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Case Report

A Misplaced Orogastric Tube Causing Esophageal Perforation and Carotid Artery Pseudoaneurysm

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ABSTRACT

Enteral access is important for nutritional support, essential medications, gastric decompression and to identify gastrointestinal bleeding. Esophageal perforation and carotid pseudoaneurysm formation are rare complications after enteric tube placement. We report a 60-year-old male with unfortunate rare concurrent complications of both esophageal perforation and traumatic external carotid artery pseudoaneurysm formation due to iatrogenic placement of an orogastric enteric tube while having a functional gastrostomy tube. Initial presentation was hemodynamically unstable requiring intubation, resuscitation, embolization, and surgical removal of the enteric tube. Computed tomographic imaging showed the orogastric tube coiling in neck, esophageal perforation, and right external carotid artery pseudoaneurysm formation. Despite maximum medical management, family requested withdrawal of life support given the extent of his illness. We hope to highlight the safety of enteric tubes, complications associated with placement, confirmation of correct position, and finally avoiding patient overuse.

Keywords: Enteric tube; OG tube; Esophageal perforation; Traumatic carotid artery pseudoaneurysm; Procedural complications; Iatrogenic injury

ABBREVIATIONS

CT: Computed Tomography; SARS-CoV-2: Severe Acute Respiratory Syndrome Coronavirus 2; COVID-19: Coronavirus Disease 2019; RT-PCR: Reverse Transcription-Polymerase Chain Reaction; NG: Nasogastric; OG: Orogastric; NJ: Nasojejunal; OJ: Orojejunal

INTRODUCTION

Enteric tube selection requires evaluation of disease state, gastrointestinal anatomy, previous surgeries, gastrointestinal motility, and estimated length of therapy. But enteric tube insertion has associated risks, despite routine performance in hospitals worldwide. Recent studies suggest that 0.1%-0.3% of all patients with blindly placed enteric tubes die due to iatrogenic injury from tube misplacement. Although this percentage seems low, in the context of an estimated 1.2 million enteric tube placements performed annually in the United States alone, this suggests roughly 1,200-3,600 preventable deaths from enteric tube placement [1-3]. We identify the role of enteric access in patient care, list the complications of enteric tube placement, discuss esophageal perforation and need for timely diagnosis, explain the ethical challenges in establishing enteric access and review evidence-based guidelines to reduce complications.

CASE PRESENTATION

A 60-year-old man with a history of metastatic tonsillar squamous cell carcinoma on chemoradiation therapy with chronic dysphagia, radiation esophagitis and recurrent aspiration pneumonias presented to our hospital with an acute oropharyngeal bleed with dyspnea. Patient denied having fevers, chills, night sweats, chest or abdominal pain, sore throat, cough, or recent travel history. He denied any previous bleeding disorders, anticoagulant or antiplatelet use, and denied smoking, alcohol, and illicit drug use. Vital signs were 36°C, 136 beats/minute, 70/40 mmHg, 28 breaths/minute, and hypoxia of 86% on high flow nasal cannula. Before transfer to our hospital, he was emergently intubated for respiratory distress, underwent aggressive resuscitation with blood products, and had emergent unverified OG tube placement to identify a bleeding source. On arrival, blood continued to pool in the patient's mouth around the OG tube with progressive hemodynamic instability despite transfusions and vasopressors. On examination, patient was pale, cachectic, nasally intubated, and tachycardiac. Auscultation revealed decreased breath sounds bilaterally and positive bowel sounds. We aspirated from the OG tube but found no gastric contents or air. A chronic gastrostomy tube was discovered and hooked to suction—blood was evacuated. Rectal examination noted no obvious bleeding or hemorrhoids.

Chest X-ray (Figure 1) highlighted bilateral lower lobe infiltrates, and the enteric tube tip was midline above the carina but not under the diaphragm nor following the course of the esophagus. CT neck, chest, abdomen and pelvis angiography (Figure 2) revealed the OG tube coiling in the neck, esophageal perforation, a traumatic right external carotid artery pseudoaneurysm from the distal tip of the OG

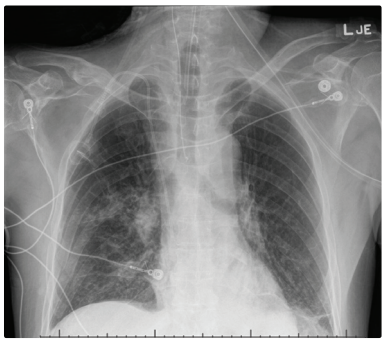

Figure 1: Displays a chest X-ray portable upright highlighting bilateral lower lobe infiltrates, an endotracheal tube in good position, right chemo-port with tip in cavoatrial junction, and an enteric tube tip that is midline above the carina but not under the diaphragm nor following the course of the esophagus.

