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Case Series: Nasogastric (NG) Feeding Tube Misplacement in Critically Ill Tracheostomized Patients

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Abstract

In this case series we present 3 cases of nasogastric tube misplacement in tracheostomy patients. Although considered safe and it being a common procedure nasogastric tube misplacement can lead to serious and life-threatening complications. We present three cases of nasogastric tube misplacement in tracheostomized patients. One of the cases presented suffered from pneumothorax. Different time intervals between procedures in these different cases resulted in similar results. We would like to emphasize the importance of due conformation of correct placement of the nasogastric tube in the tracheostomy patient as well as to suggest that over inflation of the balloon securing the tracheostomy apparatus in place during nasogastric tube placement, might prevent misplacement. Nasogastric tube placement in tracheostomized patients has potential for serious complications. As such maintaining safe practice procedure is essential. Considering over inflation of the tracheostomy apparatus balloon might be beneficial as well, by preventing entry of NGT into the trachea.

Keywords

Nasogastric Intubation, Nasogastric Misplacement, Tracheostomy, Mechanically Ventilated

1. Introduction

Nasogastric feeding tube insertion is a very common procedure with over a mil-

*Mr.Comay and Dr. Quint contributed equally to the paper.

lion nasogastric placements performed in 2013 in the US [1]. Nasogastric tube (NGT) is used in intensive care units (ICU), emergency departments and hospital wards routinely. The procedure is performed for medication administration, enteral nutrition and stomach lavage and decompression. While considered safe this procedure may cause severe complications during insertion [2] [3].

Complications can be classified as intrathoracic misplacement and outer thoracic misplacement [4]. These complications include pneumonia, acute respiratory failure, vocal cord paralysis, tracheal perforation, nasopharyngeal submucosal passages, facial trauma, esophageal perforation, bronchopulmonary intubation, hydrothorax, empyema, and pneumothorax. Pneumothorax is a leading cause of morbidity [1] [4] [5] [6] [7] [8]. In this case series presentation, we report 3 cases of NGT misplacement in patients with tracheostomy in our ICU department, some of which resulted in serious complications.

2. Case Presentation

2.1. Case 1

A 37 y/o male patient, with history of heavy smoking and alcohol use.

He was admitted to General Intensive Care Unit (GICU) after Partial Glossectomy and Neck dissection for Glossal Squamous Cell Carcinoma. During the surgery a tracheostomy was performed and NGT was placed. When he arrived at the GICU, a routine chest X-Ray was performed which showed the NGT in the Left Main Bronchus (**Figure 1**). Following the chest X-Ray, the NGT was taken out without significant consequences. A new NGT was inserted for enteral feeding. A few days after the surgery and following the misplacement of the NGT, the patient was discharged to his home without complication without NGT.

2.2. Case 2

A 57 y/o malepatient, PMH of chronic renal failure, essential hypertension, HBV carrier.

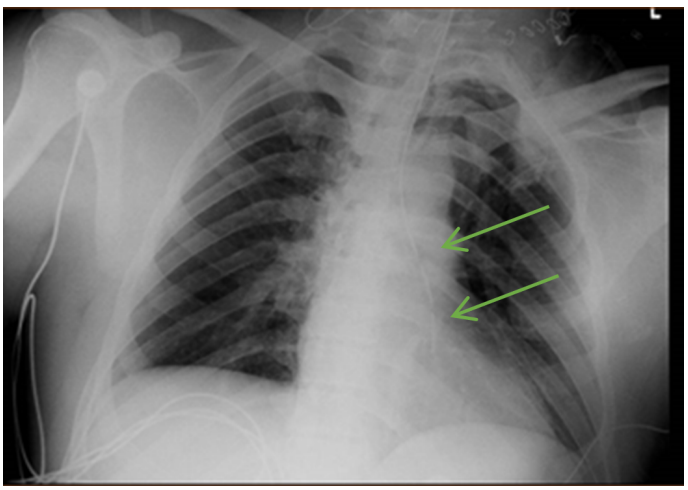

Figure 1. Chest X-Ray demonstrating NGT in the left main bronchus.

