

Crohn's disease-associated silent aspiration in the outpatient setting: Anesthesiologists beware

ABSTRACT

Every anesthesia provider fears aspiration of gastric contents during an anesthetic, and it may occur even in the absence of overt signs such as coughing or choking. Whether the aspiration is frank or silent, catastrophic and deleterious consequences may ensue. Therefore, familiarity with risk factors for silent aspiration is essential. Crohn's disease reportedly delays gastric emptying making these patients more susceptible to silent aspiration during surgery. Anesthesia providers must be cognizant of this risk and vigilant in the recognition to formulate a specific treatment plan preoperatively. We present a case of an ambulatory surgical patient with suspected silent aspiration undiagnosed by the anesthesia care team before induction of anesthesia.

Key words: Adult; Crohn's disease; respiratory aspiration of gastric contents; respiratory distress syndrome

Introduction

Aspiration is the bane of anesthesiologists and the rationale for fasting before endotracheal intubation and surgery treatment. Fortunately, it is a rare occurrence.^[1] However, the incidence of silent aspiration is difficult to quantify simply because there are often no clinical signs. Anesthesiologists should be on guard for associated risk factors, but the fact remains that even screening tests may not accurately assess silent aspiration.^[2]

Symptoms of dysphagia and dyspepsia are often clues to an increased risk for aspiration. Inflammatory bowel diseases, such as Crohn's disease (CD) and ulcerative colitis, have only recently been associated with this symptomatology. CD is a chronic inflammatory condition of the bowel

that may involve any part of the gastrointestinal tract but more commonly has patchy involvement. Symptoms of this disease often include abdominal pain, diarrhea, general malaise, and further anatomical complications that may include bowel obstruction from stricture and adhesions, fistulae, and abscess formation. There may also be extraintestinal involvement including ophthalmologic, dermatologic, and hematologist manifestations.^[3] Delayed gastric emptying and gastroparesis are two recent physiologic manifestations of CD that have come to light.^[3] We present a case describing a complicated clinical course after silent aspiration in a patient with minimal risk factors before induction of anesthesia other than history of CD and associated dyspepsia.

This is an open access article distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 3.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as the author is credited and the new creations are licensed under the identical terms.

For reprints contact: reprints@medknow.com

How to cite this article: Snell C, Coleman S, Van Hal M, Rashidian F, Okum G, Green MS. Crohn's disease-associated silent aspiration in the outpatient setting: Anesthesiologists beware. Saudi J Anaesth 2018;12:339-42.

Access this article online	
Website: www.saudija.org	Quick Response Code 
DOI: 10.4103/sja.SJA_663_17	

CHRISTOPHER SNELL, SCOTT COLEMAN, MICHELE VAN HAL, FARSHAD RASHIDIAN, GARY OKUM, MICHAEL STUART GREEN

Department of Anesthesia, Drexel University College of Medicine, Hahnemann University Hospital, Philadelphia, PA, USA

Address for correspondence: Dr. Michael Stuart Green, Department of Anesthesiology and Perioperative Medicine, 245 N, 15th Street, Suite 7502, MS 310, Philadelphia, PA 19102, USA. E-mail: msg37@drexel.edu

Case Report

An 18-year-old female with CD presented from home with a preoperative diagnosis of abdominal pain. The past surgical history included several small bowel resections and multiple endoscopies. Her social history was significant for half pack per day tobacco use and occasional use of marijuana. Family history was positive for uterine carcinoma. The patient's only medication was frequent antacid use, and she had no known drug allergies. On physical examination, the patient presented with blood pressure of 90/50, heart rate of 80, oxygen saturation of 94%, normal respiratory effort, and a temperature of 97.5. The patient's height was 155 cm and her weight was 39.9 kg. Preoperative chemistry and complete blood count were within normal limits.

The patient presented for laparoscopic sphincterotomy and small bowel resection. Standard monitors were placed revealing a baseline room air oxygen saturation of 94%. After confirmation with a second pulse oximeter probe, preoxygenation for 5 min and a smooth intravenous induction with midazolam, fentanyl, propofol, and rocuronium ensued. Intubation was unremarkable with a Cormack–Lehane Grade I view, and no aspirate or food particles were noted. A size 7.0 mm orotracheal tube was placed and secured with bilateral breath sounds that were clear to auscultation. However, oxygen saturation remained 94% even following preoxygenation and throughout the 2.5-h duration of the case. Of note, an orogastric tube, placed per routine, yielded 800 mL of yellow aspirate. The surgery proceeded uneventfully, and the patient was extubated and taken to the postanesthesia care unit (PACU). In the PACU, the patient was noted to have dyspnea, nasal flaring, and accessory respiratory muscle use. The patient was placed on a nonrebreathing mask with 100% oxygen but the saturation remained at 93%. She continued to require a high level of supplemental oxygen over the course of the next 2 h. She then was amendable to a slow wean of supplemental oxygen and was eventually transitioned to nasal oxygen cannula. She remained stable on nasal oxygen and was transferred to a surgical floor.