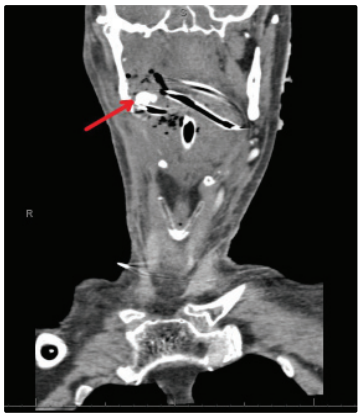

Figure 2: Computed Tomography (CT) of Neck Angiography: Displays a CT neck angiography coronal view demonstrating a coiled enteric tube not following the path of esophagus and subcutaneous emphysema in upper neck demonstrating a perforation. The red arrow shows on right external carotid artery with contrast with a pseudoaneurysm located medially suggesting a traumatic etiology.

tube, dense bibasilar lung parenchyma consolidations and with a right tonsillar mass with phalangeal space invasion in soft tissue. Complete blood count showed leukocytosis and anemia. Metabolic profile showed hyponatremia, hypochloridemia, hypomagnesemia, and lactic acidosis with normal blood urea nitrogen level. SARS-CoV-2 was positive on RT-PCR performed by nasal swab. Coagulation studies were normal. Finally, he underwent emergent bronchoscopy with bronchoalveolar lavage, culture, legionella antigen and galactomannan detection which were negative.

Despite empiric antibiotics, surgical enteric tube removal, bleed localization and embolization of branches of the right external carotid artery, and mechanical ventilation and vasopressors, deterioration continued. Within 24 hours into the hospitalization, family requested to withdraw patient life support and he was declared dead.

DISCUSSION

A man in his 60s who was immunocompromised due to metastatic tonsillar squamous cell carcinoma with adenopathy on chemoradiation presented with acute massive hemoptysis and shortness of breath from outside facility, emergently intubated with subsequent enteric tube placement prior to arriving at our hospital. Patient may have had tonsillar carcinoma invading blood vessels in his oropharynx or neck, trauma during emergent intubation or enteric tube placement, infection, diffuse alveolar hemorrhage from infection or chemotherapy, or an upper gastrointestinal bleed. Explicit details in clinical presentation, imaging, and diagnostic testing may help to discern the exact etiology.

The possibility of trauma from intubation was a real concern, based on the documentation from outside facility nasal intubation was successfully performed by anesthesia with two documented attempts. However, radiographic imaging of the oropharynx did not identify an obvious bleeding source originating from anterior or posterior oropharynx. But given the extent of bleeding and tonsillar mass with soft tissue invasion seen on imaging, there was no complete certainty that trauma was not caused during necessary intubation to protect his airway. Bleeding from tonsillar carcinoma invading into blood vessels was a possibility, luckily our patient received his oncological care at our hospital, and we had direct access to all imaging. In comparison to previous imaging, his head and neck cancer was responsive to the chemoradiation and was decreasing in size and no previous report was ever discovered of hemoptysis prior to this hospitalization. Other potential considerations were infectious pneumonia given his bilateral lower lobe consolidations and history of recurrent aspiration pneumonia, but bronchoscopy did not identify upper or lower tracheal injury, active bleeding with negative serial aliquots ruling out diffuse alveolar hemorrhage, and bronchoalveolar lavage culture, and legionella and galactomannan detection were negative. While patient was SARS-CoV-2 positive, no direct association with upper airway bleeding has been reported to our knowledge and patient did not have typical radiographic imaging of COVID-19 disease. We evaluated for an active upper gastrointestinal bleed by his clinical presentation, examination, radiographic imaging. However, the cumulative testing did not identify a source of bleeding. He had a normal blood urea nitrogen level and connecting his gastrostomy tube showed a large hematoma that was evacuated. Endoscopy was not performed due to his instability and family wishes for palliative care. While the initial clinical presentation was acute hemoptysis with an oropharyngeal bleed, it appeared his bleeding progressed despite aggressive attempts to stabilize him. His clinical deterioration combined with inability to aspirate any contents from his OG tube, and radiographic imaging confirming enteric tube misplacement with esophageal perforation and external carotid artery pseudoaneurysm was the likely pivotal point in his care. While multiple factors may have contributed to his bleeding including the extent of his tumor and intubation, placement of an enteric tube only aggravated the situation, and was both excessive and unnecessary.

