

Case Report

Successful single-lung ventilation using a bronchial occluder for repair a large tracheoesophageal fistula: a case report

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Abstract: A 25-year-old girl was found a large tracheoesophageal fistula (TEF) 20 cm away from the incisors by gastroscopically. It was a consequence of prolonged intubation after the head operation because of right temporal lobe cerebral hemorrhage broken into ventricles. The patient was tracheotomy and retained spontaneous breathing. Operation was planned to be via cervical and thoracic abdominal esophageal transection plus cervical esophagogastrostomy to repair the fistula under single lung ventilation under general anesthesia. Here we report a successful case using an endotracheal tube (EET) combined with a bronchial occluder for single ventilation to repair a large TEF.

Keywords: Tracheoesophageal fistula, bronchial occluder

Introduction

Anesthesia management for TEF repair may be a challenge because the patient should be present aspiration of esophageal through the fistula and block one side of main bronchus simultaneously to facilitate surgical operation. Nowadays, a double-lumen endotracheal tube (DLT) may be the first selective for operation needed lung separation. However, in patient with TEF especially a large fistula, selective lung ventilation and separation may require unusual methods of airway management. In our case, using an EET and bronchial occluder which was successful treatment with surgical operation of TEF repair under general anesthesia.

Case description

The patient was 25-year-old, diagnosed with a large TEF. She had performed craniotomy and decompressive craniectomy three months ago. After the head operation, the patient suffered severe ARDS. Therefore the patient was tracheotomy and ventilator assisted breathing. However, last week, gastroscopically revealed a large TEF (2 cm) 20 cm away from the incisors (**Figure 1**) and its upper edge 4 cm below to the epiglott-

is (**Figure 2**). A operation (via cervical and thoracic abdominal three incision) was planned for repairing the fistula under left-lateral position. Intraoperation monitoring including electrocardiograph, capnograph, blood oxygen saturation, invasive blood pressure. Patient was retained spontaneous breathing and given intravenous infusion dexmedetomidine 0.4 ug/kg/h after entering operation room. Under fully conscious sedation by dexmedetomidine, following topical anesthesia, a cuffed 7.0 EET was just passed through the glottis under a video laryngoscope and withdraw the tracheotomy tube simultaneously. Then, a fiberoptic bronchoscopy was inserted through EET to avoid the fistula because our patient's fistula was very large. The EET was then skipped over the fistula and furthered into the trachea. Subsequently, iv injections of sufentanil 20 ug, propofol 120 mg, midazolam 2 mg and rocuronium bromide 50 mg. Controlled respiration with a tidal volume 500 ml and a rate 12 breaths/min. Then, we inserted the bronchial occluder. Before cuff inflation, a fiberoptic bronchoscopy through side port was inserted. The bronchial occluder was inserted into the right main stem bronchus under direct fiberoptic vision and adjusted to a right position so that the top part of the cuff could be seen at

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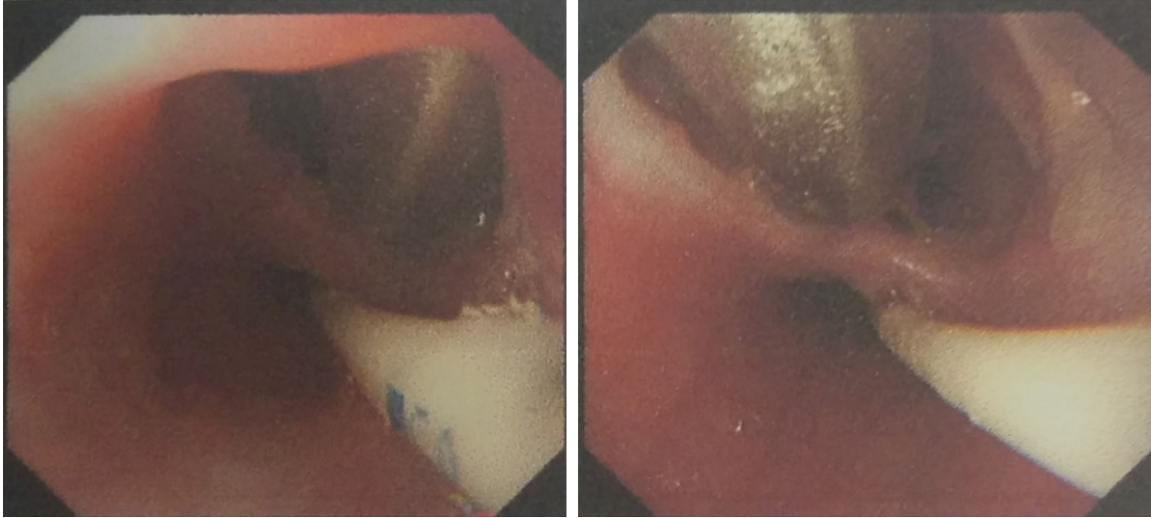


Figure 1. TEF (2 cm) 20 cm away from incisors.