On postoperative day (POD) #1, she continued to require nasal cannula supplementation and atelectasis was presumed. When her heart rate and oxygen requirement did not improve by POD #3, the diagnosis of pulmonary embolism was considered. Computed tomography scan of the chest demonstrated bilateral pulmonary infiltrates and pneumonia [Figure 1]. She continued to decompensate with hypotension, oxygen saturation 80%–85%, and a heart rate of 160 beats per min, at which time she was transferred

to the Intensive Care Unit (ICU). Further deterioration occurred overnight despite aggressive treatment, and she was intubated the following day (POD #4). By POD #7, deterioration mandated institution of extracorporeal membrane oxygenation (ECMO) therapy. After 14 days of ECMO therapy, she was successfully weaned, but continued ventilator dependence warranted a tracheostomy 3 days later. After 14 days of ventilation through the tracheostomy, the patient successfully weaned from mechanical ventilation and was decannulated. However, in addition to her pulmonary complications, her hospitalization was also complicated by multiple anastomotic leaks requiring reoperation, intra-abdominal abscesses requiring interventional radiologic-assisted drainage, and a *Clostridium difficile* infection. The patient remained hospitalized for an additional month after leaving the ICU. Her nutritional and functional status improved to the point that she was able to return home with an outpatient rehabilitation program after a hospital stay of 64 days [Table 1].

Discussion

Aspiration under anesthesia is relatively rare. Kallar and Everett reported the incidence as 1.4–6/10,000 anesthetics.^[1] The frequency of silent aspiration is difficult to quantify. Using videofluoroscopy, Smith *et al.* reported silent aspiration in 59% of patients with dysphagia.^[4] However, the paucity of data in patients without history or suspicion of dysphagia renders the true frequency of silent aspiration in a healthy population essentially unknowable. Risk factors for aspiration include obesity, diabetes, peptic ulcer disease, delayed gastric emptying, esophageal and upper abdominal surgery, stress, opioid use, trauma, and difficult airway management.^[1] The greatest risk factor for silent aspiration appears to be dysphagia. Our patient had no documented concerns for



Figure 1: T6 axial computed tomography scan performed on postoperative day #2 that shows dense consolidation throughout all lung fields, bilateral pleural effusions, and/or noncardiogenic pulmonary edema representing acute respiratory distress syndrome

dysphagia. Are there other factors in this patient's history that should have alerted the care team to her increased risk of aspiration?

Multiple studies have correlated CD and delayed gastric emptying.^[3,5,6] Therefore, CD should be considered a comorbidity increasing a patient's risk for aspiration. Keller *et al.* showed a 50% decrease in gastric emptying in patients with moderate-to-severe CD activity.^[7] Interestingly, even patients without active disease have been shown to suffer from delayed gastric emptying.^[2] Annese *et al.* also found this to be true when patients complained of dyspeptic symptoms.^[5] Our patient used antacids for periodic reflux symptoms. The exact mechanism for delayed gastric emptying has not yet been elucidated. Obviously, strictures, skip lesions, and obstructions which occur in CD may contribute. However, even in the absence of these factors, CD slows gastric emptying. One mechanism posited by Keller *et al.* is an increase in cholecystokinin (CCK) levels.^[7] The normal physiologic response to CCK is slowed gastric emptying to mediate small intestine digestion. An elevated quantity of this enzyme may be a contributing factor.

Table 1: Chronologic order of events starting from (December 19, 2015)

POD	Event
#0	Stricturectomy, small bowel resection, jejunocolic fistula takedown (December 19, 2015)
#1	Tachycardia, hypotension, and decreasing oxygen saturation
#2	CT scan of chest performing showing ARDS Patient transferred to the ICU [Figure 1]
#3	Patient intubated for increasing oxygen requirements
#4	Venovenous ECMO started for suspected ARDS
#7	Laparotomy for abdominal compartment syndrome due to anastomotic leak and revision of small-bowel anastomosis and placement of an abdominal VAC
#10	Femoral ECMO catheters removed
#11	Exploratory laparotomy and washout for abdominal abscesses
#12	Exploratory laparotomy and washout for abdominal abscesses
#14	Weaning from ECMO began
#18	ECMO therapy discontinued
#20	Tracheostomy placed for ventilator-dependent respiratory failure
#23	Exploratory laparotomy, washout of abdominal wall, abdominal VAC change, and Graham patch repair of small bowel leak, creation of end jejunostomy, creation of mucus fistula, and abdominal wall closure
#27	Insertion of two abdominal drainage catheters by IR for fluid collections
#35	Insertion of a fenestrated tracheostomy tube
#39	Drainage of multiloculated/multifocal complex abdominal fluid collection by IR
#64	Discharged to an acute rehabilitation center with fenestrated tracheostomy and jejunostomy

