Efficacy of one-lung jet ventilation using an airway exchange catheter for removal of a migrated bronchial stent: a case report

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Background

Complete airway obstruction is a fatal complication that may occur during the removal of a foreign body from the airway. Although extracorporeal membrane oxygenation (ECMO) is often used, it has a risk of complications, including bleeding. We here report a case in which one-lung jet ventilation (JV) was successfully used to maintain oxygenation during removal of a migrated bronchial stent.

Case report

A 55-year-old woman (height, 160 cm; weight, 54 kg) underwent bronchial stenting for a stenotic left main bronchus (Fig. 1a), and mechanical ventilation via tracheostomy was continued due to post-tuberculosis sequelae. She received mechanical ventilation, with the ventilator settings at a peak inspiratory pressure of 16 cmH₂O, positive end-expiratory pressure of 8 cmH₂O, and fraction of inspired oxygen (FiO₂) of 0.25. With these settings, the tidal volume was 300 ml, the partial pressure of arterial oxygen (PaO₂) was 87.5 mmHg, the partial pressure of carbon dioxide (PaCO₂) was 39.1 mmHg, and the arterial blood pH was 7.47. Three months after the stenting, the bronchial stent had proximally migrated to the trachea, and complete airway obstruction was likely to occur (Fig. 1b); therefore, stent removal using rigid bronchoscopy under general anesthesia was scheduled. General anesthesia was induced with propofol target-controlled infusion (TCI 3 µg/ml), remifentanyl (0.2 µg/kg/min), and rocuronium (40 mg); and maintained with oxygen, air, propofol (TCI 3 µg/ml), and remifentanyl (0.3 µg/kg/min). We planned to insert an airway exchange catheter (AEC) (OD, 3.7 mm) (Cook[®], Bloomington, USA) into the right main bronchus orally, under bronchoscopic monitoring, via the tracheostomy, and use JV to maintain oxygenation during the stent removal procedure; and we prepared ECMO on stand-by (Fig. 2a). However, the AEC could not pass through the outside of the tracheostomy tube; thus, we removed the tracheostomy tube and orally intubated a smaller endotracheal tube (ID 6.0 mm, OD 8.2 mm) (Fig. 2b). The AEC was then inserted into the right main bronchus by passing it through the outside of the tracheostomy tube, under bronchoscopic monitoring (Fig. 1c), and one-lung JV was begun through the AEC. Since the PaO₂ was maintained at 95 mmHg through 5 minutes of one-lung JV (FiO₂, 1.0; inspiratory time, 0.5-1.0 sec; respiratory rate, 15/min; oxygen pressure, 0.2 Mpa), we removed the endotracheal tube and inserted a rigid bronchoscope (Fig. 2c). The bronchial stent was uneventfully removed under one-lung JV (Fig. 1d), with the SpO₂ maintained at 99-100% during the procedure. The AEC was then removed, and the tracheostomy tube reintubated. The patient emerged from anesthesia without complications, and was discharged on postoperative day 21.

Fig. 1 Bronchoscopic view.

(a) Just after the stenting. (b) Three months after the stenting. (c) AEC insertion into the RMB. (d) Just after the stent removal. LMB: Left main bronchus, RMB: Right main bronchus, AEC: Airway exchange catheter

Fig. 2 Our plans to maintain oxygenation during stent removal.

Discussion and Learning Points

This case showed that a long, thin AEC was a suitable device for airway management of distally located airway stenosis, and that one-lung JV via AEC had the potential to maintain oxygenation in such cases. Although JV has the potential to cause barotrauma, the incidence of this complication is relatively low in non-emergency settings¹⁾; therefore, one-lung JV with an AEC is considered to be a valuable technique for airway management.