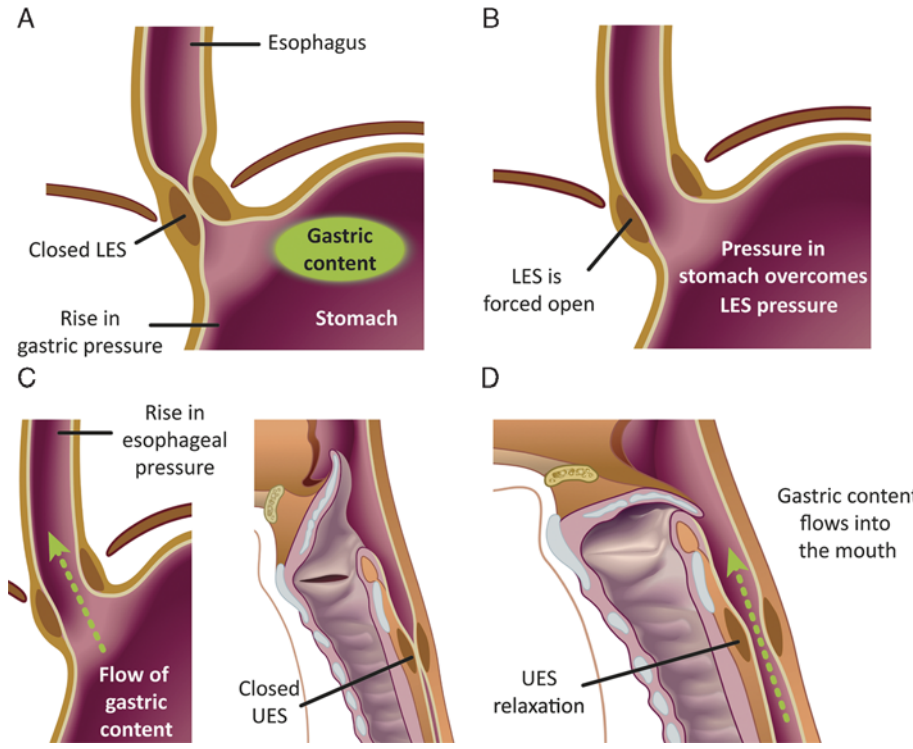

FIGURE 1. Mechanism of primary rumination and secondary rumination. LES indicates lower esophageal sphincter; UES, upper esophageal sphincter. A, Rise in gastric pressure. B, Gastric pressure overcomes LES pressure. C, Gastric content flows into the esophagus. D, Gastric content flows into the mouth.

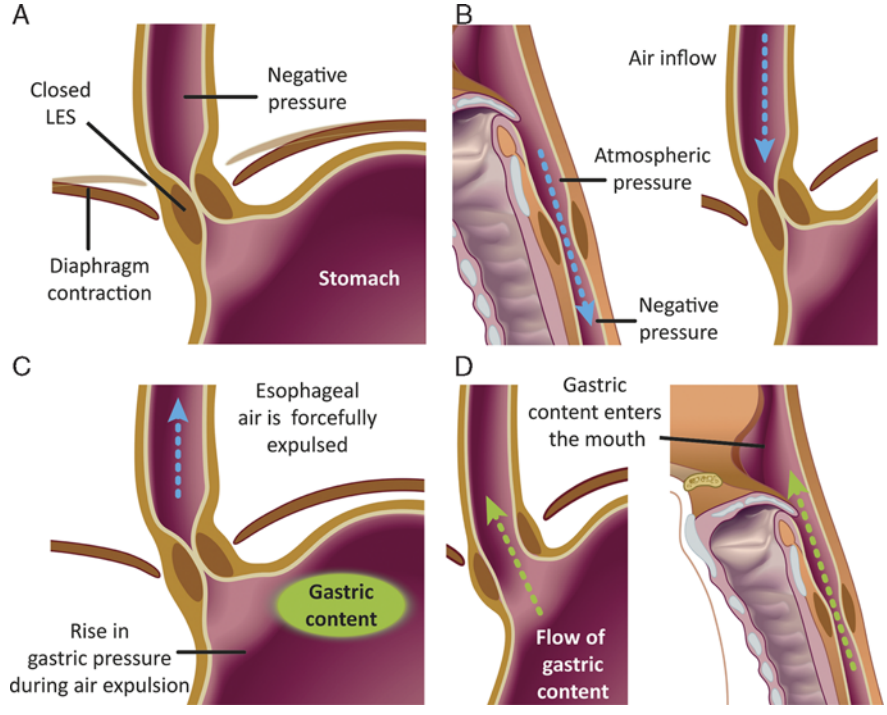

FIGURE 2. Mechanism of supragastric belch-associated rumination episodes. LES indicates lower esophageal sphincter. A, Negative esophageal pressure due to contraction of the diaphragm. B, Air flows into the esophagus. C, A rise in intragastric pressure occurs during the forcefull expulsion of esophageal air. D, Gastric content flows into the mouth.

