Pneumothorax Following Feeding Tube Placement: Precaution and Treatment

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Abstract- Nasojejunal feeding tubes are being used at an increased frequency, but it is not without complications that could be life-threatening. We report two cases of pneumothorax following small-bore feeding tube insertion into the pleural cavity, resulting in pneumothorax. We further discuss the potential measures that can be taken to prevent and treat this serious complication.

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Introduction

Many patients benefit from early placement of nasogastric and nasojejunal feeding tubes. Nasoenteric feeding can be successfully used to provide adequate nutrition to patients whose medical conditions prevent them from eating while their enteral system is otherwise functioning normally (1). However, there are many reports of malpositioning of feeding tubes, ranging from inadvertent placement in the respiratory tract (2) including into the major airways and through the parenchyma into the pleural space inducing pneumothorax, (3,4) esophageal and gastric perforation (5,6). Dobbhoff feeding tubes (Sherwood-Davis and Geck, St Louis, Mo) are small-bore tubes that are more flexible than nasogastric tubes. These tubes are placed beyond the pylorus, in the fourth portion of the duodenum or the jejunum, making them particularly useful in patients who are at a particular risk for aspiration, including trauma patients, patients with altered mental status, and those with gastroparesis due to neurologic injuries. These small-bore nasojejunal feeding tubes are thought to be safer, owing to their soft, flexible nature. Flexible nature of these tubes makes the accuracy of their placement in the right space more difficult. In this paper, serious complication of misplacement of these feeding tubes resulting in pneumothorax are being addressed (7).

Case Report

Case 1

91-year-old woman was transferred to our facility three days after an initial cerebellar hemorrhage, with progressive decline in neurologic status, and gross hemiparesis. Her airway was protected, and she could maintain adequate respiration on her own. A ventriculostomy tube was placed, and she was admitted to the intensive care unit (ICU) for the close monitoring. Subsequent evaluation by a speech pathologist indicated decreased lingual strength with reduced but rapid laryngeal elevation. She was judged to be at moderate to severe risk for aspiration secondary to fatigue and weakness, and nasoenteral feeding was recommended.

Two days after admission to the ICU, a nurse attempted to place a number-10 french nasojejunal feeding tube (Corflo–UltraLite non-weighted feeding tube with stylet; Corpak Med Systems, Wheeling, Ill) in accordance with the protocol provided by the supplier. Tube was placed at 40 cm in, with the stylet left in place. This nurse was well experienced in placing such small bore feeding tubes. . Patient did not produce a gag reflex and was not able to swallow during the insertion. Upon placement of the tube, she did not cough, and there was no change in her oxygen saturation. Post insertion chest x-ray film showed the feeding tube to be in the right main stem bronchus, and entering the right lung field (Figure 1).

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Figure 1. Placement of the feeding tube in the right main-stem bronchus and into the pleural cavity.

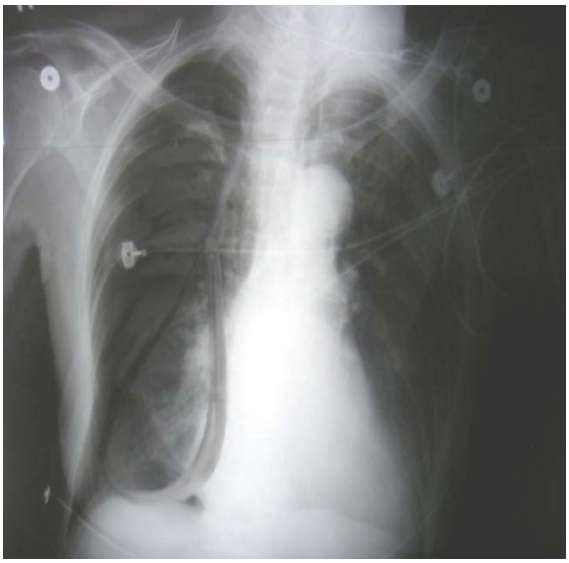

Figure 2. Moderate right pneumothorax has been seen several hours after removal of malpositioned tube.

Tube was immediately removed, and five hours later a repeated chest x-ray revealed increasing pneumothorax (Figure 2).

A TRU-CLOSE thoracic Vent (UreSil, LLC Skokie, IL, USA) was placed in the second intercostals space to treat the pneumothorax. The thoracic vent was removed after 6 days, with no residual pneumothorax on follow-up chest x-ray film. Patient was then transferred to another facility for treatment of her other medical problems.

Case 2

70-year-old woman was admitted to the ICU following abdominal aortic aneurysm repair. Post-operative course was complicated with respiratory and renal failure as well as a prolonged ileus. On postoperative day 10, a small-bore feeding tube similar to that used in Case 1 was placed while the patient was on mechanical ventilation. The ventilator settings included; synchronized intermittent mandatory ventilation rate 12/min, positive end-expiratory pressure 5 cm H_2O, tidal volume 700 mL, and stable fraction of inspired oxygen. During feeding tube insertion, there was no change in the oxygen saturation, and the endotracheal tube's cuff remained inflated. Further there was no increase in the airway pressure, nor any clinical evidence of pneumothorax. However, chest x-ray film demonstrated the feeding tube to be in the left main stem bronchus entering the left lung field. The tube was then removed immediately. Subsequently patient experienced a sudden drop in oxygen saturation and decrease in blood pressure. Repeat chest x – ray (unavailable) film revealed a tension pneumothorax. Chest tube was immediately inserted. The rest of the hospital course of this patient was unremarkable, and she fully recovered.

