Successful treatment with one-way endobronchial valve of large air-leakage complicating narrow-bore enteral feeding tube malposition

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Abstract

Tracheopulmonary intubation is the most common misplacement site for narrow-bore feeding tube and it might be associated with severe pleuro-pulmonary complications. A 38-year-old female with a severe bilateral pneumonia and acute respiratory insufficiency was admitted in the ICU, intubated, and mechanically ventilated. Few hours after the insertion of a narrow-bore feeding tube the patient’s oxygen saturation dropped with hypotension and tachycardia. A large left-side hydropneumothorax developed requiring a chest tube. Air-leakage was important and bronchoscopic implant of one-way endobronchial valve was accomplished. Immediate and substantial decrease of air-leakage was observed, and it completely stopped after 5 days; as soon as the patient was extubated. Endobrochial one-way valve, specifically designed for bronchoscopic lung volume reduction, resulted in being safe and effective to control a significant and prolonged air-leakage due to a malposition of a narrow-bore feeding tube.

Keywords: Pneumothorax; Bronchoscopy; Nutrition

1. Introduction

Inappropriate intubation of the tracheopulmonary system by a narrow-bore nasogastric tube is a well-known hazard. This malposition is reported in about 2% of placement attempts with an incidence of major pulmonary complication of 0.7% and mortality of 0.3% of cases [1]. Misplacement in the tracheobronchial tree or in the intrapleural space can cause pneumothorax, pneumonia, empyema, and pulmonary hemorrhage [2]. Most of the cases described in the literature occurred in ICU patients even the in presence of an endotracheal tube with an inflated cuff. Pneumothorax is the most common complication usually resolved with a chest tube drainage, but the persistence of a significant air-leakage might prolong the ICU stay, making the weaning from ventilator difficult, and it may also require a surgical treatment.

This report describes the bronchoscopic control of a significant and prolonged air-leakage, because of malposition of narrow-bore feeding tube, by placing a newly designed airway prosthesis with one-way valve into the corresponding segmental bronchus responsible for air-leakage source.

2. Case report

A 38-year-old female with severe bilateral pneumonia and acute respiratory insufficiency was admitted in the ICU, intubated, and mechanically ventilated. Adequate antibiotic therapy was started. Six days later, while still on the ventilator and lightly sedated, a narrow-bore feeding tube with a wire stylet was inserted through the right nostril without any particular difficulty or resistance. Since malposition was not suspected enteral nutrition was started.

A few hours later, the patient’s oxygen saturation dropped with hypotension and tachycardia. Enteral nutrition was stopped and chest X-ray documented a large left-side hydropneumothorax, immediately treated with a chest tube drainage. The manoeuvre yields the rapid relief of patient’s symptoms. Air-leakage from the chest tube was important and maintained during all the respiratory cycles of the ventilator. The patient underwent chest computed tomography scan (CT-scan) that revealed the nasogastric tube malposition in the left bronchopulmonary system tree, with its tip into the pleural space (Fig. 1). After that the tube was removed. The air-leakage remained significant after 3 days,
and the lung was not completely re-expanded. The respiratory patient’s conditions were not good, and required strong ventilatory support with 80% of oxygen. Fiberoptic bronchoscopy was performed and it allowed to exclude lesions of large size bronchi. In order to understand the possible source of the air-leakage, we occluded first left lobar bronchi inflating a Fogarty balloon catheter, passed through the working channel of the bronchoscope, and then segment by segment monitoring the effect on the air-leakage. We were able to demonstrate that the source was in the territory of the lingula, and one stent with silicon one-way valve (Emphasys Medical, Inc., CA) was placed. An immediate and substantial decrease in the air-leak was obtained. Chest X-ray (Fig. 2) immediately after the procedure demonstrated the complete re-expansion of the lung, and the patient’s oxygen saturation improved rapidly.

The air-leakage stopped completely after 5 days as soon as the patient was extubated and the chest tube removed. The patient completely healed from pneumonitis and was discharged from the hospital. The valve was bronchoscopically removed after 1 month.

3. Discussion

Inappropriate intubation of the tracheopulmonary system by a narrow-bore nasogastric feeding tube is a well-known hazard in ICU patients, and several reports have been published [3].

The presence of an endotracheal tube or a tracheostomy does not prevent this kind of misplacement, as the inflated cuff can modify the normal local anatomy predisposing the patient to the tracheobronchial malposition, as confirmed in different series. where 57%—92% of patients had tracheostomy or endotracheal tube [1,3].

The metal stylet and weighted tip contribute to the rigidity of the feeding tube so that, seeking the path of least resistance, it can advance along the bronchial tree to terminal bronchiole into the parenchyma and through the pleura. Pneumonia, pneumothorax, empyema, pulmonary hemorrhage, and death represent the major complications [2]. Pneumothorax is the most common consequence that can be usually treated with chest tube insertion or it can even be healed spontaneously. When there is a large and persistent air-leakage, this can worsen the clinical conditions of critically ill patients, increasing the respiratory impairment and the risk of infection, delaying the weaning from ventilator. Surgical procedure might be indicated to treat the air-leakage but not always feasible in critical cases. We have used an endobronchial one-way valve, specifically designed for bronchoscopic lung volume reduction [4], to stop the passage of air distally to the lung lesion, but allowing the passage of secretions. The same endobronchial valves have been used for successfull occlusion of a broncho-cutaneous fistula after pulmonary lobectomy [5].

These devices are available in two different sizes and are easy to be placed with a fiberbronchoscope. They are well-tolerated and easily removable if necessary.

References