Artificial nutrition includes parenteral and enteral nutrition. Enteral nutrition is achieved through acquiring access either through enteric, gastrostomy and jejunostomy tube placements. Enteral access is considered for patients with a functioning gastrointestinal tract who cannot or will not eat. Enteric access has physiological advantages, less complications and less costly than parenteral nutrition. NG, OG, NJ, or OJ tubes are recommended for short-term use (days to 6 weeks) for gastric or small bowel feeding or gastric decompression. Patients who have facial trauma, nasal injury, abnormal nasal anatomy, recent gastrointestinal bleeding, radiation or surgery to the esophagus, hemodynamic instability, respiratory compromise, and alterations in esophageal anatomy are contraindications for tube placement. The use of enteral nutrition in comparison to parenteral nutrition may seem benign, but patient harm can occur when evidence-based practice recommendations are not followed. Adverse events related to enteral access have been reported at every step of the process specifically in feeding tube malposition or displacement, and bronchopulmonary aspiration. These risks often go unnoticed due to lack of familiarity with literature and complication infrequencies, as most misplaced tubes are removed without injury and are not clinically reported. Therefore, patient safety is a fundamental principal in the consideration of enteral access [1,2]. Complications following enteric tube placement can include misplacement where the tip of the tube is placed in an anatomical position not intended for proper administration of enteral nutrition, while displacement refers to the tube tip migrating or inadvertently moved to an anatomic position not intended for the proper position. Tube misplacement or displacement can lead to lethal complications including esophageal perforation, vessel injuries causing hemorrhage, tube breakage and leakage, gastrointestinal erosion or ulceration, ileus, peritonitis, infection, tracheobronchial injury, pleural effusions, aspiration pneumonia, pneumonitis, and pneumothorax [2,3].

To prevent these complications, the American Society for Parenteral and Enteral Nutrition has recommended discontinuing auscultatory methods for assessment and confirmation of enteric tube placement. This is due to auscultatory methods not being able to differentiate tubes wrongly placed in the lung or coiled in the esophagus from properly positioned tubes. This acknowledges that an abdominal radiograph is the current gold standard for visualizing the entire course of the tube. Without confirmation, patient harm has been noted with a study reporting that 1.3%-2.4% of NG tubes in more than 2000 insertions located outside the GI tract and 20% led to pulmonary complications that were never verified [3,4].

Esophageal perforation is a rare and devastating complication of enteric tube placement. The most common perforation sites are the thoracic and cervical esophagi due to absence of serosa and muscle. Risk factors include prior radiation or esophageal surgery, strictures, diverticula, tumor obstruction, severe esophagitis, and/or an inexperienced operator. The major prognostic factor is the time

from esophageal injury to surgery, as delays in diagnosis, increase mortality. It requires knowing the location, cause, depth of tear, and surgical exploration for primary closure. On the other hand, carotid artery pseudoaneurysm is usually classified by blunt or penetrating trauma and managed either by embolization through endovascular intervention, or by surgical repair with ligation of carotid artery branch with or without bypass and arterial reconstruction [3-6].

A literature review showed multiple publications of misplaced enteric tubes with esophageal perforations, but no publications describing a situation of an enteric tube placed in a patient with a functioning gastrostomy that led to both esophageal perforation and carotid pseudoaneurysm formation. Further evidence-based guidelines are needed to address placement of enteric tubes while having long-term enteral access, the accuracy of using enteric tubes to discern between upper versus lower GI bleeding, and to determine the appropriateness of these devices to improve patient safety and maintain quality of care [7-9].

In summation, our patient presented with an oropharyngeal bleed from head and neck cancer with an unverified OG tube placed to identify bleeding source while intubated despite having a functional gastrostomy tube. The circumstance of his death was unfortunate. Still, the unnecessary placement of an OG tube could have been prevented, or at least verified. This was an example of patient overuse. It takes a sentinel event of morbidity and mortality to adjust practice.

CONCLUSION

Esophageal perforation and carotid pseudoaneurysm formation are rare complications of enteric tube placement. Initiatives to avoid complications should be taken at every step of the process of enteric tube placement from operator, correct size, length, patient appropriateness, timing, and confirmation of correct placement. Simply understanding patient disease states, risk factors, and complications of enteric tube placement will allow physicians to think twice before establishing and maintaining enteral access.

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