# Respiratory insufficiency with pneumonia following improper gastric tube insertion into the right bronchus

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Blind placement of gastric tubes is commonly done at the bedside, and is associated with significant risk. Inadvertent placement of gastric tubes into the lungs may lead to some dreaded and serious complications including intrapulmonary infusion of fluids, pneumothorax, pneumonitis, hydropneumothorax, bronchopleural fistula, empyema, and pulmonary hemorrhage. Although the reported frequency of inadvertent airway gastric tube placement varies from 1% to 15%, clinicians agree that the associated complications may result in increases in mortality, morbidity, cost and length of hospital stay, and are to be avoided [1].

In this report, we would like to present a case of respiratory insufficiency with pneumonia following improper gastric tube insertion into the right bronchus and active carbon administration.

On the day of admittance, in the morning hours, the patient (a 43-year-old prisoner) was brought by ambulance to the local Emergency and Rescue (ER) Department from a prison, with suspected drug intoxication with an unknown substance.

In the ER, the patient was unconscious but with both respiration and circulation fully sufficient, and a directional reaction to pain stimuli. On auscultation, numerous disseminated rhonchi, more pronounced on the left side, were heard. The patient was intubated (using thiopental and suxamethonium), and the gastric tube was placed, with subsequent gastric lavage. A pus-like fluid was extracted from the tracheal tube using suction; chest X-ray was performed to exclude pneumonia. As the patient's general condition improved, he regained full consciousness, and with spontaneous breathing the tracheal tube proved unnecessary, which resulted in extubation (within approximately 30 min). The gastric tube was removed as well, but due to bronchial spasm, salbutamol nebulization was initiated, with further improvement of the general condition. Toxicological analyses were performed from urine and blood samples. At this stage, the patient was mentally labile, with pronounced anxiety and non-compliance with medical personnel requests, and was often verbally offensive. Two hours after admittance to the ER, toxicological analysis revealed high (toxic) levels of carbamazepine and phenothiazine, resulting in the introduction of treatment with activated carbon. A gastric tube (16 F) was placed again through the nasal cavity; however, this time the patient was fully conscious.

Correct placement of the tube was confirmed by the physician who placed the tube, and by the assisting nurse. For this purpose the patient twice was auscultated over the epigastric region, both by the physician and the nurse. With no doubts regarding tube placement, carbon administration was initiated, but after approximately 10 ml of the solution was given, intensive coughing was observed. The procedure was aborted, and the gastric tube was removed immediately and replaced, with no resistance noted. Tube placement was ascertained on auscultation again, with subsequent administration of 10 ml 0.9% NaCl. As no extensive agitation or coughing was noted during either tube placement or test dose administration, treatment with a full dose of active carbon was implemented, with no adverse reactions. In the chest X-ray performed after carbon administration, massive airless and probably inflammatory foci were found in the middle and lower right lung lobes, while less pronounced lesions were present in the lower left lobe. Four hours later, an experienced consulting anesthesiologist examined the patient; his general condition was described as satisfactory, and midazolam and diazepam in fractioned doses were given to reduce anxiety.

In the late afternoon hours of the same day (several hours after the mistaken active carbon administration), increasing respiratory insufficiency was observed. The ER physician on duty observed progression of auscultatory abnormalities with predominance of right-sided rales (while in the morning left-sided symptoms were more pronounced). The patient was qualified for further treatment in the intensive care unit (ICU).

