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Case Report

Malposition of a nasogastric feeding tube into the right pleural space of a poststroke patient ☆☆☆

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ABSTRACT

Nasogastric feeding tube plays an important role in administering enteral feeding and drug delivery for poststroke patients with consciousness disorders or poststroke dysphagia. Nevertheless, placement of nasogastric tubes is not without any risk of potential harm. Inadvertent malposition into the trachea or the distal tracheobronchial tree could induce severe pulmonary complications. As for poststroke patients with long-term dysphoria, such tubes have to be replaced periodically to prevent the overdue service of the tubes. Therefore, the risk of feeding tube misplacement into pulmonary system for these patients is increased. Here, we present a case of a 79-year-old poststroke patient with hydropneumothorax induced by malposition of nasogastric tube into the right pleura after routine replacement, accompanied by acute anterior wall myocardial infarction.

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Introduction

According to data from the systematic analysis of the Global Burden of Disease, stroke has become a life-threatening disease with high mortality and disability, causing great pressure on stroke patients, their families and societies [1]. A large number of stroke survivors suffer from consciousness disorders or poststroke dysphagia [2], depending on

feeding tubes to provide nutritional supplementation and drug administration.

The swallowing movement resulting in the closure of epiglottis will aid the placement procedure. However, due to damaged function of deglutition or harmed consciousness, these poststroke patients have poor ability to cooperate during the insertion process of feeding tubes. In addition, the cough reflex of such stroke survivors is reduced or absent. Therefore, the likelihood of tubes inadvertently inserting into

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the trachea becomes higher. The subsequent drug administration and nutrition infusion could be disastrous with great danger and even death to the patients. Pulmonary complications, which occur in approximately 1.2%-2.4%, induced by malposition of nasogastric tubes into the tracheobronchial tree include tracheal perforation, pneumothorax, pneumonia, pulmonary abscess and even severe acute respiratory distress syndrome [3–5].

Here we present a case about a routine replacement of the nasogastric tube of an old woman with a history of cerebral infarction, leading to a series of disastrous events.

Case report

A 79-year-old woman presented to emergency department (ED) of our hospital with dysphoria about 4 hours after the very last replacement of her nasogastric tube in local hospital. Her medical history included hypertension for 20 years, coronary artery disease for 5 years and cerebral infarction 8 months ago, leaving dysphagia for which she had to depend on feeding tube to provide enteral nutrition and administration of medications.

Complaints of dysphoria but no cough during the insertion procedure were reported at first. After returning home, her dysphoria sustained and became more serious which eventually caused her fall off bed. Immediately by ambulance she was transferred to ED of our hospital. Once admitted to ED, heart rate, respiration frequency, blood pressure and pulse oxygen saturation were examined with values of 125 min^{-1} , 24 min^{-1} , 148/66 mmHg, and 92%, respectively. Slight decrease in consciousness and sustained dysphoria were observed by physical examination. Subsequent electrocardiogram showed ST segment elevation in V3 V4 V5 leads. Myocardial injury markers were found elevated with troponin I 2.47 ng/mL, myoglobin 210 ng/mL, CK-MB 17.5 ng/mL, respectively. Type B natriuretic peptide was normal with value of 183.0 pg/mL. Bedside cardiac ultrasound suggested abnormal segmental movement of the left ventricle. Therefore, acute anterior wall myocardial infarction was diagnosed. And the patient was further transferred to intensive care unit. Considering the medical condition of the patient, her family refused the cardiologist's recommendation of percutaneous coronary intervention and preferred conservative treatment.

In consideration of the patient's history of fall from bed, computed tomography scan of the whole body was performed to exclude fracture or severe visceral hemorrhage, especially intracranial hemorrhage before administration of anti-platelet aggregation with Aspirin, Clopidogrel and subcutaneous injection of low molecular weight heparin. Neither fracture nor severe visceral hemorrhage was found. However, the right hydropneumothorax with the right lung compressed by about 50% and the misplaced nasogastric tube into the right pleural cavity were accidentally found out (Figs. 1-3). Removal of the tube and thoracic cavity closed drainage were immediately performed. A new nasogastric tube was reinserted for the oral medication and enteral nutrition, confirmed by bedside anteroposterior chest radiography (Fig. 4).