occur during a transient lower esophageal sphincter relaxation (TLESR) and have suggested that TLESRs can be sensed by a patient and trigger their rumination behavior or can be induced by a patient during rumination episodes.[13,20,21]

Rumination episodes can occur during 3 distinct mechanisms. The first mechanism is primary rumination, which appears to occur spontaneous and not triggered by any identifiable cause. Secondary rumination occurs exclusively after the onset of a reflux episode. Recent studies have recently described third type of rumination episode (Fig. 2).[12,13] These episodes are characterized by a, so-called, supragastric belch which immediately precedes the rumination episode. Supragastric belching is a functional disorder which is believed to be triggered by an unpleasant abdominal sensation.[22,23] The mechanism underlying supragastric belches involves a contraction of the diaphragm which causes a negative pressure in the esophagus.[24] When subsequently upper esophageal sphincter relaxation occurs, air can flow into the esophagus after which the air is immediately expulsed without ever reaching the stomach. The association of supragastric belches with rumination episodes therefore suggests that in these patients, the supragastric belch is the trigger for rumination episodes.

DIAGNOSIS

Patients with the rumination syndrome typically present with symptoms of effortless regurgitation which starts during the meal or during the immediate postprandial period (Table 1, Fig. 3). Patients may report repetitive regurgitation during which gastric content can regurgitate several times per minute. Patients frequently describe that the regurgitated material has the same taste and consistency as the food which they consumed before. Furthermore, the response to acid suppression is often limited or absent. Weight loss is also a common symptom in patients with the rumination syndrome which can occur in up to 83% of patients with the rumination syndrome.[12]

Historically, the rumination syndrome is a clinical diagnosis. The diagnostic criteria for the rumination syndrome have been defined by the ROME criteria and the most recent criteria include persistent or recurrent effortless regurgitation of recently ingested food into the mouth, not preceded by retching (Table 2).[10] The absence of retching allows the physician to distinguish rumination episodes from episodes of vomiting which are typically preceded by retching. Notably, patients with the rumination syndrome often refer to their rumination episodes as vomiting, despite the absence of retching. Therefore, taking a thorough history is pivotal (Fig. 4).

Several attempts at utilizing physiological measurements for the diagnosis of the rumination syndrome have been made, to provide objective diagnostic criteria. Previous studies utilizing combined manometry and pH-monitoring

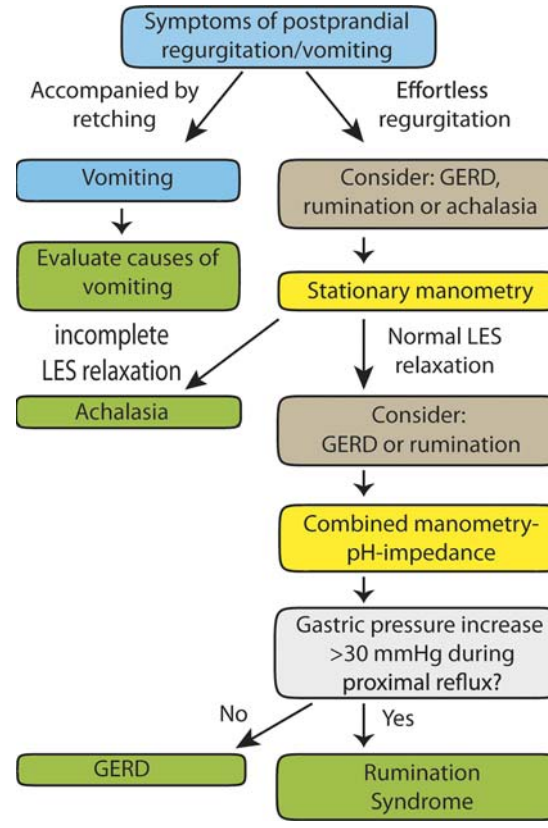

FIGURE 3. Diagnostic algorithm for patients with suspected rumination syndrome. GERD indicates gastroesophageal reflux disease; LES, lower esophageal sphincter.