POD: Postoperative day; CTA: CT angiography; ICU: Intensive Care Unit; ECMO: Extracorporeal membrane oxygenation; IR: Interventional radiology; VAC: Vacuum-assisted device; ARDS: Acute respiratory distress syndrome; CT: Computed tomography

A second risk factor is her ambulatory status. Ong *et al.* demonstrated higher gastric volumes in ambulatory patients than inpatients when all had fasted.^[8] Outpatients are also believed to be at a higher risk because of the anxiety and stress associated with the same day admission.^[1] She may have also had some degree of bowel obstruction given her disease process and surgical history. An inpatient with signs of obstruction typically is decompressed with a nasogastric tube. However, because she was an ambulatory patient, her stomach was not decompressed until an orogastric tube was inserted after intubation. We also considered the idea that this patient may have aspirated while sleeping the night before her procedure, which would explain her decreased baseline oxygen saturation of 94%. A third potential risk factor is her smoking history. Smith *et al.* postulate that smoking reduces the laryngeal reaction to aspiration.^[4] This would place a patient at higher risk for silent aspiration, as a cough reflex may not be generated when laryngeal sensitivity is diminished. This theory remains to be validated.

This patient's hospital course clearly shows the potentially disastrous sequelae of pulmonary aspiration. Certainly, the risk factors for delayed gastric emptying in Crohn's patients enumerated above are not well known to anesthesiologists who do not frequently deal with such patients. She neither described any "red flag" symptoms that would have alerted the anesthesiologist to the need for a "rapid-sequence" induction nor is such an induction 100% successful in preventing aspiration. She presented to the operating room with an oxygen saturation that one would not expect to see in an otherwise healthy, underweight, 18-year-old patient. There were no other signs or symptoms of silent aspiration noted. Her chest was clear to auscultation, she was in no distress and was not coughing, and the routine chest radiograph in patients without pulmonary disease was eliminated from preoperative screening. In the setting of silent aspiration in a patient without a history of dysphagia, the diagnosis can easily be delayed as it was in this case. A higher index of suspicion in patients with CD and the other risk factors mentioned above will help in earlier diagnosis and treatment.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

1. Kallar SK, Everett LL. Potential risks and preventive measures for pulmonary aspiration: New concepts in preoperative fasting guidelines. *Anesth Analg* 1993;77:171-82.
2. Wakasugi Y, Tohara H, Hattori F, Motohashi Y, Nakane A, Goto S, *et al.* Screening test for silent aspiration at the bedside. *Dysphagia* 2008;23:364-70.
3. Nóbrega AC, Ferreira BR, Oliveira GJ, Sales KM, Santos AA, Nobre E Souza MÁ, *et al.* Dyspeptic symptoms and delayed gastric emptying of solids in patients with inactive Crohn's disease. *BMC Gastroenterol* 2012;12:175.
4. Smith CH, Logemann JA, Colangelo LA, Rademaker AW, Pauloski BR. Incidence and patient characteristics associated with silent aspiration in the acute care setting. *Dysphagia* 1999;14:1-7.
5. Annese V, Bassotti G, Napolitano G, Frusciante V, Bruno M, Conoscitore P, *et al.* Gastric emptying of solids in patients with nonobstructive Crohn's disease is sometimes delayed. *J Clin Gastroenterol* 1995;21:279-82.
6. Kristinsson JO, Hopman WP, Oyen WJ, Drenth JP. Gastroparesis in patients with inactive Crohn's disease: A case series. *BMC Gastroenterol* 2007;7:11.
7. Keller J, Beglinger C, Holst JJ, Andresen V, Layer P. Mechanisms of gastric emptying disturbances in chronic and acute inflammation of the distal gastrointestinal tract. *Am J Physiol Gastrointest Liver Physiol* 2009;297:G861-8.
8. Ong BY, Palahniuk RJ, Cumming M. Gastric volume and pH in out-patients. *Can Anaesth Soc J* 1978;25:36-9.