Fig. 1 – The white arrow shows the misplaced nasogastric tube into the right lung.

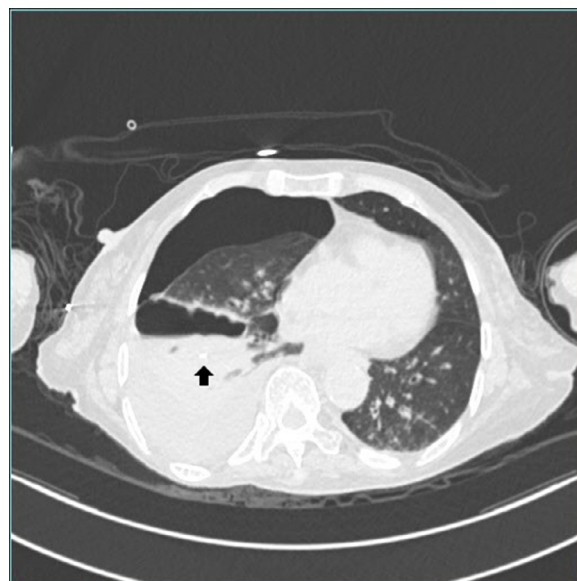


Fig. 2 – Hydropneumothorax shown in lung settings with the black arrow pointing to the misplaced nasogastric tube.

About 10 hours after admission, the patient's vital signs developed unstable, presenting with cardiac pump failure, showing heart rate of 140 min^{-1} pulse, oxygen saturation 89% (nasal catheter for oxygen 5 L/min), blood pressure 80/55 mmHg. Treatment was immediately initiated with fluid resuscitation and vasopressors. Successfully, the patient's vital signs became stable again. Afterwards, myocardial injury markers were reexamined with troponin I 19.29 ng/mL, myoglobin 1468.2 ng/mL, CK-MB 15.5 ng/mL, respectively. Type B natriuretic peptide was extremely elevated with value of 3326.0 pg/mL.



Fig. 3 – Coronal reformation of the chest computed tomography, demonstrating the full length of the nasogastric tube into the right pleural cavity.

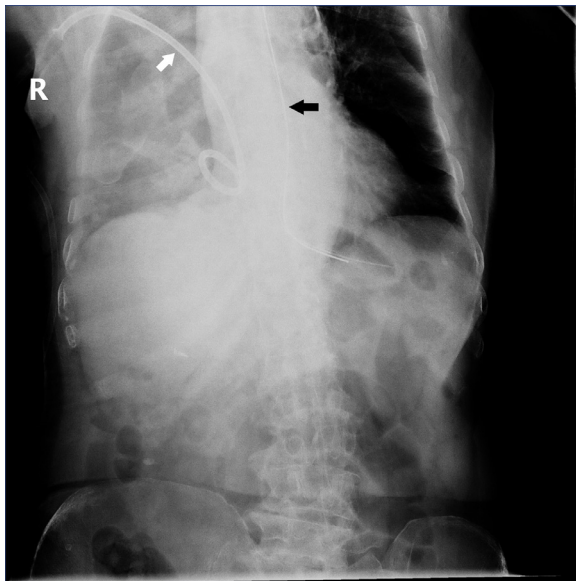


Fig. 4 – The white arrow indicating pleural drainage tube, the black arrow showing the new reinserted nasogastric tube, confirmed by bedside anteroposterior chest radiography.

On the 2nd day after admission to ICU, the patient developed severe cardiogenic shock. With efforts of up-turning of vasopressors and fluid resuscitation, her blood pressure still declined progressively. Eventually, the patient died despite cardiopulmonary resuscitation.

Discussion

Over the last few decades, due to changes of lifestyles and aging of populations, chronic noncommunicable diseases have become major global health problems, with stroke being the second leading cause of disability and death worldwide [6]. Life quality of quite a number of poststroke patients is seriously affected by long-term swallowing difficulty, requiring methods for ensuring proper intake of food, water and medicine. So far, nasogastric, nasointestinal, gastrostomy, and jejunostomy tubes play important roles in administering enteral feeding and drug delivery. There are different kinds of advantages and disadvantages of these methods [7], among which nasogastric tube is frequently and widely applied in clinical practice.