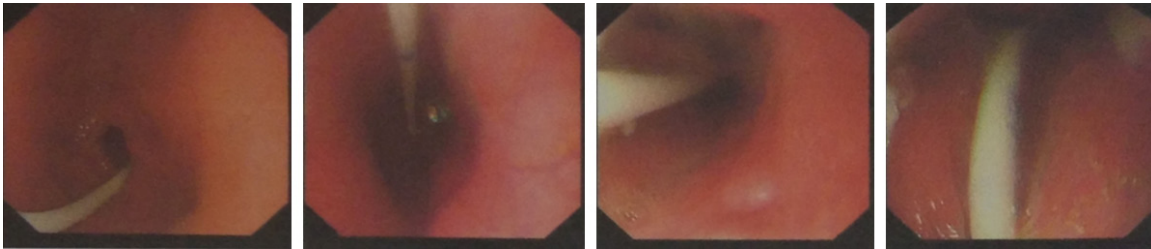


Figure 2. Upper edge of TEF 4 cm below to the epiglottis.

Table 1. The comparison of inner and outer diameters between 7#EET and DLT

	37 Fr DLT	35 Fr DLT	7#EET
Insider diameter	5.5 mm	5.0 mm	7 mm
Outsider diameter	13-14 mm	12-13 mm	About 9.5 mm

the carina around. Then the cuff was inflated. The patient was turned into left-lateral position and adjusted the tidal volume to 400 ml. We ensured the position of EET and bronchial occluder under fiberoptic once again, and then the operation started. Anesthesia was maintained with remifentanyl 0.25 ug/kg/min, cisatracurium besylate 0.5 mg/kg/h, and propofol 8 mg/kg/h. The operation lasted for 4 hours, and the bronchial occluder was pulled out at the end to make two-lung ventilation. The patient was sent to ICU with EET. Intraoperation, oxygen saturation was normal, hypotension was treated by IV injections of ephedrine 6 mg and intravenous drip hydroxyethyl starch to expand blood volume, no other special condition.

Discussion

TEF including congenital and acquired, the later most commonly occurs as a complication of prolonged tracheal intubation [1]. Surgical operation is the main treatment method. Intraoperation, patient sometimes needed lateral position and single lung ventilation, which facilitate to surgical respiration of fistula.

There are various technique of blocking the TEF and the main stem bronchus simultaneously. Some research choose a DLT for a large acquired TEF [2]. However, the shortcoming is the large inner diameters of it may further tearing and enlarge the original fistula in the intubation process. In addition, a DLT was more difficult to operate compare to bronchial occluder combine with EET. Another alternative technique of single-lung ventilation is to deliberately slide a general tracheal tube into the one side of main stem bronchus. Sometimes, it is easy, but effective [3, 4]. However, when the fistula is

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very close to or even below the carina, this way is useless and endangered. What's the worse, intraoperation, it would make us very passive if we need to adjust the position of the EET, under the condition of the patient in the lateral position.

This way of combine occlude with EET has not been reported yet. There are many reasons why we choose an occluder to achieve single lung ventilation. First, it is easy to operate and less time consuming, especially fit to the difficult intubation [5]. Second, on the one hand, comparing to DLT, airway pressure is significantly lower when using occluder for single lung ventilation, which is conducive to blood of the operation's lung to the ventilation's lung. Therefore, it is beneficial to blood redistribution, decreases intrapulmonary shunt [6] and reduces the incidence of lung barotrauma [7]. On the other hand, under the same insider diameter and ventilation, the outer diameter of EET is smaller, which is less likely to damage the fistula (**Table 1**). Third, the anesthesia management is more convenient than other technique of single-lung ventilation. In addition, we do not need to change a new tube after operation for respiratory support patients, and just need to pull out the occluder to ventilate both lungs.

In summary, we report the successful using of occluder during repair of a large TEF. This appears to be a safe and effective technique for TEF patient who need surgery repair under single-lung ventilation.

Disclosure of conflict of interest

None.

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References

- [1] Payne DK, Anderson WM, Romero MD, Wissing DR, Fowler M. Tracheoesophageal fistula formation in intubated Patients. *Chest*. 1990; 98: 161-4.
- [2] Ford JM, Shields JA. Selective bilateral bronchial intubation for large acquired tracheoesophageal fistula. *Aana J* 2012; 80: 49-53.
- [3] Tercan E, Sungun MB, Boyaci A, Kucukaydin M. One-lung ventilation of a preterm newborn during esophageal atresia and tracheoesophageal fistula repair. *Acta Anaesthesiol Scand* 2002; 46: 332-333
- [4] Baraka A, Akel S, Haroun S, Yazigi A. One-lung ventilation of the newborn with tracheoesophageal fistula. *Anesth Analg* 1988; 67: 189-91
- [5] Arndt GA, Delessio ST, Kranner PW, Orzepowski W, Ceranski B, Valtysson B. One-lung ventilation when intubation is difficult: presentation of a new endobronchial blocker. *Acta Anaesthesiol Scand* 1999; 43: 356-358.
- [6] Tugrul M, Camci E, Karadeniz H, Senturk M, Pembeci K, Akpir K. Comparison of volume controlled with pressure controlled ventilation during one-lung anesthesia. *Br J Anaesth* 1997; 79: 306-310.
- [7] Gammon RB, Shin MS, Groves RH Jr, Hardin JM, Hsu C, Buchalter SE. Clinical risk factors for pulmonary barotraumas: a multivariate analysis. *Am J Respir Crit Care Med* 1995; 152: 1235-1240.