Acute Respiratory Distress Syndrome and Feculent Airway Casts due to Severe Constipation

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Abstract

Acute respiratory distress syndrome (ARDS) is a disabling and potentially lethal syndrome requiring prompt recognition and urgent interventions to prevent morbidity and mortality[1]. Although constipation is not generally recognized as a cause for ARDS or usually listed within the differential diagnosis, there have been case reports describing such an association[2,3]. We present the case of a patient with history of intermittent constipation presenting with progressive abdominal pain and an acute abdomen that required emergent surgical fecal decompaction. This was followed by hypoxemic respiratory distress leading to respiratory failure in the setting of severe constipation and aspirated feculent material. To our knowledge, this is the first published case report describing aspirated feculent material in a child with respiratory failure due to ARDS.

Case Report

A developmentally normal 13-year-old female presented to the adult hospital with 5 days of increasing abdominal pain and distention associated with decreased oral intake and non-bloody, nonbilious emesis. She had a history of chronic constipation requiring intermittent use of polyethylene glycol and magnesium citrate. She reported daily small watery stools with her last normal bowel movement occurring over one month prior to presentation.

In the emergency department (ED), she was afebrile with a heart rate of 140-150 beats per minute, respiratory rate of 28 breaths per minute, and peripheral oxygen saturations (SpO2) below 90%. Physical examination revealed a distressed female with significant abdominal distention, tenderness to palpation and associated rigidity. Laboratory evaluation revealed leukocytosis with white blood count 31.6 10^3/uL (reference range 4.5-13.5 10^3/uL), bandemia at 60.9% (reference range 5.0-11.0%), and lactate 2.4 (reference range 0.5-2.2 mmol/L). The contrast-enhanced abdominal Computed tomography (CT) scan revealed an obstructing stool ball with massive diffuse upstream colonic distention (Fig 1). This distention compressed adjacent organs and intrahepatic inferior vena cava. Chest CT showed multifocal compressive atelectasis with low lung volumes (Fig 1). She was started on 4 liters nasal canula and given intravenous fluids and piperacillin/tazobactam. The patient was transferred to our pediatric institution for concerns of toxic megacolon and the necessity of surgical fecal decompaction.

Upon arrival, the patient was prepped for urgent decompression. She had desaturations with SpO2 between 70-80% following sedation and prior to intubation. Upon with direct laryngoscopy fecal material was visualized on the vocal cords by the anesthesiologist. Although this procedure was uncomplicated, she was unable to tolerate extubation and was transferred to the intensive care unit for ongoing care. Overnight into hospital day (HD) 1, the patient had symptoms consistent with septic shock requiring epinephrine and broadened antibiotic coverage to Vancomycin, Cefepime, and Metronidazole.

Due to continued ventilator support, worsening lung compliance, and increasing FiO2 requirements, a bronchoscopy with bronchoalveolar lavage (*BAL*) was performed. Tracheobronchial tree was evaluated and feculent material was noted in several subsections of the right middle and upper lobes. A total of 20 mL of fluid were instilled with return notable for feculent small airway casts (Fig 1), sent for cultures and cytology. The patient subsequently underwent a total of 3 bronchoscopy procedures with therapeutic lavages for airway clearance resulting in improved respiratory status and radiologic findings.

BAL cultures grew rare *Lactobacillus* species and antimicrobial management was adjusted to solely to piperacillin/tazobactam, for total 10-day course. She tolerated extubation to high flow nasal canula on HD 9 and was weaned to room air on HD 13. She underwent a bowel clean out after surgical decompression. Her home going bowel regiment included polyethylene glycol powder 17 grams twice daily and bisacodyl 10 mg daily, with close gastroenterology follow up.

The patient was ultimately diagnosed with functional constipation. Initial imaging that assessed for any neurologic, spinal etiologies was negative. She had normal thyroid function and had not been on any medications known to delay stool passage. Currently, the patient is undergoing a comprehensive workup for Hirschsprung's Disease. With the inpatient anorectal manometry inconclusive, a second attempt to evaluate her will be repeated as an outpatient.

Discussion:

Chronic constipation is a relatively prevalent condition, affecting approximately 10-15 % of the pediatric population with a functional etiology accounting for up to 6%. Constipation detrimentally impacts quality of life and incurs a substantial healthcare burden to the individual[4]. Although fecal impaction is frequently diagnosed, chronic constipation associated with toxic megacolon is less prevalent among the pediatric population. Megacolon criteria is obtained when the sigmoid colon measures 6 cm or more in diameter. With the presence of toxic megacolon, a volvulus should be ruled out. Although she presented with the triad of symptoms concerning for volvulus (abdominal pain, distension, and constipation), this was not seen on diagnostic modalities[5].

The literature rarely reports presentations of severe constipation leading to respiratory failure in the pediatric population. Severe constipation can cause considerable abdominal distention that mimics patients with ascites or pregnancy. In such instances, there is a reduction in lung height and an increase in anterior-posterior diameter, resulting in an overall reduction in chest volume. This deficit in lung mechanics is caused by abdominal and rib cage restrictions resulting in a restrictive lung pattern and reduced vital capacity. Significant abdominal distention critically impacts the mobility of the diaphragm, causing a reduction of excursion during inspiration[3].

While the mechanics described above most definitely contributed to our patient's respiratory failure, this case highlights the possibility of aspirated fecal material as a cause of ARDS in profoundly constipated individuals hospitalized for respiratory failure. ARDS is a disabling and potential lethal syndrome that is relatively common among mechanically ventilated patients. This well-known syndrome was recently redefined as occurring within 7 days of known clinical insult with new or worsening respiratory symptoms. In addition, bilateral opacities on radiologic imaging, accompanied with respiratory failure unexplained by fluid status, are required. Its severity is determined by an increased fraction of inspired oxygen (FiO2) requirements or minimum positive end-expiratory pressure (PEEP). The differential diagnosis includes infections, toxic inhalations, allergies, mechanical obstructive process, and systemic diseases. This syndrome requires prompt recognition and urgent interventions to improve any associated morbidity and mortality, with severe cases carrying a mortality rate up to 46% in pediatric patients[1]. Although multiple risk factors for the development of ARDS are known, constipation has not historically been considered as a known factor. To our knowledge, this is the first case to describe aspiration of feculent material and removal of airway casts via bronchoscopy with therapeutic lavage. Although occurring in rare instances, constipation with abdominal distention must be assessed in the differential diagnosis of a healthy child with ARDS that could lead to more complicated conditions of varying severity for the patient.

References:

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