

Case Report

Repeated lung lavage with extracorporeal membrane oxygenation treating severe acute respiratory distress syndrome due to nasogastric tube malposition for enteral nutrition: a case report

Xiaoming Kao MS, Wenkui Yu MD, Weiming Zhu MD, Ning Li MD, Jieshou Li MD

Research Institute of General Surgery, Department of General Surgery, Jinling Hospital, Medical School, Nanjing University, Nanjing, China

Enteral nutritional support, a frequently applied technique for providing nutrition and energy, played a pivotal role in the treatment of high risk patients. However, severe complications induced by malposition of nasogastric tube caused great danger and even death to the patients. In this case report, we present a patient with severe acute respiratory distress syndrome (ARDS) induced by bronchopleural fistula (BPF) due to malposition of nasogastric tube. Repeated lung lavage combined with extracorporeal membrane oxygenation (ECMO) was performed after transferring to the ICU of our hospital. Finally, the patient recovered and discharged 7 days after admission.

Key Words: enteral nutritional support, acute respiratory distress syndrome, extracorporeal membrane oxygenation, nasogastric tube malposition, bronchopleural fistula

INTRODUCTION

Enteral nutritional support, a procedure for providing energy and nutrition to high risk patients is frequently applied in clinical practices as it forms a protective barrier for intestinal mucosa and prevents intestinal infection. As we know, complications including occlusion, abdominal distension, diarrhea, metabolic hyperglycemia and respiratory complications were noted after enteral feeding, among which respiratory complication (e.g. severe acute respiratory distress syndrome) is of great danger to patients with a high death rate.^{1,2} To date, frequently used methods for administering enteral feeding is through the nasogastric tube, nasointestinal tube and intestinal stoma, among which nasogastric tube is easy to perform, and is frequently used in clinical applications.³ However, serious pulmonary complications were frequently induced by malposition of nasogastric tubes.^{4,5} These complications, even those that were not severe, may lead to death if inappropriate interferences were given. We present a patient with severe acute respiratory distress syndrome (ARDS) caused by malposition of a nasogastric tube that resulted in large amounts of fluids infused into the thoracic cavity.

CASE PRESENTATION

A 67-year-old male patient received enteral nutritional support outside of our hospital due to ulcerative colitis. Peptisorb enteral nutritional suspension was injected via nasogastric tube (osmotic pressure: 440mOsmol/L, pH-4.0). The rate of the tube feeding was set at 50ml/h. Complaints of mild chest pain and cough were reported at first. About 17 h after tube feeding, severe cough (yellow

liquid was spit) together with respiratory distress was observed. Thus, the patient was transferred to the intensive care unit (ICU) of our hospital.

Once admitted to the ICU, heart rate (HR), respiration frequency and pulse oxygen saturation were examined with values of 145min⁻¹, 40min⁻¹ and 80%, respectively. Immediate mechanical ventilation via respirator was given. As the patient was spitting yellow liquid when coughing, bronchoscopy was performed, which indicated that enteral nutrition fluid infused into the pulmonary bronchus. Lung lavage was performed, after which the yellow-colored fluid (containing enteral nutrition) was drawn out from pulmonary bronchus. As consecutive decrease of pulse oxygen saturation (<80%) was observed during lung lavage, so it was stopped. After that, blood gas analysis (BGA) was performed (pH: 7.431; PO₂: 67.1 mmHg; PCO₂: 34.7 mmHg; Lac: 4.1 mmol/L; oxygenation index: 67). Chest X-ray indicated pulmonary inflammation and pleural effusion (Figure 1). Even though repeated mechanical ventilation plus subsequent lung lavage was performed, the pulse oxygen saturation was still decreasing. Progressive and severe hypoxemia still existed after mechanical ventilation. On this occasion,

Corresponding Author: Wenkui Yu, Research Institute of General Surgery, Department of General Surgery, Jinling Hospital, Medical School, Nanjing University, 305 East Zhongshan Road, Nanjing, 210002 China.

Tel: +86-02580863336; Fax: +86-02584803956.

Email: kaomiaoming@126.com

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Figure 1. Chest X-ray indicated severe pleural effusion in the right thoracic cavity after thoracentesis and drainage.

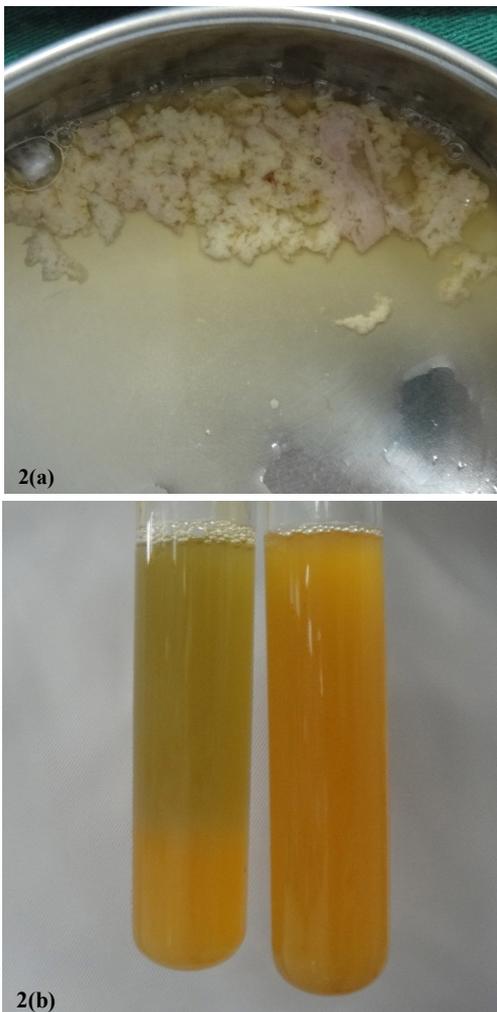


Figure 2. (a): White precipitate in the yellowish fluid were detected after thoracentesis and drainage; (b): The yellowish fluid turned into blue after adding iodine solution.

extracorporeal membrane oxygenation (ECMO) was performed with a flow rate of 3.0-3.5 L/min and oxygen flow rate of 3 L/min to maintain suitable pulse oxygen saturation. After pulse oxygen saturation was maintained at a level of ~ 98%, lung lavage via bronchoscopy was performed again. Combination of lung lavage (twice a day, 200 ml physiological saline each time), anti-infection therapy, glucocorticoid administration and parenteral nutrition support was administrated.

Once pulse oxygen saturation was maintained within the normal range, thoracentesis and drainage was performed to eliminate pleural effusion. Then white precipitate was noted in the yellowish fluid (Figure 2A), which turned into blue after adding iodine solution (Figure 2B). After pleural effusion was eliminated, significant improvement in pulmonary function was noted. About 45 hours later, ECMO was stopped. Twenty-four hours later, the respirator was removed. BGA result was (PH: 7.424; PO₂: 106 mmHg; PCO₂: 30.4 mmHg; Lac: 1.2 mmol/L; Oxygenation index: 312). The patient was discharged 7 days after regaining normal pulmonary function.

DISCUSSION

It has been reported that malposition of nasogastric tube can induce major bronchial injury,⁶ pneumothorax, bronchopleural fistula (BPF),⁷ tracheal perforation, pleural perforation, perforation of esophagus, pulmonary infection, empyema and even death.^{8,9} A review of more than 2,000 small-bore nasogastric feeding tube insertions over 4 years indicated 50 radiographically confirmed malpositions for an overall incidence of 1.3% to 2.4%. More than half of these patients were endotracheally intubated, only 2 patients showed normal mental status. Thirteen patients were noted with complications that were directly caused by malposition of nasogastric tube, including 2 deaths¹⁰. In a retrospective study, McWey reported an occurrence of 1.3% among the 1100 subjects with malposition of nasogastric tube caused complications, e.g. pulmonary infection, pneumothorax and BPF.¹¹

In 1978, a case report of James RH indicated that one patient died from acute pulmonary edema as nutrition infused into pleural cavity via mediastinum. Even though extubation was performed as malposition of nasogastric tube was confirmed by chest X-ray, the patient died 10 weeks after treatment.¹² Another study reported that 3 patients received enteral nutrition support were observed with BPF caused by malposition of nasogastric tube.¹³ Then thoracentesis and drainage was performed, followed by removal of nasogastric tube. All of them discharged 2 days after extubation. No death and/or complications after discharge were reported. Tiziano De Giacomo *et al.* report that a patient with malposition of nasogastric tube recovered 2 days after thoracentesis and drainage, followed by removal of nasogastric tube.¹⁴ In this report, the patient showed BPF due to malposition of nasogastric tube. At first, the patient complained of slight dyspnea. However, his condition deteriorated as a large amount of fluid infused into thoracic cavity. A great amount of Peptisorb enteral nutritional suspension from the pleural cavity infused into pulmonary bronchus through the pleural fistula, which eventually induced severe ARDS. For patients with similar clinical conditions, we advocated gastrointestinal decompression via thoracentesis and drainage should be considered first for the sake of patient safety, followed by corresponding treatment for BPF.

Extracorporeal membrane oxygenation has been reported for the treatment of severe ARDS which could not be treated by conventional methods. Timothy and Andrew reported a patient with ARDS (caused by inhalation of vomit into the lungs) who was treated with VV-ECMO and bronchoalveolar lavage.¹⁵ Removal of the feed that

has infused into the pulmonary bronchus is of prime importance in this report. As it was hard to maintain suitable oxygen saturation during the lavage, ECMO was applied in this case. Our treatment plan can reduce the treatment course of the patient, decrease requirement for ventilator, and avoid the ventilator induced lung injury.

In this case report, we presented a patient with severe ARDS induced by malposition of nasogastric tube. We concluded our clinical experiences as follows. For those with severe chest pain and dyspnea after insertion of nasogastric tube, firstly, BPF should be identified. Once BPF was identified, thoracentesis and drainage should be performed to eliminate the pleural effusion. Additionally, we presented a successful case of repeated lung lavage with ECMO for the elimination of the nutritional liquid infused into pulmonary bronchus, followed by thoracentesis and drainage. The patient was discharged with satisfactory outcome.

AUTHOR DISCLOSURES

All the authors declare that they have no competing interests.

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肺灌洗联合体外膜氧合治疗置管错位引发的急性呼吸窘迫综合征：病例研究

肠内营养支持可为重症患者提供营养与能量支持，在临床领域广泛应用。但因置管错位导致的并发症常危及患者生命安全。本文报道一例因置管错位导致胸膜瘘，并最终引发急性呼吸窘迫综合征的病例。患者入院后，行肺灌洗与体外膜(葉克膜)氧合进行治疗。治疗7天后患者康复出院。

關鍵字：肠内营养支持、急性呼吸窘迫综合征、体外膜氧合、置管错位、胸膜瘘