He was admitted to GICU after extensive 2nd degree burns over 50% body surface area. Secondary to the burns he stumbled and fell causing an open fracture of his ankle. During the Pre-hospital treatment period, he was intubated and ventilated. When he arrived at the ER a total body CT was performed without any further findings, and he was admited to GICU. He had a prolonged hospitalization including orthopedic intervention and massive supportive care including mechanical ventilation, fluids and vasopressors. His burns were treated by debridement, topical treatment and skin grafts.

As he needed prolonged mechanical ventilation a tracheostomy was performed two weeks after admission. He remained under treatment without significant signs of recovery. He suffered several episodes of sepsis that were treated with antibiotics. Three weeks after tracheostomy placement, his NGT was replaced. A chest X-Ray was done and according to the imaging evaluation, the NGT was withdrawn 50 cm for proper placement (**Figure 2**) and confirmed by a chest X-Ray.

The day after this NGT insertion, a repeat routine chest X-Ray was performed, showing the NGT in the left bronchus and continuing distally. The NGT was removed and a bronchoscopy was performed without significant findings. Following the bronchoscopy, a repeat chest X-Ray demonstrated a left side pneumothorax and a chest tube were inserted (**Figure 3**).

Several days later, the chest tube was removed due to clinical improvement as well as improvement on imaging. A few days after chest tube removal, due to an infection suspicion, a CT scan was performed. The CT demonstrated significant left pneumothorax causing mediastinal deviation (**Figure 4**). Another chest tube was inserted for a number of days.

Throughout his hospitalization, the patient suffered many episodes of sepsis without improvement despite broad spectrum antibiotic and anti-fungal therapy. Despite all efforts, this patient continued to deteriorate and suffered Multi Organ Failureleading to his death, one week after the insertion of the second chest tube.

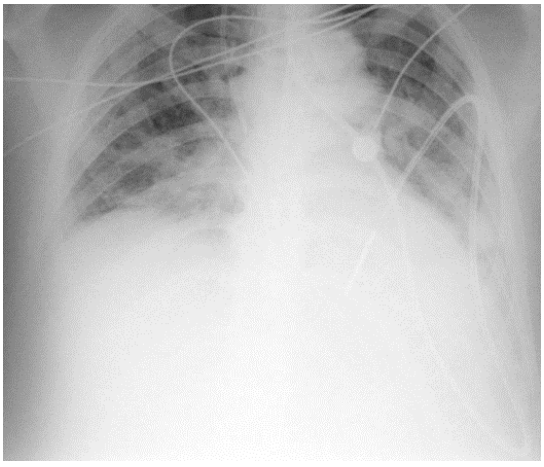

Figure 2. Chest X-Ray demonstrating NGT in proper placement.

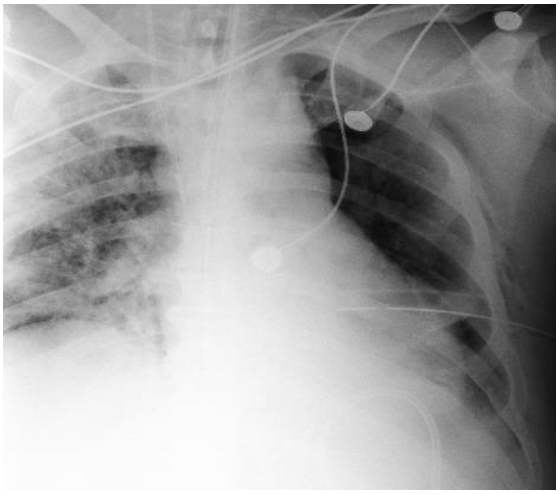

Figure 3. Chest X-Ray demonstrating left side pneumothorax.

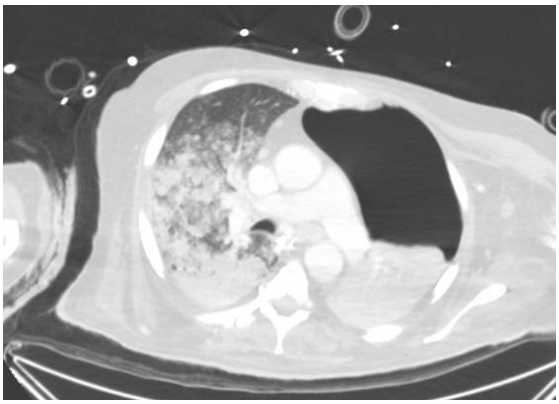

Figure 4. Left side pneumothorax demonstrated by CT scan.