On admittance to the ICU, the patient was conscious but with no logical verbal contact; no neurological deficits were found on general examination, except for symmetrical, pinpoint pupils. Spontaneous breathing on the verge of respiratory insufficiency was observed; therefore bag-valve-mask aided ventilation and oxygen supplementation were started. Baseline arterial oxygen saturation was 87%. On auscultation, disseminated right-sided rales and crepitations over the right lung base were found, with less pronounced left-sided abnormalities. The patient was intubated using the Sellick maneuver as the laryngeal orifice was covered with carbon solution, and mechanical ventilation was introduced. In bronchoscopy it was found that the gastric tube was placed in the right main bronchus, which was filled with the active carbon solution. The tube was removed along with the carbon solution and the right bronchus was irrigated. Within the next three days, the clinical condition of the patient gradually improved, with extubation after 4 days of mechanical ventilation. Full respiratory and circulatory sufficiency was achieved, but despite adequate arterial oxygen saturation, disseminated rhonchi prevailed, more pronounced over the right lung. After 6 days of intensive treatment, the patient was transferred to the General Internal Diseases Unit with no lung abnormalities detected on auscultation.

In the presented case, an inadequately placed gastric tube with failure to detect the mistake and active carbon administration were the immediate causes of the patient's general deterioration and respiratory insufficiency. The consultant radiologist did not diagnose the improper placement of the gastric tube in the chest X-ray, while the ER physician did not have access to the film, but only to the written result. These factors were indirectly responsible for the delay in the final verification. Additionally, the patient's good general condition with no cough – plausibly as an effect of previously applied sedatives – proved to be further misleading. Moreover, prisoners are usually difficult to diagnose, since they frequently conceal their symptoms and/or have a higher tolerance to drugs because of their overuse. The mistake was discovered approximately 8 h after the initial chest X-ray, during bronchofiberoscopy, when right-sided atelectasis and local pneumonia became apparent.

According to guidelines outlining the proper verification of gastric tube placement, X-ray based confirmation (consisting of chest and abdominal X-rays) is optimal [2–4]. However, capnometry (capnography) is much faster, less labor-intensive and less invasive to the patient compared to a radiological examination and hence should be performed immediately after tube placement [5, 6].

Auscultation of air in the stomach has been classically used to confirm placement, but air infused into the pleural space can just as easily be heard over the upper abdomen [7]. Additional tests may include aspiration of pleural fluid. A pH below 4.0 is characteristic for proper gastric placement of the tube [8, 9]. However, this test is inappropriate in patients who are administered antacids and many of such subjects are treated in ICUs. Other diagnostic possibilities include fluoroscopy, endoscopy and direct visualization of the tube [10], but all these procedures are relatively complicated, time-consuming, and cost-prohibitive to verify the proper placement of the gastric tube.

## References

1. Burns SM, Carpenter R, Blevins C, et al. Detection of inadvertent airway intubation during gastric tube insertion: capnography versus colorimetric carbon dioxide detector. Am J Crit Care 2006; 15: 188-95.
2. Bell L. Determining the correct placement of gastric tubes. Am J Crit Care 2007; 16: 551.
3. Elpern EH, Killeen K, Talla E, Perez G, Gurka D. Capnometry and air insufflation for assessing initial placement of gastric tubes. Am J Crit Care 2007; 16: 544-9.

4. Metheny NA. Preventing respiratory complications of tube feedings: evidence-based practice. Am J Crit Care 2006; 15: 360-9.
5. Araujo-Preza CE, Melhado ME, Gutierrez FJ, Maniatis T, Castellano MA. Use of capnometry to verify feeding tube placement. Crit Care Med 2002; 30: 2255-9.
6. Kindopp AS, Drover JW, Heyland DK. Capnography confirms correct feeding tube placement in intensive care unit patients. Can J Anaesth 2001; 48: 705-10.
7. Leschke RR. Nosogastric intubation. In: Emergency medicine procedures. Reichman EF, Simon RR (eds.). McGraw-Hill, New York 2004; 413-9.
8. Metheny NA, Meert KL, Clouse RE. Complications related to feeding tube placement. Curr Opin Gastroenterol 2007; 23: 178-82.
9. Kawati R, Rubertsson S. Malpositioning of fine bore feeding tube: a serious complication. Acta Anaesthesiol Scand 2005; 49: 58-61.
10. Howes DW, Shelley ES, Pickett W. Colorimetric carbon dioxide detector to determine accidental tracheal feeding tube placement. Can J Anaesth 2005; 52: 428-32.