Int J Clin Exp Med 2014;7(12):5913-5916
www.ijcem.com /ISSN:1940-5901/IJCEM0002843

Case Report

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

Ling Ye[1*], Pingliang Yang[2*], Yunxia Zuo[1]

Departments of [1]Anesthesiology and Translational Neuroscience Center, [2]Anesthesiology, West China Scond Hospital, Sichuan University, Chengdu 610041, Sichuan Province, P. R. China. [*]Equal contributors.

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 lar-yngeal 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 (FiO_2 = 1.0) for 3 min. Anesthesia was induced with IV injections of midazolam 1 mg, sulfentanil 10 μg and propofol target-controlled infusion (TCI). Until plasma concentration for TCI of propofol was 2.0 ug·ml^{-1}, the patient was insert a size 4 clissical 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

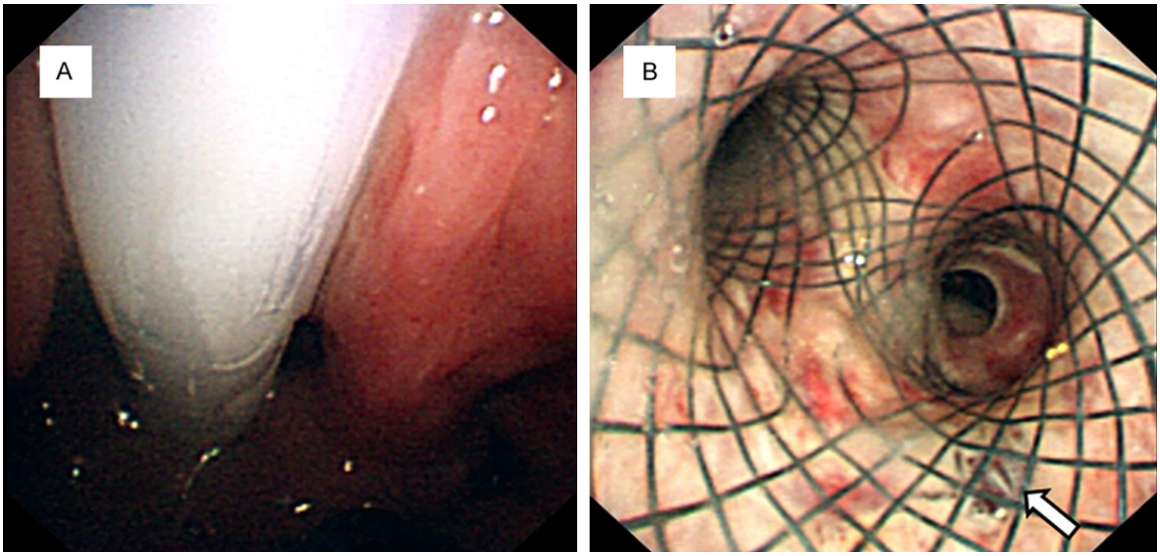

Figure 1. Delivery tube passed through the vorcal cords guided by fiberoptic bronchoscope (A). Whole picture of the stent and Tracheoesophageal Fistula(FET, arrow) after the Y shaped stent has been placed in the optimal position (B).

2.5 ug·ml^{-1}) and remifentanil 2 ug·kg^{-1}·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 dilivery 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 reseachers occuluded the FET using a Fogarty balloon cather [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 sugery. 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 insersion procedure more smooth. Ford et al reported selective bilateral bronchial intubation for large,

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 us-ed high-frequency jet ventilation during srugery to provide adequate ventilation without gas leakage. In our case, we use succinylcholine as the muscle relaxant to make the stent insertion procedure more smooth and save time. Also the use of intraoperative remifentanil and propofol could potentially allow rapid wake up and unevenful postoperative management. Gavin et al [13] showed total intravenous anesthesia ensuring adequate anesthesia depth and pa-tient safety.

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 difficultied 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 81-200865). 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.

Address correspondence to: Ling Ye, Department of Anesthesiology and Translational Neuroscience Center, West China Hospital, Sichuan University, Chengdu 610041, Sichuan Province, P.R. China. Tel: 86-28-85423593; Fax: 86-28-85423593; E-mail: zerodq_hx@163.com

References

[1] Grebenik CR. Anaesthetic management of malignant tracheo-oesophageal fistula. Br J Anaesth 1989; 63: 492-6.

[2] Tsui SL, Lee TW, Chan AS, Lo JR. 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.

[3] Pittoni G, Davia G, Toffoletto F, Giron GP. Spontaneous ventilation and epidural anesthesia in a patient with a large tracheoesophageal fistula and esophageal cancer undergoing colon interposition. Anesthesiology 1993; 79: 855-7.

[4] Langham BT, McLaren IM. Severe airway management problems during insertion of a cuffed oesophageal stent. Anaesthesia 1995; 50: 721-3.

[5] Au CL, White SA, Grant RP. A novel intubation technique for tracheoesophageal fistula in adults. Can J Anaesth 1999; 46: 688-91.

[6] Inada T, Umemoto M, Ohshima T, Sawada O, Nakamura Y. Anesthesia for insertion of a Dumon stent in a patient with a large tracheoesophageal fistula. Can J Anaesth 1999; 46: 372-5.

[7] Reeves ST, Burt N, Smith CD. Is it time to reevaluate the airway management of tracheoesophageal fistula? Anesth Analg 1995; 81: 866-9.

[8] Filston HC, Chitwood WR Jr, Schkolne B, Blackmon LR. The Fogarty balloon catheter as an aid to management of the infant with esophageal atresia and tracheoesophageal fistula complicated by severe RDS or pneumonia. J Pediatr Surg 1982; 17: 149-51.

[9] Nakada J, Nagai S, Nishira M, Hosoda R, Matsura T, Inagaki Y. Sealing of a tracheoesophageal fistula using a Sengstaken-Blakemore tube for mechanical ventilation during general anesthesia. Anesth Analg 2008; 106: 1218-9.10.

[10] Ford JM, Shields JA. Selective bilateral bronchial intubation for large, acquired tracheoesophageal fistula. Aana J 2012; 80: 49-53.

[11] Garcia NM, Thompson JW, Shaul DB. Definitive localization of isolated tracheoesophageal fistula using bronchoscopy and esophagoscopy for guide wire placement. J Pediatr Surg 1998; 33: 1645-7.

[12] Mieda H, Nagano Y, Iwasaki E, Oishi Y, Sasai T, Shin Y, Watanabe Y, Oku S, Fukushima T, Tokioka H. [Two cases of airway stent placement to treat tracheal and bronchial fistula using general anesthesia under spontaneous respiration]. Masui 2012; 61: 880-4.

[13] Joynt GM, Chui PT, Mainland P, Abdullah V. Total intravenous anesthesia and endotracheal oxygen insufflation for repair of tracheoesophageal fistula in an adult. Anesth Analg 1996; 82: 661-3.

[14] Brain AI, Verghese C, Strube PJ. The LMA 'ProSeal'--a laryngeal mask with an oesophageal vent. Br J Anaesth 2000; 84: 650-4.

[15] Howath A, Brimacombe J, Keller C. Gum-elastic bougie-guided insertion of the ProSeal laryngeal mask airway: a new technique. Anaesth Intensive Care 2002; 30: 624-7.