

Hidden Dangers of Duo-Tubes in Adults: A Case Report and Literature Review

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Abstract

Background: Insertion of nasogastric (NG) or nasoduodenal (ND) tubes for temporary feeding access is a commonly performed procedure in the intensive care unit. Due to widespread usage, associated complications with the placement of these tubes have been widely reported. Duo-tubes are a lightweight tube specifically designed for feeding access. The rare case of gastric perforation following the placement of a duo-tube in a critically ill patient is described along with a review of existing literature on the topic.

Summary: A 62-year-old African American woman admitted to the neurological intensive care unit secondary to an ischemic stroke required placement of temporary feeding access via a weighted duo-tube on hospital day seven. The patient received barium contrast in preparation for a percutaneous endoscopic gastrostomy tube insertion. Imaging the following day demonstrated perforation of the stomach by the duo-tube with a significant amount of contrast extravasation into the peritoneal cavity. An emergent laparotomy revealed a gastric perforation with the duo-tube tip protruding into the peritoneal cavity. The perforation was repaired primarily with a non-absorbable suture. The patient remained stable after surgery and was able to tolerate tube feeds via a jejunostomy tube before discharge to rehabilitation four weeks post-op.

Conclusion: Gastric perforation secondary to NG or ND intubation is a rare but serious complication associated with placement of temporary feeding tubes. Early recognition and surgical intervention are the hallmarks of management.

Few previous reports in the literature described this complication, however this is the first case report of a perforation caused by a duo-tube.

Keywords: Gastric Perforation; Feeding Tube; Misplacement; Complications; Nasogastric Tube

Introduction

Nasogastric (NG) or nasoduodenal (ND) tubes are commonly placed in critically ill patients to provide feeding access for enteral tube feeds. The majority of complications associated with these tubes are minor, and include epistaxis, sinusitis, and aspiration due to tube malposition [1]. However, more serious complications such as perforation of anatomic structures, including the aorta and abdominal viscera, although uncommon, have been described [2-4]. Duo-tubes are smaller caliber tubes with a weighted tip to help place the tube past the pylorus into the duodenum. They are designed to be more flexible than a traditional NG to provide more comfort for the patient. There are few reports on the complications of duo-tubes in the literature. The majority of previous literature on duo-tube complications focused on the placement of these tubes in neonates. Due to increasing use of these devices in adults, it is important to understand the potential for complications and how to avoid them. We report the unusual case of gastric perforation following the placement of a duo-tube for feeding access. To our knowledge, this is the first case reported in the literature of duo-tube insertion resulting in gastric perforation.

Case Report

A 62-year-old woman with medical history significant for hypertension and hyperlipidemia presented to the Emergency Department with left-sided weakness and altered mental status. Imaging revealed a right middle cerebral artery ischemic stroke. The patient was initially managed with tissue plasminogen activator (tPA) and an endovascular thrombectomy. Hemorrhagic conversion of the stroke required an emergent right decompressive hemicraniotomy. As a result, she had a prolonged stay in the intensive care unit (ICU). She had significant dysphagia and was unable to pass a swallow study. On hospital day seven, the patient’s nurse inserted a weighted duo-tube for temporary feeding access. The guidewire was removed after correct tube placement was confirmed by abdominal x-ray. The nurse reported some resistance when inserting the tube but did not report any other issues.

On the day following duo-tube insertion, interventional radiology was consulted to place a percutaneous gastrostomy tube (PEG) for long-term feeding access. The patient was given barium via her duo-tube as per protocol 24 hours before PEG tube insertion. The following morning, the patient’s white blood cell count increased to 28,100 mL. The patient was also complaining of abdominal pain. A routine abdominal x-ray demonstrated extravasation of contrast and free air (Figure 1). Subsequently, a CT scan showed perforation of the stomach wall with a large amount of contrast extravasation into the peritoneal cavity (Figure 2). The patient’s altered mental status from her recent stroke precluded the ability to obtain a reliable abdominal exam.



Figure 1: Abdominal x-ray of a 62 year old woman status post placement of a duo-tube for feeding access showing extravasation of contrast.

