Intrapleural displacement of a nasogastric tube in an immuno-compromised patient

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Abstract. A 33-year-old immuno-compromised patient was admitted to the Intensive Care Unit with respiratory failure necessitating mechanical ventilation. Two days earlier a small-bore nasogastric tube had been positioned and enteral feeding started. Not until the following day did the patient, who was fully conscious, complain about chest pain, dyspnoea and cough. A chest X-ray showed consolidations in the right lung. The nasogastric tube was visible but had initially remained unrecognized. Bronchoscopy showed the displacement of the nasogastric tube between the vocal cords and it was immediately removed. No artificial food was seen in the bronchial tree. Pleural drainage revealed purulent fluid, containing artificial food. Despite maximal support the patient died as a consequence of multi-organ failure. In conclusion, displacement of a nasogastric tube can be potentially dangerous. The routine procedures for checking the correct position are not fully reliable.

Introduction
The use of nasogastric tubes to administer nutrition is common [1]. With the advent of flexible polyurethane tubes, their positioning and usage has become more practical and more comfortable than before, and they are generally placed by nursing staff [2]. A rare but potentially life-threatening complication occurs when the tube becomes displaced, particularly if a small-bore tube with a metal guidewire is used. [3]. Although positioning in the airways is generally accompanied by clear clinical symptoms such as cough and dyspnoea, correct positioning of the tube needs to be checked according to guidelines [4]. We describe a case in which a nasogastric tube was wrongly positioned in an immuno-compromised patient.

Case
A 33-year-old woman was admitted to the Intensive Care Unit (ICU) at Twenteborg Hospital with respiratory failure. Two days earlier she had been admitted to the Department of Internal Medicine with progressive weight loss, dyspnoea, and cough in combination with fever and neutropenia.

Her medical history revealed severe active Crohn’s disease, which was treated with 6-mercaptopurine and budesonide (Entocort). Treatment with broad-spectrum antibiotics (amoxicillin clavulanate and gentamycin), in combination with an antiviral drug (acyclovir) and an antifungal drug (fluconazole) had been started after blood cultures had been taken.

Because of poor food intake and progressive weight loss a small-bore nasogastric tube was positioned by a qualified nurse and in accordance with our hospital guidelines, and enteral feeding was started. After the tube had been introduced, its position was checked by auscultation of the epigastric region during insufflation of air. The normal well-known bubbling sounds were heard. It was not until the following day that the patient, who was fully conscious, complained about chest pain, dyspnoea and cough. A chest X-ray showed consolidations in the right lung. The nasogastric tube was visible but had initially remained unrecognized. Bronchoscopy showed the displacement of the nasogastric tube between the vocal cords and it was immediately removed. No artificial food was seen in the bronchial tree. Pleural drainage revealed purulent fluid, containing artificial food. Despite maximal support the patient died as a consequence of multi-organ failure. In conclusion, displacement of a nasogastric tube can be potentially dangerous. The routine procedures for checking the correct position are not fully reliable.

Discussion
Because of the immuno-compromised status of the patient, treatment was kept as conservative as possible. Therefore, in the first instance, admission to the ICU was avoided in order to minimize the risk of infection. In addition even after admission to the ICU seemed inevitable, we tried to avoid intubation because of its known high mortality in immuno-compromised patients. Furthermore, placement of the epidural catheter and administration of pain medication most likely attributed to the “doctors’ delay”. The lack of immediate clinical signs after the displacement of the tube led to a further delay in the diagnostic procedure. One would expect a pneumothorax to develop immediately after the tube had been positioned in the pleural cavity, causing progressive dyspnoea. After the tube had been placed its position was checked by auscultation of the epigastric region during insufflation of air. Despite the incorrect positioning of the tube, the known bubbling sounds were heard. Apparently thoraco-abdominal sounds can be misinterpreted and this method is not reliable [1, 6]. In addition this case shows that even a routinely performed chest X-ray is not, on its own, reliable enough to detect such a complication. A recent study has shown that the sensitivity and specificity of different test methods for the correct positioning of a nasogastric tube such as insufflation of air, suctioning of gastric fluid or pH-measurement of gastric fluid are all low. A combination of these methods does not increase their reliability [6].

Different reports show that about 30% of displaced nasogastric tubes are not recognized on a routinely performed chest X-ray [7, 8]. An important factor was the lack of explicit questioning regarding the position of the tube on the chest X-ray. The chest X-ray was viewed on a computer screen on the clinical unit which is not suitable for the evaluation of fine details. Taking both frontal and lateral chest X-ray views would be a better method to detect the displaced nasal gastric tube [9].

Retrospectively the sudden appearance of extended areas of consolidation on the chest X-ray should have led to the thought that fluid could be present in the pleural cavity. Since the patient was neutropenic she was not able to develop infiltrates quickly. We do not support the placement of nasogastric tubes under direct vision only because of the fact that such procedures are equally invasive, and therefore not without risk in immuno-compromised patients.

In conclusion, displacement of a nasogastric tube in immuno-compromised patients is a potentially lethal complication which appears not to be fully preventable by using the present means of checking correct positioning. Therefore we would plead for a frontal as well as lateral chest X-ray with explicit attention being paid to the correct positioning of the tube before enteral feeding is started.

**Keywords:** intrapleural displacement, nasogastric tube, immuno-compromised

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**References**