Discussion

Early nutrition using enteral access has shown significant benefits in critically ill patients (8-11). Enteric access can be achieved by placement of feeding tubes in the stomach or past the pylorus into the small bowel. Dobbhoff feeding tubes are commonly used in surgical and trauma patients to achieve nasoenteral feeding.

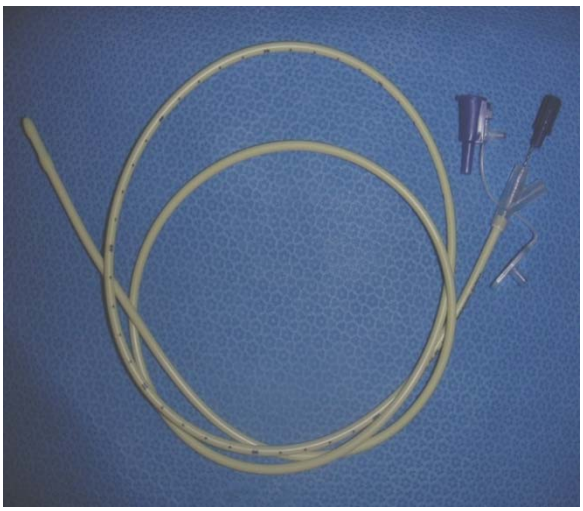

Figure 3. Example of a Small-Bore Feeding tube.

Such tubes are often placed in the duodenum and small bowel via fluoroscopy or at bedside using blind placement technique. Patients with head injuries often have gastroparesis (12) and are at increased risk for aspiration; therefore placement of feeding tubes beyond the pylorus is preferable. These small-bore tubes usually are radiopaque and include a braided stainless steel stylet. Some have a tungsten-filled guide tip, and the surface of the tube contains water activated lubricant (Figure 3).

Although small-bore nasojejunal feeding tubes such as Dobbhoff tubes are thought to be safer due to their soft flexible nature, however complications of blind placement of these tubes are similar to those associated with blind placement of large-bore nasogastric tubes (13). At the same time, the flexible natures of these soft tubes make the correct placement more difficult. More over blind transpyloric feeding tube placement is even more difficult to achieve in patients with severe head injury, and can result in placement of the tube short of stomach in the esophagus, in the respiratory tract (2-4), intracranial placement (14,15), or may even result in gastric perforation (5,6). A decreased or lack of a swallowing reflex and a decreased or lack of a cough reflex increase the risk of placement of enteric tubes into the respiratory tract. When placement is difficult or uncertain, alternative placement techniques include endoscopically guided placement, fluoroscopy-guided placement (16) and bedside sonographic-guided placement should be implemented (17). Placement and confirmation of nasoenteral feeding tubes using external magnetic guidance has also been described (18, 19).

Spiral nasojejunal tubes are preferable to straight tubes for blind bedside postpyloric placement in patients with normal gastric emptying (20). Using the small-bore feeding tube without a stylet could potentially decrease the risk of injury to the lung if the tube is accidentally placed into the respiratory tract. Although more difficult and more time consuming, placement without a stylet should be attempted first, especially if the patient is awake and able to swallow. After administering a prokinetic agent, patient should be positioned right side down (facilitates passage through the pylorus) with the head slightly flexed forward (facilitated passage through the pharynx to the esophagus). Tube should never be forced through resistance. In a conscious patient, tube placement can be evaluated by checking respiratory status and auscultation of the epigastrium by air insufflation through the tube. Speaking ability also validates placement outside the airway. The new onset of a cough reflex during tube placement is an indication that the tube is being placed in the bronchus rather than the gastrointestinal tract, and upon immediate withdrawal of the tube, chest x-ray should confirm the absence of pneumothorax.

Placement of the flexible nasoenteric feeding tubes in critically ill patients is very difficult. Clinical confirmation of tube placement without radiographic confirmation especially in critically ill patient can be misleading and may delay management of complications related to tube placement. In both of our cases, clinical and radiographic evidence of pneumothorax appeared after the feeding tubes were removed. It is extremely important to obtain a chest x-ray after the misplaced nasoenteric tube is removed, even if there is no evidence pneumothorax prior to tube removal. Close observation is important especially those on mechanical ventilation due to the risk of a tension pneumothorax. It should also be recognized that patients who have had a feeding tube misplaced are at increased risk for having successive misplacements. Therefore, other means of insertion should be considered.

Insertion of feeding tubes is routine but not without the potential complications. In compromised and unconscious patients, a chest x-ray should be performed to confirm tube placement. If the tube has entered the respiratory tract, serial radiographic films should be obtained to assess potential serious lung injury such as a pneumothorax and tension pneumothorax. Pneumothorax complicating small-bore feeding tube placement therefore need to be treated with chest tube or thoracic vent placement.

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