

Case of Lung Perforation Secondary to Nasogastric Tube Insertion

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INTRODUCTION

Nasogastric tube insertion is considered a rather benign and common procedure in our day to day practice. However, this procedure is not without risks. The purpose of this paper is to highlight that lung perforation secondary to nasogastric tube insertion is no longer uncommon in patients who have been intubated.

We report a case of a patient who suffered complication of nasogastric tube insertion resulting in prolonged stay in the hospital.

CASE REPORT

Mr S, a 76-year-old man, was admitted to our unit for acute exacerbation of chronic obstructive airway disease secondary to a chest infection. He was a smoker but had stopped smoking 7 years ago. He had fairly good pre morbid status and was able to do farming. During the hospitalization, his condition deteriorated in spite of appropriate therapy necessitating endotracheal intubation. A size 8.0mm low pressure cuff endotracheal tube was used. Immediately after intubation, a nasogastric tube was inserted using blind method. There was no documentation if there was any difficulty during insertion of the nasogastric tube. Placement was confirmed by auscultation. It took a while before a portable chest radiograph was done. Meanwhile, medication was served through the nasogastric tube prior to the film being made available.

During review of the chest radiograph, it was noted that the nasogastric tube was in the right pleural space [figure 1]. Unfortunately, no computed tomography of chest was done immediately to differentiate between esophageal perforation or lung injury. The nasogastric tube was immediately withdrawn and the patient developed pneumothorax subsequently, requiring insertion of chest tube [figure 2]. He was nursed in the intensive care unit for a total of 12 days as he developed worsening consolidation in his right lung. A computed tomography of the chest a week later showed collapse consolidation of right lower lobe of the lung, with focal consolidations in both upper lobes, bilateral pleural effusion, with no evidence of pneumomediastinum to suggest esophageal perforation. He was treated as having bronchopleural fistula secondary to a wrongly placed nasogastric tube. The chest tube was removed after 8 days with full expansion of the lung.

Throughout his 7 weeks in hospital, he required regular chest and limb physiotherapy. He was also given broad spectrum antibiotics intravenous piperacillin/tazobactam (tazosin) for 2 weeks as his tracheal aspirates grew *Pseudomonas aeruginosa*. He subsequently made good recovery and was discharged well. His chest radiograph upon discharge showed an improvement of consolidation, with no residual pneumothorax [figure 3].

DISCUSSION

Nasogastric tube insertion is indicated in patients who require controlled feeding and drug administration when they are not suitable for oral intake; gastric aspiration for poisoning situations where the ingested substance is potentially life-threatening; as well as gastric drainage when risk of aspiration is high. However, nasogastric tube insertion is not without risks. It has been reported a complication risk of 0.3 to 8% associated with nasogastric tube insertion¹. A study by Rassias *et al* on 740 patients on nasogastric tube reported a 2% tracheopulmonary complication with 0.7% suffering a major complication including 0.3% mortality². All of the patients who developed complications had altered consciousness and all, except one, had endotracheal tubes in place².

Stark did a small study on the patients in Massachusetts General Hospital Intensive Care Unit and found that for all the four intubated patients with endotracheal tube cuff pressure kept below 20mmHg, nasogastric tube was inserted into the tracheobronchial tree with ease past the inflated endotracheal cuff. It was previously believed that this complication was unlikely to happen in the older high pressure endotracheal cuffs as the inflated balloons reaching a pressure of 200mmHg would block off the entrance of the nasogastric tube³. However, these cuffs led to unwanted complications of tracheal ulceration in prolonged intubated patients, hence the introduction of the newer low pressure cuffs whereby the inflated balloon sealing the trachea would still be wrinkled with a pressure of 15-20mmHg³. With the use of these new cuffs, lung perforation due to nasogastric tube insertion is now a possible complication.

Our patient suffered from bronchopleural fistula secondary to nasogastric tube insertion. There was no evidence of extraluminal air on the computed tomography of the chest to

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Fig. 1 : Nasogastric tube in right pleural space.

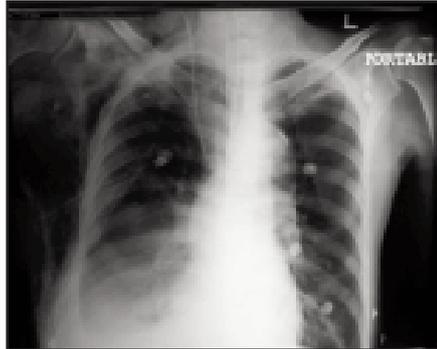


Fig. 2 : Chest tube insertion secondary to right pneumothorax after removal of nasogastric tube.

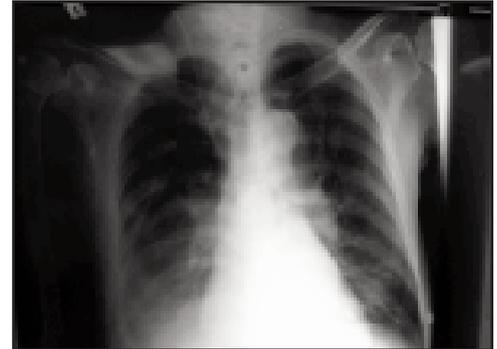


Fig. 3 : Chest radiograph upon discharge.

suggest esophageal perforation. He had higher risk of complication as he was ventilated and unconscious at the time of nasogastric tube insertion. During the time when wrong placement was noticed on the chest radiograph, the nasogastric tube should have been left in situ until an urgent computed tomography of the chest has been done to rule out esophageal perforation as immediate surgical repair may be needed to reduce mortality.

There are various methods to confirm placement of nasogastric tube after insertion. The commonest method used is by auscultation of bubbling with injection of air into the tube. However, this can be unreliable as a single test as bowel or chest sounds can be mistaken for a correct placement of the nasogastric tube as proven in the study done by Methany et al in 1990⁴. The gold standard for confirmation of placement of the tube is via a chest radiograph⁵ but this may not be feasible as a routine test for all patients on nasogastric tube.

The Birmingham East and North "Policy for the insertion of a nasogastric tube in adults" 2009 suggested combination of a few methods to confirm placement of the tube⁶.

1. Gentle aspiration of the tube to confirm presence of gastric contents
2. Using pH paper to confirm a pH of less than 5.5
3. Chest radiograph if methods 1 and 2 are negative

However it is important to note that for patients receiving medication which alter the gastric pH, such as antacids and proton pump inhibitors, it may not be suitable to use method 2 as it will cause a false negative result⁷.

Another method is to hold the free end of the tube into a cup of water after insertion. If there is continuous bubbling, it suggests that it is in the tracheopulmonary region.

However, more importantly is to prevent wrong placement of the nasogastric tube. In conscious patients, we should abort advancement of the tube when the patient coughs as it is a

sign of the tube being in the airway. One way is to get the patient to drink water from a straw as the tube passes through the nasopharynx as the swallowing action closes the glottis to enable the tube to advance into the esophagus⁸. In unconscious patients, especially with those using the new lower pressure endotracheal cuffs, nasogastric tube insertion should be done under direct laryngoscopy to ensure correct insertion into the esophagus.

CONCLUSION

Nasogastric tube insertion is often seen as a simple procedure and it is commonly done in both conscious and unconscious patients for various reasons. It is no longer deemed as a safe procedure in intubated patients due to the reasons stated above. Hence it is advisable to exercise precautions when inserting nasogastric tube, especially in unconscious patients and then to confirm placement of the tube via few methods before feeding is commenced, as failing to do so will lead to increase morbidity and mortality.

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