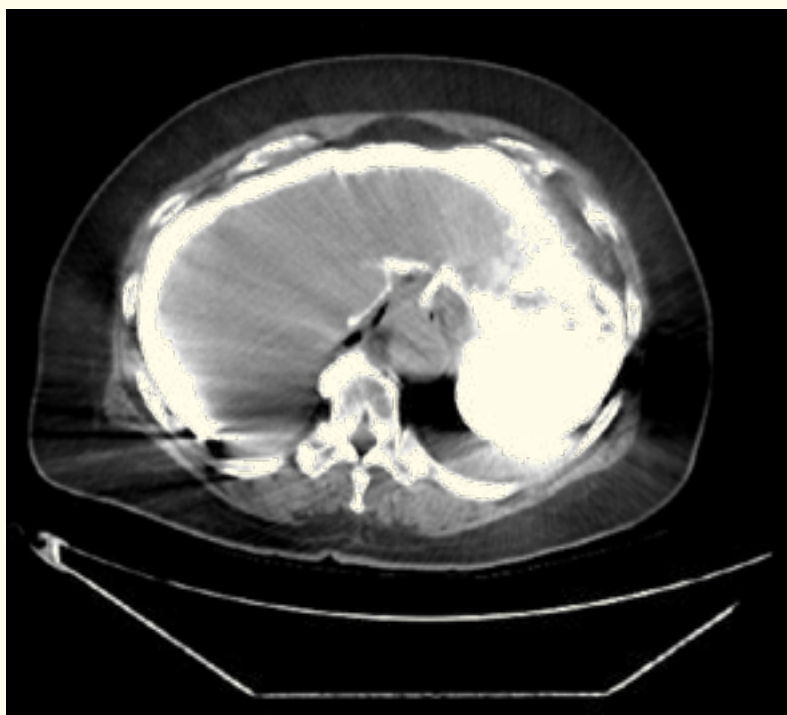
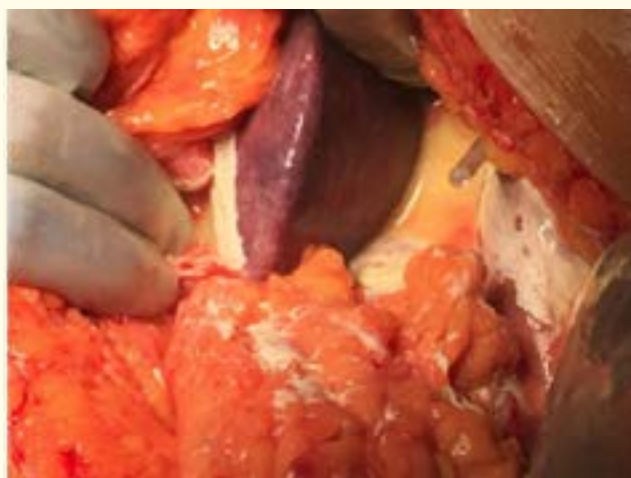


Figure 2: CT scan of abdomen demonstrating perforation of nasoduodenal tube through stomach and contrast extravasation into the peritoneum.

The patient was taken to the operating room for an emergent exploratory laparotomy. Intra-operative findings were significant for a copious amount of purulent fluid and barium contrast throughout the abdomen (Figure 3A). The duo-tube tip was found to be protruding from the wall of the stomach along the lesser curvature approximately 2 cm distal from the gastroesophageal junction (Figure 3B). The perforation in the stomach was identified and was primarily repaired by oversewing the defect with a 3-0 silk suture. The duo-tube was then removed. The peritoneal cavity was copiously irrigated. A 20-french Malecot drain was inserted to drain the stomach. A jejunostomy feeding tube was also inserted at the time of surgery. The patient was returned to the ICU intubated in stable condition. She was started on tube feeds via the jejunostomy tube and she was able to tolerate the feeds without issue. She was discharged to inpatient rehab four weeks post-surgery.



(A)



(B)

Figure 3: A) Intra-operative image of entry into the abdomen with the presence of barium contrast and B) nasoduodenal tube perforating the stomach.

Discussion

Nasogastric or nasoduodenal tubes are flexible tubes inserted via the nasal cavity into the stomach or small bowel for feeding access or to administer medications to patients who cannot tolerate oral intake. Healthcare professionals caring for critically ill patients routinely place these tubes. The most common complications associated with the use of these tubes include nose bleeds, sinusitis, or a sore throat. More serious complications include erosion of tissue in contact with tubing, esophageal perforation, pulmonary aspiration, or intracranial placement of the tube. Case reports have described intracranial, tracheobronchial, and esophagoaortic placement of nasogastric tubes [2,5,6]. However, there are few reported cases of gastric perforation from feeding tubes [4,7,8]. here is a paucity of literature on gastric perforation secondary to nasogastric intubation. Previously recorded cases of gastric perforation due to nasogastric intubation have mostly been recorded in neonates [4]. To our knowledge, there are no other published reports of gastric perforation secondary to duo-tube placement in adults.

A case series published by Ghahremani and colleagues described six different instances of perforation caused by the insertion of flexible tubing [4]. Nasogastric tubes were responsible for five cases of gastric perforation. One patient experienced injury to his esophagus from a Linton tube placement for esophageal varices. Proposed risk factors for three of these patients included salicylate use, neoplastic tissue, and gastric anastomosis. Ghahremani, *et al.* also describes cases where a previously flexible tube became rigid after exposure to gastric juices and led to pressure ischemia [4]. Daliya, *et al.* described another case of gastric perforation in which the patient had fibromuscular dysplasia. The authors proposed that gastric wall weakening secondary to fibromuscular dysplasia might have played a role in the patient’s predisposition to gastric perforation [7].

In recent years, various groups have investigated the utility of devices that provide tracking and visualization of the feeding tube during insertion [9,10]. This is accomplished through an electromagnetic (EM) signal without the need for post-placement radiograph [9]. A transmitter on the distal tip of the feeding tube transmits a signal to a receiver unit on the patient’s xiphoid process producing a graphic on a portable monitor. The view on the monitor is divided into quadrants to indicate incorrect placement. This technique may be effective in sensing bronchial intubation, however, EM devices are unlikely to detect a tube misplaced into the peritoneum if it follows the general path of the esophagus or either gastric curvature [10].

Early identification and management of gastric perforation related to nasal feeding tubes is critical. A high clinical suspicion and plain abdominal films can assist in the diagnosis to identify free air suggesting perforation. On evaluation of the patient, it was considered if she could have developed a gastric perforation secondary to an ulcer. However, the patient had no previous history of peptic ulcer disease or other known risks factors for gastric ulcers. She was on a proton pump inhibitor for stress ulcer prophylaxis during her ICU stay. Intra-abdominal pathology confirmed that her perforation was caused by the duo-tube placement.

| Author | Feeding Tube Type | Organ Injured | Known Risk factor | Outcome |
|--------------------|-------------------|-------------------------|--|---|
| Oe., et al. | Nasogastric | Aorta, esophagus | Stiff neck from rheumatoid arthritis | Death |
| Hanna, et al. | Nasogastric | Brain stem/ spinal cord | Endoscopic transnasal resection of clival chordoma | Focal paralysis, eventual death |
| Hutchinson, et al. | Nasogastric | Esophagus | None | Full recovery |
| Ahmed, et al. | Nasogastric | Esophagus | | Full recovery |
| Ghahremani, et al. | 1. Linton Tube | 1. Esophagus | 1. None | 1. Full recovery |
| | 2. Nasogastric | 2. Pharyngoesophagus | 2. None | 2. Pseudodiverticulum |
| | 3. Nasogastric | 3. Esophagus | 3. Hiatal hernia | 3. Esophageal stricture |
| | 4. Nasogastric | 4. Stomach | 4. Subtotal gastrectomy, GJ | 4. Total gastrectomy, esophagojejunostomy |
| | 5. Nasogastric | 5. Stomach | 5. None | 5. None |
| | 6. Nasogastric | 6. Stomach | 6. Stomach cancer | 6. Death |
| Wang, et al. | Nasogastric tube | Lung | COPD, ventilator dependence | Full recovery |
| Daliya, et al. | Nasogastric tube | Stomach | None | Full recovery |
| Janicki, et al. | Nasogastric tube | Stomach | Fibromuscular dysplasia | Respiratory failure, pneumonia, death |

Table 1: Summary of previous studies of nasogastric tube perforation.

Conclusion

To our knowledge, this patient is the first case reported of an adult with a gastric perforation from a lightweight feeding tube. In addition, the patient did not have any clearly identifiable risk factors demonstrated in previous studies. Although clearly a rare complication, the clinician should be aware of this potential complication, especially with increasing use of feeding tubes in critically ill patients. Early surgical management is the mainstay of treatment, along with the placement of distal feeding access. Future studies may focus on the refinement of technology to assist with more accurate bedside placement of temporary nasogastric feeding tubes.

Lessons Learned

Visceral perforation secondary to nasogastric intubation is a rare complication. Even in the absence of clear, identifiable risk factors, a high degree of suspicion should be maintained to identify this complication.

Conflicts of Interest

No conflicts of interest to report.

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