demonstrate typical manometric patterns characterized by a rise in intragastric pressure. However, as rumination is mostly exhibited during of immediate after eating, the ruminated volume is usually nonacidic as it contains food-buffered gastric contents. Therefore, only a minority of all rumination episodes can be detected by pH-monitoring.[15,25] Studies with manometry combined with impedance monitoring have shown that patients with the rumination syndrome exhibit typical manometric-impedancometric patterns.[13,15,17,25,26] Recently, a novel diagnostic classification for the rumination syndrome has been proposed which uses pH-impedance monitoring combined with conventional manometry or high-resolution manometry (Table 3).[12] These proposed criteria include reflux events extending to the proximal esophagus that are closely associated with an abdominal pressure increase of >30 mm Hg and simultaneous esophageal

TABLE 1. Typical Presentation of Rumination, Vomiting, and Reflux

Rumination	Vomiting	Reflux
Effortless	Forceful	Effortless
No retching	Retching	No retching
No nausea	Nausea	No nausea
Recognizable food	Recognizable food	Acidic material
Postprandial and during meal	During entire day	During entire day, postprandial increase
Does not occur during the night	Does not occur during the night	Also occurs during the night
Often repetitive and in episodes	Occurs episodic in case of cyclic vomiting syndrome	Isolated events
Weight loss	Weight loss	No weight loss

TABLE 2. ROME Criteria for the Rumination Syndrome (Clinical Diagnosis)

Must include both of the following for the last 3 mo with symptom onset at least 6 mo before diagnosis
(1) Persistent or recurrent regurgitation of recently ingested food into the mouth with subsequent spitting or remastication and swallowing
(2) Regurgitation is not preceded by retching
Supportive criteria
(1) Regurgitation events are usually not preceded by nausea
(2) Cessation of the process when the regurgitated material becomes acidic
(3) Regurgitant contains recognizable food with a pleasant taste

pressure increase. These manometric profiles are not observed in patients with GERD. Furthermore, specific criteria for the 3 different mechanisms during which rumination episodes can occur have been described.[12] All rumination patterns are characterized by a rise in intragastric pressure (> 30 mm Hg) which most often precedes but can also occur at the start of the rumination episode, this does not occur in GERD (Fig. 2). Furthermore, the pressure increase in the esophageal lumen is considerably higher compared with regurgitation episodes in GERD patients. The third mechanism is defined as supragastric belch-associated rumination (Fig. 3). During this type of rumination episodes, a supragastric belch occurs immediately preceding the rumination episode. The rise in intragastric pressure (> 30 mm Hg) which forces the gastric content into the esophagus during supragastric belch-associated rumination occurs during the expulsion of esophageal air. Similarly to primary and secondary rumination, a rise in esophageal pressure occurs during the rumination episodes and this rise in esophageal pressure is considerably higher compared with GERD patients.

Experienced clinicians can recognize patients with the rumination syndrome by clinical observation alone. However, patients with the rumination syndrome often present to physicians who lack clinical experience with the rumination syndrome. The clinical presentation of the rumination syndrome is therefore not seldom mistaken for other diseases and the low prevalence of the syndrome makes that only a few physicians have significant experience with these patients. Furthermore, the treatment for the rumination syndrome is often a time-consuming and expensive treatment which is often not covered by standard health care.

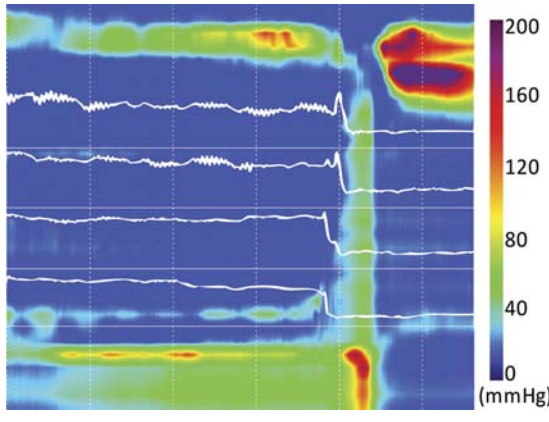

FIGURE 4. Example of a rumination episode as measured by high-resolution manometry-impedance.

We therefore propose that the diagnosis of the rumination syndrome should preferably be made on both clinical observation and physiological measurements.