2.3. Case 3

Ahealthy 35 y/o malepatient, without significant past history.

He was admitted to emergency room (ER) after falling from a height of 10 meters. During the pre-hospital evaluation he was intubated. On examination he was found to have suffered hemorragic shock with a blood pressure of 50/30. In the trauma bay evaluation, a focused assessment with sonography in trauma (FAST) reveled positive signs for free fluid and the patient was immediately taken to the operating room. A laparotomy was performed in which 700 ml of blood was evacuated as a result to a splenic injury. A splenectomy was performed followed by abdominal packing. External fixation of a broken femur was done at a later date. Following the primary surgical intervention, a chest X-Ray showed a bilateral hemothorax and two chest tubes were inserted bilaterally, with drainage of 1800 ml of blood. At the time of admission and operation the patient received a massive blood transfusion per protocol.

After the primary treatment, the patient underwent a total body CT scan that showed significant injury to spinal vertebra, lung, and the retroperitoneum. He was then admitted to GICU for supportive care.

During his hospitalization in the GICU a tracheostomy was performed. His supportive care was continued. A month after the tracheostomy, NGT was placed. A chest X-Ray showed the NGT in the right main bronchus (**Figure 5**). The NGT was removed and relocated in the stomach without any consequence.

A week later he was found with dilated pupils. A head CT scan demonstrated a massive intra-cranial bleed with severe edema. The patient continued to deteriorate and after several days he passed away.

3. Discussion

NGT misplacement or malposition occurs in 1.2% - 2.4% of NGT placements where up to 60% of these incidents are in mechanically ventilated patients, and various studies demonstrating an increased risk for NGT malposition and associated complication in ventilated patients [1] [4] [5] [6] [9] [10] [11] [12] [13].

NGT placement in specific and enteral feeding in the ICU setting is crucial and mandatory to all patients. It is a fundamental and routine maneuver in the ICU setting, usually performed by the nursing staff [14]. Chest X-Ray is usually performed for confirmation of placement. CT scan and US can be performed as well.

NGT placement is usually performed utilizing blind passage, as it is a cheap and simple technique. Patients can be awake, sedated or in coma. In awake patients the nasopharyngeal passageway is first sedated with local anesthetic, the tube is lubricated and inserted through one of the nares. Feedback is important for correct placement. If they are able the patients will be asked to swallow during this procedure—easing the passage. On occasion of misplacement the patient may cough or show signs of distress—in such cases it is mandatory for NGT to be withdrawn. In patients who are either sedated or in coma such feedback cannot be obtain thus making successful positioning harder [6] [15] [16]. These difficulties require a conformation chest x ray to be performed shortly after placement in order to ensure correct placement [2] [4].

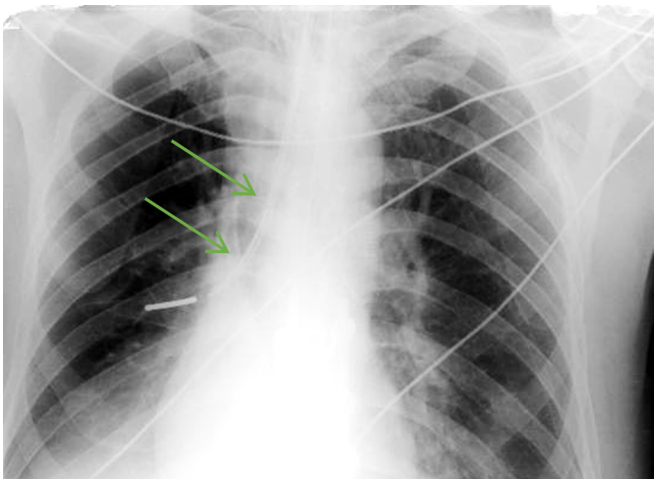

Figure 5. Chest X-Ray demonstrating NGT in the right main bronchus.

Tracheostomy is often performed for critically ill patients during their ICU stay. It is commonly used in the ICU setting for prolonged ventilation in patients [17]. Patients who undergo tracheostomy usually have a complicated management, including sedative drugs and might have altered mental status and a decreased ability to give feedback regarding NGT misplacement, such as coughing, vomiting, verbal or nonverbal communication [4]. The need for tracheostomy is usually associated with comorbidities (critical illness, respiratory failure, trauma, stroke, advanced age, reduced functional reserve and medications treating the critically ill) that may lead to conditions such as altered mental status and decreased gag reflex (which are major risk factors for NGT misplacement) [18].