Nevertheless, placement process of nasogastric tubes into patients is not without any potential harm. To date, there have been lots of reports about pulmonary complications induced by nasogastric tube misplacement, such as tracheal perforation, pleural perforation, pneumothorax, bronchopleural fistula, pulmonary infection, pulmonary empyema, and acute respiratory distress syndrome [3–5]. A retrospective study over an 18-month period by McWey et al. [4] reported 14 malpositions out of 1100 nasoenteric tubes insertions, amounting to an occurrence of 1.3% of malpositioning. Amongst the 14 cases of malpositions, 13 caused pulmonary complications, eg, pneumothorax, hydrothorax, pneumonia, and empyema, with 1 case of nonpulmonary complication presenting as an esophageal perforation at gastroesophageal junction. With the development of soft, small-bore, properly tipped feeding tubes, the incidence of malpositioning has decreased to some extent. Nevertheless, inadvertent malposition into the trachea or the distal tracheobronchial tree from blind bedside placement still occurs now and then.

As far as dysphagic poststroke patients with long-term indwelling nasogastric feeding tubes are concerned, such tubes have to be replaced periodically, in order to prevent the overdue service of the tubes, which could probably lead to gastrointestinal infection caused by feeding nutriment remains in the nasogastric tube cavity or tube clogging or unilateral nasopharyngeal mucosa edema and ulcer. Therefore, the risk of feeding tube misplacement into pulmonary system for these patients is increased. The patient in our case report had a past medical history of cerebral infarction 8 months ago. Afterwards, long-term enteral nutritional support through nasogastric tube was required due to her residual pharyngeal dysphagia. Disastrous tragedy from replacement of nasogastric tube arose with hydropneumothorax accompanied by acute myocardial infarction, which eventually resulting in cardiogenic shock and death of the patient.

Since serious complications can be caused by inadvertently misplaced nasogastric tubes into the tracheobronchial tract, and enteral feeding and drug administration through such tubes can furthermore induce more severe complications or even death, it is of vital importance to confirm the position of a nasogastric tube prior to feeding or drugs delivery. There are certain methods employed to ascertain the position of an inserted nasogastric tube, including auscultation, radiography, ultrasonography, capnography, and pH testing of

aspirate drawing from the tube. It is also indicated that using an electromagnetic device to confirm the location of feeding tubes is of tremendous value [8]. However, postprocedural radiographic examination is considered to be the gold standard [9]. In our case, malposition of the nasogastric tube causing hydropneumothorax of the patient was ascertained by computed tomography scan, the position of her new reinserted nasogastric tube was confirmed by bedside anteroposterior chest radiography.

It is worth noting that the patient in our case encountered acute myocardial infarction besides hydropneumothorax. Is there any relationship between myocardial accident and malposition of her feeding tube into the right pleural cavity? We performed a literature search, finding out there have been few reports linking nasogastric tube insertion with myocardial events. Doshi VS presented two cases of myocardial infarction after successful nasogastric tube placement [10]. It was speculated that nasogastric tube insertion may induce sympathetic and parasympathetic responses and coronary spasm, which could be harmful to patients with ischemic cardiomyopathy. The elderly patient presented in our case had multiple comorbidities, including hypertension, cerebral infarction, and especially coronary artery disease, causing her predisposition of myocardial ischemia or even myocardial infarction during nasogastric tube insertion. The malposition into trachea and distal tracheobronchial tree and then into pleural cavity could probably induce more severe hemodynamic changes. However, there is no certain conclusion about such relationship. It requires more data to conclude whether nasogastric tube placement or malposition of the tube could precipitate myocardial injury or not.

Conclusion

The difference of our case from others' is that it occurred upon a transferred patient from other medical institution with a newly inserted feeding tube for some certain complaints, but it turned out the newly inserted nasogastric tube probably should take full responsibility of the series of disastrous events. Therefore, as to a transferred patient with a feeding tube inserted outside of our hospital, we should be alert that the present complaints of the transferred patient might have

something to do with the nutritional tube. With the lesson drawn from our case, it is suggested that we should not simply take it for granted that the tube brought along with a transferred patient is just in right place, unless we obtain imaging data.

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