Blind Nasogastric Tube Insertion:
Be careful

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Abstract:

Nasogastric tubes are used in all specialties of medical practice. In critically ill patients, these feeding tubes provide enteral nutrition, which maintains enteric mucosal integrity as well as the immune system of the body, less risk of sepsis and decrease in length of intensive care stay. The insertion of nasogastric tube (NGT) is being considered as a simple blind bedside procedure but this procedure is not free of complications and can be fatal as these tubes can be malpositioned into the respiratory tract or central nervous system. Critically ill patients with endotracheal and tracheostomy tube are at particular risk for malpositioning of the nasogastric tubes due to loss of protective reflexes.

Here we report three cases, two intubated and one patient with tracheostomy, in whom the enteral feeding tube was malpositioned into the respiratory system, detected early and a new one inserted in correct position, confirmed by x-ray.

The aim of this report is to increase awareness about malpositioning of gastric feeding tubes, proper confirmation of their positioning, risk factors for malpositioning and its prevention.

Key words: Nasogastric tube, enteral feeding, malpositions, X-ray chest

Introduction:

Nasogastric tubes (NGT) are used in almost all specialties of medical practice. In critically ill patients these feeding tubes provide enteral nutrition, which maintains enteric mucosal integrity as well as the immune system of the body and hence decrease the length of intensive care stay with less risk of sepsis. The insertion of nasogastric tube (NGT) is considered a simple blind, bedside procedure but this procedure is not free from complications; it can be fatal if these tubes are malpositioned into the respiratory tract or central nervous system. Critically ill patients with endotracheal and tracheostomy tube are at particular risk for malpositioning of the nasogastric tubes due to loss of protective reflexes.

Here we report three cases of malpositioned nasogastric tubes, detected and re-inserted into proper position: Aim of this report is to increase awareness of the risks of malpositioning of NGT, its prevention and the necessity of confirming correct positioning. We also review the literature on safe insertion.

Case 1:

A 47-year-old male was admitted to the surgical intensive care unit (SICU), post-operatively after total gastrectomy and packing of abdominal cavity for haemostasis. On day three he underwent a second laparotomy for oesophago-juejenostomy and to remove the abdominal packs. A naso-enteric tube was inserted.

He remained on a ventilator, sedated with analgesia. It was noticed that nasogastric drain bag was repeatedly air filled with a leak of ventilatory tidal volume. Immediate post-operative x-ray of the chest showed the naso-enteric tube in the left main bronchus. The tube was removed and a new tube inserted under direct laryngoscopy, the correct position being confirmed by x-ray.

He remained in the SICU for three weeks, was weaned from the ventilator and extubated, and then transferred to the ward from where he was discharged to be followed in the out-patient department.

Case 2:

A 54-year-old male admitted to SICU with an infected diabetic foot, multi-organ dysfunction and septic shock underwent above the knee amputation. He had repeated septic shock, multiple organ failure, acute renal failure and was started on haemodialysis. While on the ventilator he went into acute respiratory distress syndrome and needed tracheostomy but remained on enteral feeding by nasogastric tube (NGT). The tube was changed after five weeks as it was malpositioned and went into the left bronchus; it was changed immediately for a new one and the correct position was confirmed by x-ray and enteral
feeding was resumed. He developed fatal septic shock and, combined with the multi-organ failure, he died on 76th day of admission.

**Case 3:**

A 50-year-old male admitted to the SICU with spontaneous intraventricular bleeding was intubated for respiratory insufficiency and at the same time a nasogastric tube was inserted. The post-intubation chest X-ray showed a malpositioned nasogastric tube in the right bronchus (Figure 1). It was removed immediately, another nasogastric tube inserted, and position confirmed by X-ray chest. He improved in a week and was weaned from ventilator and extubated but continued on enteral feeding. He was transferred to the ward on day 12 from where he was discharged home to be followed in the neurosurgical Outpatient Department.

**Figure 1**

**Discussion:**

It is well known that the status of the gastrointestinal mucosa influences the outcome of critically ill patients. Enteral feeding increases blood supply to the gut, preserving the gut enterocyte membrane, prevents translocation of bacteria and enhances the immunological defence mechanism. The insertion of these nasogastric tubes is considered a simple blind bedside procedure but this procedure is not free from complications and can be fatal, as these tubes can be malpositioned in to respiratory tract or central nervous system. As we discuss below.

