Case Report
Sealing of tracheoesophageal fistula using a Y stent through fiberoptic bronchoscope during general anesthesia under laryngeal mask airway

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Received September 28, 2014; Accepted December 8, 2014; Epub December 15, 2014; Published December 30, 2014

Abstract: A 64-yr-old man was admitted because of repeated pneumonia. Both fiberoptic bronchoscopy and esophagoscopy revealed a large tracheoesophageal fistula (15 mm) in the right posterior trachea 1 cm beyond the carina. Coated nickel-titanium shape memory alloy Y shaped stent was planned to seal this fistula under general anesthesia. We took advantage of laryngeal mask airway to insert the fiberoptic bronchoscope to guide the stent placement. Our method of sealing a large tracheoesophageal fistula with LMA under total intravenous anesthesia was successful.

Keywords: Tracheoesophageal fistula, fiberoptic bronchoscope, laryngeal mask airway

Introduction

Tracheoesophageal fistulas (TEF) occur as a result of malignant disease such as esophageal cancer and it is difficult to prevent regurgitation via the fistula [1-5]. Anesthesia management for TEF under general anesthesia is difficult and there is no established, definitive strategies. Here we report a case on how to sealing of tracheoesophageal fistula using a coated nickel-titanium shape memory alloy Y shaped stent through fiberoptic bronchoscope during general anesthesia by taking advantage of laryngeal mask airway (LMA). Research Ethics Board (IRB) of West China Hospital Research Ethics Committee, Sichuan University, China approved the whole procedure and a written informed consent was obtained from the patient preoperatively.

Case description

A 64-yr-old man (height 160 cm, weight 43 kg) was admitted to our hospital because of repeated episodes of pneumonia. He has undergone esophageal cancer surgery 4 yr ago. He began to suffer symptoms such as coughing, fever, and dyspnea due to aspiration pneumonia 8 months ago. Both fiberoptic bronchoscopy and esophagoscopy revealed a large tracheoesophageal fistula (15 mm) in the right posterior trachea wall 1 cm beyond carina. A coated Y-shaped stents (Macro-technology Co., Ltd., Nanjing, China, manufactured according to the patient’s anatomy) was planned for sealing this fistula under general anesthesia using fiberoptic bronchoscopy.

Standard monitoring including electrocardiograph, pulse oximeter, capnograph and noninvasive blood pressure monitor were applied to the patient. Atropine 0.25 mg was administered. Patients were pre-oxygenated (FiO₂ = 1.0) for 3 min. Anesthesia was induced with IV injections of midazolam 1 mg, sufentanil 10 µg and propofol target-controlled infusion (TCI). Until plasma concentration for TCI of propofol was 2.0 µg·ml⁻¹, the patient was insert a size 4 classical laryngeal mask airway (LMA, Medical peacekeeping force Co., Ltd., Guangzhou, China) after 60 mg succinylcholine. We confirmed sufficient ventilation was obtained manually through LMA without distension of stomach. Anesthesia was maintained with propofol (TCI concentration
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2.5 $\text{ug} \cdot \text{ml}^{-1}$) and remifentanil 2 $\text{ug} \cdot \text{kg}^{-1} \cdot \text{min}^{-1}$. Then the patient was positioned 15 degree head down, and surgeons were warned of the potential for aspiration and airway obstruction.

Then the fiberoptic bronchoscopy was inserted through the LMA and guide wires were placed into the left and right bronchus. The surgeon removed the bronchoscopy and inserted the stent delivery tube through LMA. Then LMA was removed. Delivery tube pass through the vocal cords guided by bronchoscope through the left naris (Figure 1A). The stent was successfully placed in the trachea and adjusted to its optimal position for sealing the fistula tightly (Figure 1B). It took the surgeon about 2 min to complete the procedure. The patient’s vital signs were stable and were maintained within their normal limits throughout the procedure. The bronchoscope and tube were removed and manual ventilation via a facemask was administered. The patient emergence from anesthesia was uneventful. There was no evidence of aspiration pneumonitis or other pulmonary complications. Two days later, the patient was examined the position of stent which showed the fistula was sealed well. The patient was discharged 1 week later.

Discussion

Esophageal cancer can cause tracheoesophageal fistula which will harm patients’ general condition and threaten their survival. In the present case, we induced general anesthesia under LMA for insertion of a Y stent to seal a large FET.

Anesthetic management for insertion of a Y-stent to seal a large FET is difficult because the patient should be prevent aspiration of esophageal content and diversion of oxygen through the fistula into the stomach from the trachea when patients are under mechanical ventilation. Some researchers occluded the FET using a Fogarty balloon catheter [6-8]. Nakada et al. placed Sengataken-Blakemore tube in the preoperative period [9]. In the present case we did not seal the FET since the patient had not been oral feeding and relied on small bowel feeding tube 1 month before the surgery. Gastric acid inhibitor was administered before sugery and manual ventilation was applied during the anesthesia. The surgery was performed without complications of hypoventilation and hypoxemia throughout the procedure. However, sealing the fistula before anesthesia should be safer, and we later on will try cuffed gastric tube for this kind of patients.

In the present case we took the advantage of LMA to guide fiberoptic bronchoscope and delivery tube which make the whole insertion procedure more smooth. Ford et al reported selective bilateral bronchial intubation for large,
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acquired tracheoesophageal fistula [10]. Some authors inserted endotracheal tube [9, 11]. But during the procedure of placing a stent, LMA will well guide the bronchoscope and delivery tube to the right place so we choose LMA as the airway tool. Mieda et al. demonstrated the stent placement was performed with general anesthesia under spontaneous respiration without any complications [12, 13]. Tusi et al. used high-frequency jet ventilation in the anesthetic management of a patient with tracheoesophageal fistula complicating carcinoma of the esophagus. Anesth Analg 1991; 72: 835-8.

There were some limitation of the present case. Later on we will try to use a cuffed gastric tube to seal the fistula before anesthesia, and use ProSeal Laryngeal Mask Airway (PLMA) since the gastric tube can be placed through PLMA so as to reduce gastric distension and aspiration [14, 15].

Sealing the TEF may present multiple difficulted to both the anesthesiologists and surgeons. We reported a case by advantage LMA to provide more smooth way for the placement of coated nickel-titanium shape memory alloy Y stent with excellent outcome.

Acknowledgements

This work was supported in part by National Natural Science Foundation of China (NSFC 81200865). The funding agency had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript. All authors have no potential conflicts of interest for this work.

Disclosure of conflict of interest

None.

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