

# Eliminating Rumination in Developmentally Disabled Children: A Case Report

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Rumination is the effortless regurgitation of food, with subsequent spitting out or rechewing and reswallowing. In developmentally delayed children, rumination is a pleasurable, self-stimulating habit. For 3 years, we evaluated and treated 2 nonambulatory, nonverbal 4-year-old children who ruminated frequently while awake. The social isolation caused by a child covered in regurgitated food prompted caregivers of these children to find a solution. We hypothesized that rumination would cease if the stomach stayed empty of food. We intervened by placing gastrojejunostomy tubes and then initiated continuous drip jejunal tube feedings over 12 waking hours to reduce hunger; the children's oral diet was also stopped. In both cases, these changes reduced episodes of rumination to 3 to 5 times daily. To eliminate rumination, unpleasant tasting substances (*N*-acetylcysteine or cayenne pepper-based hot sauce) were given through the gastrostomy tube every 4 hours while the children were awake. Within 1 week of adding the unpalatable substances, rumination ceased. After 2 months of no rumination, 1 mother restarted oral feeding. There was no recurrence of rumination, and 3 months after gastrojejunal tube placement, the tube was removed. In 1 year of follow-up, rumination did not recur. The second mother was pleased with the outcome with jejunal feedings and chose not to resume oral feedings. These results showed that jejunal tube feeding in combination with insertion of unpalatable contents into the stomach eliminated rumination in these developmentally delayed children.

Rumination is the effortless regurgitation of recently ingested food, with the subsequent spitting out or rechewing and reswallowing.<sup>1</sup> As voluntary muscles from the abdominal wall and diaphragm contract, the lower esophageal sphincter relaxes, moving gastric contents from the higher intragastric pressure to the lower intrathoracic pressure. After years of rumination, dental enamel may be damaged.<sup>2</sup> Erosive esophagitis, weight loss, and failure to thrive are uncommon.<sup>3,4</sup>

Many developmentally delayed children find rumination a pleasurable, self-stimulating experience.<sup>1,4</sup> Treatment in developmentally delayed

patients includes diet manipulations (increasing caloric intake or withholding liquids), sensory interventions to provide an alternative automatic reinforcement to rumination, social reinforcement by verbal praise or attention, and punishment (negative consequence).<sup>5</sup> We hypothesized that rumination would cease if the stomach stayed empty of food. Daytime continuous gastrojejunal tube feeding was substituted for eating, and a nontoxic but unpalatable substance was inserted into the stomach in 2 developmentally delayed children with rumination syndrome.

## abstract

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Ms Severio volunteered her time to write the abstract for presentation at the annual North American Society for Pediatric Gastroenterology, Hepatology and Nutrition meeting held in October 2014 and to write the first draft of the manuscript; she and Dr Hyman were responsible for subsequent drafts of the manuscript. Dr Monagas and Dr Noel placed the gastropexy and gastrojejunal feeding tubes and assisted in editing the manuscript in a variety of stages. Dr Hyman mentored Ms Severio at all steps in the process; was the gastroenterologist providing care to both subjects; and was responsible for the treatment protocol, jejunal daytime feedings, and the concept of putting unpalatable liquid into the stomach. Dr Hyman recruited the coauthors for assistance.

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## CASE REPORTS

### Patient 1

A 4-year-old boy with Phelan-McDermid syndrome (22q13 deletion) experienced 3 years of effortless regurgitation of recently ingested food, with an estimated 30 episodes per day. He ate all food types without choking, pain, or aspiration.

Esophagogastroduodenoscopy with a biopsy revealed normal stomach and duodenum and no esophagitis. Trials of lansoprazole, ranitidine, erythromycin, and baclofen failed to improve his symptoms. One month before referral, the child was hospitalized due to a 7-day course of ruminating all food immediately after meals. The child was constantly bathed in regurgitated food, making it difficult for his caregiver to interact in social environments. He weighed 15.8 kg (25th percentile), his height was 104 cm (75th percentile), and his BMI was 14 (5th percentile). We placed a 16-F, 22-cm gastrojejunostomy tube using the MIC transgastric-jejunal feeding tube gastropexy introducer kit (Kimberly-Clark, Neenah, WI). Jejunal tube feedings of a nutritionally balanced, cow's milk-based formula (120 mg per hour) were initiated over 12 daylight hours to reduce hunger; no eating was allowed. Initially, there was no rumination. Five days after beginning jejunal feeding, the caregiver reported that the patient ruminated swallowed saliva and gastric contents 3 to 4 times per day. To discourage rumination episodes, we prescribed noxious-tasting and -smelling *N*-acetylcysteine 20% (Mucomyst, Bristol-Myers Squibb, Princeton, NJ) 5 mL every 4 hours through the gastrostomy tube while the child was awake. Within 1 week of not eating and *N*-acetylcysteine treatment, rumination ceased, and no new symptoms arose. Two

months later, the family discontinued the *N*-acetylcysteine and introduced small, frequent meals. Three months after the percutaneous endoscopic gastrostomy tube placement, the parents had the tube removed. After 1 year of treatment, there was no recurrence of rumination.

### Patient 2

A 4-year-old girl with Down syndrome presented with a 3-year history of regurgitating nonbilious, nonbloody food particles minutes after all meals. Use of lansoprazole and ranitidine failed to reduce regurgitation. The patient weighed 12.7 kg (5th percentile), her height was 101 cm (50th percentile), and her BMI was 12 (<5th percentile). Results of a barium study revealed normal swallowing and normal stomach and duodenum with no malrotation. The patient returned to the clinic 8 months later unchanged except for weight loss. Her height was 106 cm (50th–75th percentile), her weight was 11.0 kg (<5th percentile), and her BMI was 9.6 (<5th percentile). Her clothes were soaked in gastric contents, and her mother was emotionally distressed about the rumination symptoms. We placed a 16-F, 30-cm gastrojejunostomy tube. Jejunal tube feedings of a nutritionally balanced, cow's milk-based formula were initiated at 60 mL per hour over 12 daytime hours to reduce hunger. The oral diet was eliminated. One month after gastrojejunostomy tube placement, the patient had only 4 to 5 episodes of rumination consisting of clear fluids. She weighed 12.8 kg (5th percentile). To further decrease the urge to ruminate, we prescribed cayenne pepper-based hot sauce (Tabasco Sauce, New Iberia, LA) 5 mL every 4 hours through the gastrostomy port to make rumination unpleasant. After 2 doses of hot sauce, rumination ceased, and the hot sauce was

discontinued. For the next year, the patient had no rumination. The mother was pleased with the outcome of jejunal feedings and chose not to resume oral feeding.

## DISCUSSION

Although rumination syndrome carries little morbidity and is not distressing to the ruminator, it may be an obstacle to social interaction and troubling to the caregivers. We report successful management of rumination syndrome in 2 developmentally delayed children using a new method.

First, we placed a gastrojejunal feeding tube<sup>6,7</sup> and fed the subjects by continuous drip during the day to suppress hunger. No eating or drinking was permitted. Rumination was reduced but not eliminated. In an attempt to eliminate rumination, we added unpalatable substances into the stomach while the subjects were awake (either *N*-acetylcysteine or a cayenne pepper-based suspension). Adding each of these unpalatable substances eliminated rumination.

In summary, we report a new method for eliminating rumination syndrome in developmentally delayed children: (1) jejunal tube feeding during waking hours to suppress hunger; (2) no eating or drinking; and (3) addition of an unpalatable-tasting solution in the gastric juice.

A larger clinical trial is necessary to replicate our results. In addition, guidelines are needed to help clinicians advise parents about which treatment approach to try in individual children.

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