The Anesthetic Management of a Case of Tracheal Necrosis

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A 63-yr-old female patient developed a tracheal necrosis after esophageal resection with gastric interposition. We report the anesthetic management of this patient undergoing tracheal repair focusing on an original airway management and ventilation strategy.

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A 63-yr-old female patient was scheduled for tracheal repair. She was treated for hypertension and hypothyroidism and had undergone several surgical interventions (abdominoplasty, breast reduction, and breast prostheses). After receiving radiation therapy and chemotherapy for her T2N0M0 neoplasia of the proximal third of the esophagus, she underwent a 3-way esophagectomy with gastric interposition performed by laparoscopy and thoracoscopy 42 days before. The immediate postoperative period was uneventful; the endotracheal (ET) tube was removed after 24 h. Postoperatively, she developed a first acute respiratory distress syndrome (ARDS) after 4 days, cardiac arrhythmias, an internal jugular thrombosis, and a second ARDS after 24 days. Repeated bronchoscopies revealed a longitudinal laceration of the membranous part of the trachea at the level of the carina involving the right main bronchus. A mucosal flap and copious purulent secretions from a necrotic mass were responsible for the repeated ET tube obstructions. After 11 days, her trachea was extubated again. Two days later, she presented an acute dyspnea leading to cardiac arrest. She was tracheally intubated again, sedated (propofol, sufentanil), and ventilated (tidal volume 550 mL, respiratory rate 12 min^{-1}, positive end-expiratory pressure +5 cm H_2O, F_{IO_2} 0.8). Bronchoscopic evaluation revealed extensive necrosis of the posterior wall of the trachea and proximal left and right mainstem bronchi. Surgical repair of the tracheal defect was scheduled 5 days later.

After the anesthesia induction, the ET tube was replaced by a left double-lumen tube (DLT) under fiberoptic control (Left 37 CH Broncho-Cath™; Mallinckrodt Medical, Athlone, Ireland).

First, the surgeon removed the breast prosthesis and dissected a pectoralis major pedicle flap, then removed the second right rib and inserted the flap inside the right pleural cavity. Second, the patient was then put in the left lateral decubitus position for a right thoracotomy.

To facilitate surgery, we had to collapse the right lung. This was poorly tolerated by the patient. As the dissection progressed, the leak increased and we could not maintain adequate oxygenation using the sole dependent lung (Spo_2 <80%, pH 7.27, Pco_2 64 mm Hg, Po_2 41 mm Hg). At that time, two-lung ventilation was no longer possible because of the opening of the trachea. Thus, we asked the surgeon to intubate the right main bronchus across the surgical field, with a usual ET tube nr 5.5 (Fig. 1) that was connected to the tracheal outlet of the Y-piece of the DLT with a sterile 20-cm-long connector. Thanks to this technique, ventilation (excluding the upper right lobe) was adequate (Spo_2 >96%) during the whole time period (200 min) going from the gastroplasty-trachea adhesiolysis to the suture of the pedicle flap on the defect. The total surgical procedure took 420 min. The patient's trachea remained intubated with the DLT in the intensive care unit.

The immediate postoperative course was uneventful: the patient's trachea was extubated after 7 days and ventilation was maintained for 2 wk through a tracheostomy because of a persistent flail chest.

Discussion

We relate the case of iatrogenic tracheal necrosis that might be compared with tracheoesophageal fistula.

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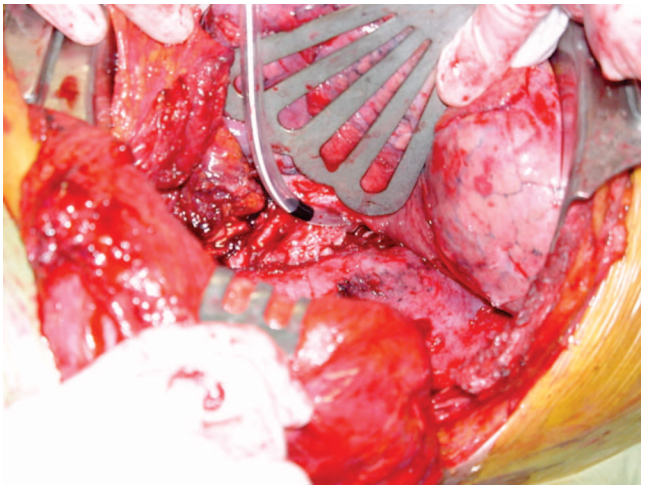

Figure 1. Direct surgical insertion of a pediatric endotracheal tube nr 5.5 in the right main bronchus.

Several anesthesia plans are described for tracheoesophageal fistula repair (1–3) or other lower airway surgery (4–6). These techniques include high-frequency jet ventilation, high-frequency positive-pressure ventilation, spontaneous ventilation, and cardiopulmonary bypass. In a similar case when the main issue was copious gastric secretions, the patient was intubated awake with two endobronchic tubes (7).

In this case, we did not consider cardiopulmonary bypass. High-frequency jet ventilation or high-frequency positive-pressure ventilation were excluded because of the distal location of the leak and the two ARDS episodes that limited the patient's lung compliance.

Thus, we decided to insert a left DLT as indicated in the classical anesthetic plan for thoracic surgery. Because the patient's lungs were ventilated for several weeks through a usual ET tube, we hypothesized that the tracheal defect did not prevent adequate ventilation during this period of time.

However, as the dissection progressed, a considerable leak appeared that forced us to clamp the ET tube and to ventilate the patient's lungs exclusively through the bronchial tube. The sole left lung ventilation was insufficient to fulfill the patient's need. Our strategy was first to increase the F_{IO_2} to 1, and second to increase the positive end-expiratory pressure to the level (12 cm H_2O) that maximized the hemoglobin saturation. Right lung ventilation, therefore, was the only possible choice. This was made possible through a tube directly inserted into the right main bronchus by the surgeon, below the level of the tracheal defect. Also, this ET tube gave support to the carina during the surgical repair. However, the cuff occluding the right upper lobar bronchus was probably the origin of the postoperative right upper atelectasis.

Early extubation is a primary goal of tracheal surgery (5,8). Because of the flail chest caused by internalization of the pedicle flap, two weeks were needed before ventilator weaning. Extubation was performed seven days later under fiberoptic control and ventilation was through a tracheostomy.

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