Despite an intuitive expectation for a protective effect by mechanically ventilated apparatuses (because of the presence of a tube which theoretically obstructs the trachea and therefore may prevent NGT misplacement to occur in that location) the literature demonstrates mechanically ventilation as the most substantial risk factor for NGT misplacement [1] [4] [5] [6] [10] [11] [12] [13]. The reason stated above may offer an explanation.

A 2011 critical review of 9931 nasogastric tube placements including 5 large scale studies, reported that all 5 studies report an increased risk of pulmonary misplacement among ventilated patients. The incidence reported was 30% - 93% [5]. While no difference in risk between endotracheal intubation and tracheostomy was reported, the data found in the literature shows significantly less reporting of tracheostomy compared to endotracheal intubation [5] [13]. Other major associated risk factors include altered mental status, critical illness, younger age, depressed gag reflex and age [1] [6].

A 2008 case study reports a 75-year-old man who underwent tracheostomy. During the patient admission a NGT was misplaced in the patient's right lower lobe bronchus leading to alveolar infiltrates of the right lung. The patient subsequently developed pneumonia and septic shock. A 2011 case study reports a case of a 78-year-old man, who underwent tracheostomy and NGT placement. An X-ray concluded the NGT was mispositioned into the left main bronchus. The NGT was removed and replaced correctly [11].

In our case series we presented 3 patients in our ICU unit, who underwent tracheostomy and during their stay in the ward NGT misplacement occurred. All three patients underwent NGT misplacement in the lower airway tract. In the first case the patient suffered no complications and was discharged home. The second patient suffered pneumothorax, recovered from it and eventually passed away due to sepsis. The third patient suffered no complications related to NGT misplacement, yet he passed away due to intracranial bleeding.

While all three shared a common risk factor—tracheostomy—two were critically ill. The first patient underwent tracheostomy followed in close proximity to NGT placement while the second and third patients underwent NGT placement 3 - 4 weeks after tracheostomy was performed. Given these cases, it is interesting to note that time interval between the procedures did not affect complications,

resulting in misplacement both with short and long intervals between procedures.

Based on the literature and the case series we reported in this article, we would like to emphasize the risk of NGT misplacement in mechanically ventilated patients and specifically patients who underwent tracheostomy. We would like to further validate and establish a NGT routine for tracheostomy patients. This routine should embrace X-ray as a routine examining procedure for NGT placement, as adjacent as possible to the placement itself and ahead of nasogastric tube feeding and usage. While further investigation is needed, we would like to bring forth our conjecture in regard to safe protocol during NGT placement in tracheostomy patient. Temporary over-inflation of the balloon in the tracheostomy apparatus during NG tube placement might prevent passage of the tube into the lower respiratory airway.

All of our patients were sedated and had altered mental status thus significantly reducing their ability to perform feedback via cough or distress sign. Some have suggested that tracheostomy alters the structure of the esophagus and trachea region, making it harder for correct NGT placement.

While further study is needed, we speculate that patients with less risk factors, who are able to give feedback indicating the location of the NGT placement, are less likely to experience such complications.

4. Limitation

While some of the processes in this work are not directly related to the prognosis of NGT misplacement, and the fact that some cases prognosis was not determined by NGT, it is our understanding that NGT misplacement is a potentially lethal procedure that requires attuned attention and refined and safe approach.

5. Conclusion

NGT misplacement is more common in mechanically ventilated patients. Our goal is to suggest and establish a more attuned NGT placement routine. We offer a routine that should include a mandatory X-ray in short proximity to the placement and ahead of NGT feeding or usage, especially in patients with risk factors mentioned above. Furthermore, we would like to bring to considerations our suggestion of over-inflation of the tracheostomy balloon during NGT placement. This operation may prevent misplacement.

Consent

Informed consent was not obtained. Thorough attempts at obtaining informed consent had ended up futile. Furthermore, our facility's ethical board do not require informed consent in case report.

This research work has been reported in line with the PROCESS criteria [9].

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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