**Indications for nasogastric tube (NGT) insertion:**

There is a wide range of indications for the nasogastric tube (NGT) insertion, from gastric decompression to enteral feeding.

**Epidemiology:**

Reported complications of NGT insertion range from 0.3 to 8%. The incidence of NGT malpositioning into the tracheobronchial tree is up to 2%.

**Various sites of malpositioning:**

NGT can be malpositioned into tracheo-pulmonary tree, intravascular penetrations, into an aberrant right subclavian or right internal jugular vein or intracranial malpositioning.

**Risk factors for malpositioning:**

1. Patients with decreased level of consciousness.
2. Intubation and tracheostomy.
3. Stylet/guide wire stiffened fine bore nasoenteric tubes, if easily squeeze, pass the low pressure cuffs.
4. Placement of NGT to its full length.
5. Absent cough and swallowing reflexes.

In patients on invasive ventilation, after blind insertion of NGT a leak and decrease in tidal volume or repeated filling of NGT draining bag with air is high risk indicator of malposition of the NGT.

**NGT insertion methods:**

There are various methods described for insertion of NGT.

1. Blind NGT insertion. This is the most commonly practised method of NGT insertion. After application of lubricant NGT is passed horizontally, through the floor of nasal cavity, along the most patent nostril and when the NGT has reached the back of the throat, a gentle push advances it further; if the patient is awake, a request to swallow and gradual pushing should take it to the stomach without any resistance. In an adult the distance travelled to reach the stomach is usually 50-60 cm from the incisor teeth. As this procedure is blind, it carries the maximum risk of malpositioning.

2. In the two-step insertion method; initially the NGT is inserted for up to 30 cm, then after X-ray of the chest the tube is pushed up to 50 cm and its position confirmed by a second X-ray. The advantage is it will prevent malpositioning of NGT but as two X-rays are needed the patient is exposed to more radiation.

3. Capnography: After insertion of 30 cms of NGT will detect sufficient carbon dioxide to indicate tracheo-bronchial malpositioning of the NGT. If carbon-dioxide is not detected the NGT can be pushed further to the 50 cms level. If the stomach is full of air, the capnometer may show a false high value.

4. Endoscopic placement is more useful in patients with gastro- paresis or elderly patients in whom NGT insertion is difficult or nasojejunal placement is needed.
Confirmation of the proper NGT position:

All the traditional ways of confirming the NGT position are neither reliable nor sensitive. The underwater bubbling to locate the pulmonary placement may be misleading if NGT malpositioned into the tracheo-bronchial tree and may not show bubbles if it is blocked with a mucus plug. In the other traditional way of checking the NGT position by air insufflation and auscultation in the epigastric area, the abdomino-thoracic transmission of air sound can give an equally audible sound even if NGT is malpositioned into the respiratory system. Air insufflation can be dangerous if the NGT is malpositioned into the intravascular compartment; hence insufflation is not recommended unless intravascular placement is ruled-out. Aspiration of the gastric content or blood in upper gastrointestinal bleeding patients after insertion of NGT strongly indicates the correct position but esophageal or refluxed gastric contents can be aspirated giving false positivity of the correct position. Measuring pH and bilirubin from the NGT aspirate; a pH of less than 5 and bilirubin of less than 5 milligram/dl will confirm up to 80% of gastric tube placement but in a significant number of patients, due to aspiration of gastric content or use of H2 receptor blockers/proton pump inhibitors. This will give false results. Capnometery can favorably confirm the correct position of NGT but there is little comment in the literature of its use after insertion of large bore NGT. X-ray of the chest is the gold standard for confirmation of correct position/proper placement of an NGT. Visualization of NGT below the diaphragm, in the area of stomach will confirm the tip in the correct position. In all patients who need NGT medications or enteral feeding, proper position/placement of NGT must be confirmed by x-ray. 

Complications:

Complications of NGT are either local or due to malposition; esophageal perforation, submucosal placement, breakage and knotting. Aspiration pneumonia, lung abscess, pneumothorax, emphysema and sepsis due to malpositioning of NGT in to the respiratory tract, erosion of vessel and hemorrhage if intravascular position and central nervous system complication if intracranial malposition.

Conclusion:

Nasogastric feeding tube insertion is not a simple procedure and it can have serious complications, particularly due to malposition. Knowledge about malposition and early detection will prevent complications. X-ray confirmation is the gold standard of proper NGT placement.

References: