We present a case of a 69-year-old man who underwent tracheobronchoplasty for tracheobronchomalacia using a single-lumen endotracheal tube and a Y-shaped bronchial blocker for airway management. The goals of airway management during tracheobronchoplasty include continuous left-lung ventilation and lung protection from aspiration. Ideally, only conventional airway management tools are used. This case demonstrates that a single-lumen endotracheal tube with a bronchial blocker can be a straightforward strategy for airway management during tracheobronchoplasty.
Finally, under moderate sedation, flexible bronchoscopy was performed, which showed tracheobronchomalacia with 50%–75% collapse of the distal trachea and main bronchi on exhalation. Dynamic airway CT scan of the chest confirmed moderate to severe tracheobronchomalacia, with 80% distal trachea, 86% right main bronchus, and 98% left main bronchus narrowing from inhalation to exhalation (Figure 1). He underwent a Y silicone stent trial for 2 weeks, during which he noted decreased shortness of breath and resolution of his cough. He agreed to the proposed right thoracotomy and tracheobronchoplasty.

After a thoracic epidural was placed and general anesthesia was induced, the patient was intubated with a single-lumen endotracheal tube with the cuff in the proximal trachea. Bronchoscopy was performed to confirm that the length of the right main bronchus was >1 cm. A Y-shaped bronchial blocker (EZ-Blocker Endobronchial Blocker; Teleflex, Raleigh, NC) was advanced into the trachea through a multiport adapter using bronchoscopic guidance. The yoke of the blocker was positioned at the carina, with the distal extensions in the main bronchi (Figure 2).

For the majority of the case, the bronchial blocker cuff in the right main bronchus remained inflated, and only the left lung was ventilated. When the mesh was sewn to the right main bronchus, the cuff was intermittently deflated, and ventilation intermittently paused. Flexible bronchoscopy at the end of the case showed the bronchial blocker in place, with indentations in the posterior trachea where the mesh had been sewn, and no visible sutures (Figure 3).

The patient was extubated in the operating room and transferred to the intensive care unit for close monitoring of his ventilatory status. He had no postoperative complications and was discharged home on room air on postoperative day 6. He was seen in the clinic 20 days and 6 months after surgery, and he reported complete resolution of his cough and greatly improved quality of life.

**DISCUSSION**

Tracheobronchoplasty is performed for moderate to severe, symptomatic tracheobronchomalacia, most commonly through a right posterolateral thoracotomy, with the patient in the left lateral decubitus position. We present a case in which a standard single-lumen endotracheal tube and a bronchial blocker were used for airway management.

There are several advantages of this approach. First, the equipment is readily available, and no modification is needed. We used a Y-shaped bronchial blocker with 2 distal extensions, and we suspect that any bronchial blocker would work as well. Second, the bronchial blocker has a low profile, so it causes no distortion of the distal trachea.

![Image of CT scans showing tracheobronchomalacia](image-url)
and minimal distortion of the main bronchi when the cuffs are deflated. Third, the airway is protected from aspiration with the single-lumen endotracheal tube cuff. Finally, flexible bronchoscopy can be performed at the end of the case without moving the endotracheal tube, decreasing the risk of accidental extubation.

One important consideration is that ventilation must be paused intermittently while the mesh is sewn to the right main bronchus. Intermittent ventilation is required because the bronchial blocker cuff must be deflated during suturing to minimize the risk of puncturing it or suturing it to the airway. Fortunately, there is low risk of puncturing the cuff of the endotracheal tube because it is placed in the proximal trachea, and only the intrathoracic, distal trachea is sutured.

Several other airway management strategies have been described. Gangadharan et al reported the largest series of patients who underwent tracheobronchoplasty. An early article from their institution described using a single-lumen endotracheal tube positioned in the left main bronchus, with completion bronchoscopy performed through the retracted endotracheal tube. A subsequent article described modifying a double-lumen endotracheal tube by shaving off the tracheal lumen. Completion bronchoscopy was performed before chest closure to ensure the airway was not narrowed, and any visible sutures were removed to prevent mesh infection. Unfortunately, this latter strategy requires modification of existing equipment to prevent airway distortion. In addition, completion bronchoscopy must be performed with a smaller bronroscope that will fit in a double-lumen endotracheal tube.

Wright used an extra-long, wire-reinforced, single-lumen endotracheal tube (Fuji Wire Reinforced Endotracheal Tube [WRETT]; Ambu Inc, Columbia, MD) positioned in the left main bronchus. These endotracheal tubes are 40-cm long and have a short cuff, so they can reach and seal in the left main bronchus. While the mesh was sewn to the left main bronchus, the cuff was temporarily deflated and ventilation stopped so that the cuff would not be inadvertently sutured. Completion bronchoscopy was performed through the retracted endotracheal tube. The disadvantage of this approach is that this specialized endotracheal tube may not be readily available at all institutions. In addition, retraction of the endotracheal tube for completion bronchoscopy may lead to accidental extubation. Damle and Mitchell described trying several techniques for airway management before settling on this same approach, although they do not mention using a specialized endotracheal tube.

Lazzaro et al described the largest series of patients who underwent tracheobronchoplasty with a robotic approach, and Tse et al described 2 patients who underwent tracheobronchoplasty with a video-assisted thoracic surgery (VATS) approach. They both described using a double-lumen endotracheal tube. Tse et al described placing the tracheal sutures after deflation of the tracheal cuff and replacing the double-lumen endotracheal tube with a single-lumen tube to perform completion bronchoscopy at the end of the case. Unfortunately, even a small double-lumen endotracheal tube is still larger than a large single-lumen endotracheal tube, causing more airway distortion. In addition, it may be risky to replace the endotracheal tube to perform completion bronchoscopy.
McLaurin et al. described the only airway management strategy that allows for continuous left lung ventilation throughout the case; although it is quite complicated. They made a “supertube” by attaching 2 size 6.5 single-lumen endotracheal tubes end to end and positioning it in the left main bronchus. They then placed a 9-French bronchial blocker in the trachea alongside the endotracheal tube. In this configuration, the mesh was sewn to the trachea and right main bronchus. The left lung was ventilated, but only the left lung was protected from aspiration. Then, the supertube was retracted into the trachea, and the bronchial blocker was positioned and inflated in the right main bronchus. In this configuration, the mesh was sewn to the left main bronchus. The left lung was ventilated, and both lungs were protected from aspiration. They found that supertubes made from larger endotracheal tubes, as well as smaller bronchial blockers, were more likely to become dislodged.

This case demonstrated the use of a standard single-lumen endotracheal tube and a Y-shaped bronchial blocker for airway management during tracheobronchoplasty. It is straightforward, and should be considered when managing these patients.

ACKNOWLEDGMENTS

The authors thank Dr Steven Shafer for reviewing the manuscript.

DISCLOSURES

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