TREATMENT

The cornerstone of the treatment of the rumination syndrome is a thorough explanation of the condition and the underlying mechanism responsible for the rumination episodes.[27] The utilization of physiological measurements also allows the physician to provide a better understanding of the disease and may help to explain patients the nature of the disorder. Not seldom patients' symptoms of regurgitation resolve after this explanation. However, in most patients rumination episodes persist and behavioral therapy aimed at suppressing the increase in abdominal pressure is then indicated.

Behavioral therapy for the rumination syndrome relies heavily on the interplay between creation of awareness of the underlying mechanism and diaphragmatic breathing exercises. It is therefore mandatory that the therapist is well aware of the pathophysiology of the rumination syndrome. Diaphragmatic breathing exercises are believed to contribute to a reversal of a patient's behavior and to compete with the urge to create the abdominal pressure increases initiating rumination. Although the literature on this subject is scarce, diaphragmatic breathing is reported to be effective and can eliminate postprandial regurgitation entirely.[20,28,29] Limited evidence exists for chewing gum as a treatment for the rumination syndrome. However, its effects have so far only been investigated in the pediatric population and results for the adult population are being awaited.[30,31]

Previous studies have suggested that antireflux surgery could also be effective in the treatment of the rumination syndrome.[32] In theory, enhancing the barrier function of the LES could prevent gastric content from flowing into the esophagus. However, rumination patients often have a normal antireflux barrier which does not require a surgical intervention and surgery is accompanied by many side effects such as gas-bloat, dysphagia, and gastroparesis.[33–36] Furthermore, the abdominal pressure during rumination episodes could also after an operation easily overcome the pressure in the LES, thereby resulting in persistent symptoms. We therefore believe that antireflux surgery is not an option for a behavioral disorder such as the rumination syndrome. Medical therapy aimed at enhancing the antireflux barrier or a reduction of TLESRs has also been studied in several small studies.[37,38] However, the evidence is very limited and we believe that the medical intervention

TABLE 3. Manometric Criteria for the Rumination Syndrome

Must include the following
Rise in intragastric pressure (> 30 mm Hg) preceding or immediately during a proximal reflux episode
Rise in intraesophageal pressure during the proximal reflux episode
Differentiation between mechanisms of rumination episodes
Rise in intragastric pressure precedes rumination episodes without being triggered by esophageal air or gastroesophageal reflux (primary rumination)
Rise in intragastric pressure is preceded by a reflux episode (secondary rumination)
Rise in intragastric pressure occurs during the expulsion of esophageal air during a supragastric belch (supragastric belch-associated rumination)

for the rumination syndrome is only reserved for patients who do not respond to any form of behavioral therapy.

Possibly, the identification of supragastric belch-associated rumination could affect the treatment of rumination patients.[12] Previous studies have demonstrated that patients with isolated belching symptoms caused by supragastric belching respond favorably to behavioral therapy performed by a speech therapist.[23] This suggests that patients who exhibit supragastric belch-associated rumination would also benefit from behavioral therapy which is aimed at reducing the supragastric belching as well as reducing the abdominal wall contraction.

DISCUSSION

The rumination syndrome is believed to be a relatively rare but underappreciated condition. With the use of high-resolution manometry and pH-impedance monitoring, the mechanisms underlying rumination episodes have now been elucidated. Historically, the rumination syndrome is a clinical diagnosis, however, recent evidence clearly demonstrates that the rumination syndrome can be diagnosed with combined impedance-manometry to distinguish the disorder from GERD.

An evidence-based approach to the treatment of the rumination syndrome is lacking. Recently, several small uncontrolled studies have investigated the use of medication that enhances the LES pressure or prevents the occurrence of TLESRs. Although the results of these studies appear to be favorable, we believe that these interventions should be reserved for severe cases who do not respond to any form of behavioral therapy. On the basis of the scarcely available literature as well as the experience in our center, the optimal therapy for rumination consists of a thorough explanation of a patient's behavior and behavioral therapy. As the latter is time consuming and often expensive for the patient, we propose that physiological measurements should be performed in all patients in whom the rumination syndrome is suspected, to avoid that these treatments are performed in vain. Furthermore, physiological measurements provide the physician a tool to explain the rumination patients who often struggle with understanding the mechanisms at work.

In conclusion, the rumination syndrome is a syndrome which is now being increasingly recognized in otherwise healthy adults. There has been increasing attention for the disorder and the latter has already resulted in an enhanced diagnosis using objective physiological measurements. More research is warranted, however, particularly in the therapeutic field.

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