Aspiration of a Blister Pack Tablet with Tracheal Obstruction and Perforation: Emergency Tracheal Repair with Extracorporeal Membrane Oxygenation Support

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Abstract

Background Airway management in case of acute tracheal injury is a challenging situation where the use of Extracorporeal Membrane Oxygenation (ECMO) has recently gained more importance.

Case Description We report the case of a 60-year old women with aspiration of a large blister pack tablet causing acute tracheal obstruction with asphyxia as well as tracheal perforation with tension pneumothorax. As bronchoscopy failed to retrieve the blister pack, emergency tracheal reconstruction with Extracorporeal Membrane Oxygenation (ECMO) support was carried out.

Conclusion The application of ECMO instantly alleviated the acute situation and provided excellent conditions for technically demanding emergency tracheal repair.

Keywords
- airway
- thoracic Surgery
- extracorporeal membrane oxygenation

Introduction

Acute tracheal obstruction caused by foreign body aspiration is a life-threatening condition requiring immediate action. In general, interventional bronchoscopy with retrieval of the object is considered to be the treatment of choice.[1] In rare cases, foreign bodies not only get stuck in the tracheobronchial system but also cause perforating airway injury. Currently there exists only limited experience with emergency utilization of ECMO in this situation.

Case Description

A 60-year-old woman was brought to the emergency department with acute shortness of breath. She had a long history of rheumatoid arthritis and chronic pain syndrome. Relatives reported that she had accidentally swallowed a blister pack tablet and since then complained about increasing dyspnea and hemoptysis. At the time of hospital admission, the patient was extremely anxious, had severe difficulty in breathing, and was coughing fresh blood. She was admitted

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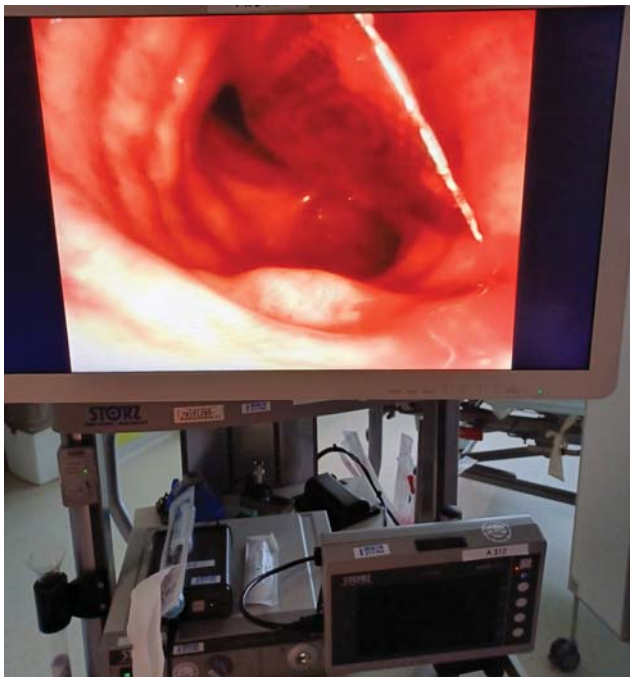

Fig. 1 Endoscopic image of the blister pack tablet in the distal trachea. Bronchoscopy revealed a large blister pack lodged into the distal trachea at the level of the carina.

straight to the medical intensive care unit (ICU) for emergency bronchoscopy.

Immediately after arriving at the ICU, the patient sustained acute respiratory failure and cardiac arrest requiring cardiopulmonary resuscitation and emergency intubation. Flexible bronchoscopy via the endotracheal tube showed a large blister pack tablet lodged into the distal trachea (►**Fig. 1**). Retrieval of the foreign body by means of bronchoscopy was not possible. The sharp edges of the blister pack had perforated the tracheal wall and the pack got stuck in the mediastinal tissue outside the trachea. Computed tomography showed the foreign body as well as a large pneumothorax on the right (►**Fig. 2A, B**).

At that time, thoracic surgery support was sought, and a chest tube was inserted. A large quantity of air escaped with whooshing noise and there was a massive air leak via the chest tube. The diagnosis of none-contained tracheal perforation with tension pneumothorax was made. Ventilation became increasingly difficult. Therefore, indication for emergency surgery with removal of the foreign body and tracheal reconstruction under extracorporeal membrane oxygenation (ECMO) support was made.

Venovenous ECMO (vv-ECMO) with peripheral vascular access and double site configuration was applied in the operating room prior to thoracotomy. Percutaneous cannulation of the right internal jugular and the right femoral vein under ultrasound guidance in the Seldinger technique was carried out. The cannulas were placed in the superior and inferior vena cava with the aid of transesophageal echocardiography. The patient was placed in the left lateral decubitus position with a stable ECMO flow up to 5 L/min (►**Fig. 3A**). Following posterior thoracotomy, mechanical ventilation was discontinued, and the endotracheal tube was slightly pulled back. Gas exchange was entirely maintained by vv-ECMO, which completely replaced the function of the lungs. The blister pack tablet had perforated the trachea and mediastinal pleura at the level of the crossing of the azygos vein. The sharp edge of the blister was clearly visible within the perforation (►**Fig. 3B**). The tracheal defect was slightly enlarged to allow the blister pack to pass through it. Following removal of the foreign body (►**Fig. 3C**), the trachea was reconstructed by means of interrupted sutures of 4–0 Polydioxanone (Ethicon Inc., New Jersey, United States) and a TachoSil sealing patch (Corza Medical, Westwood, Massachusetts, United States). After that, the endotracheal tube was repositioned under bronchoscopy guidance and ventilation was restarted. Water submersion test showed no air leak. Following placement of a large-bore chest tube, the thoracotomy was closed, and the patient was placed in the supine position for tracheotomy. Following insertion of a 9–0 tracheal cannula and final bronchoscopy, the patient was transferred to the surgical ICU.

The postoperative course was uneventful regarding the operative procedure. ECMO could be weaned off and ventilation via the tracheostomy tube was unproblematic. However, the patient stayed unresponsive because of hypoxic brain injury that she had most likely sustained during cardiac arrest and cardiopulmonary resuscitation at the time of emergency admission. In accordance with the patient's decree, the family

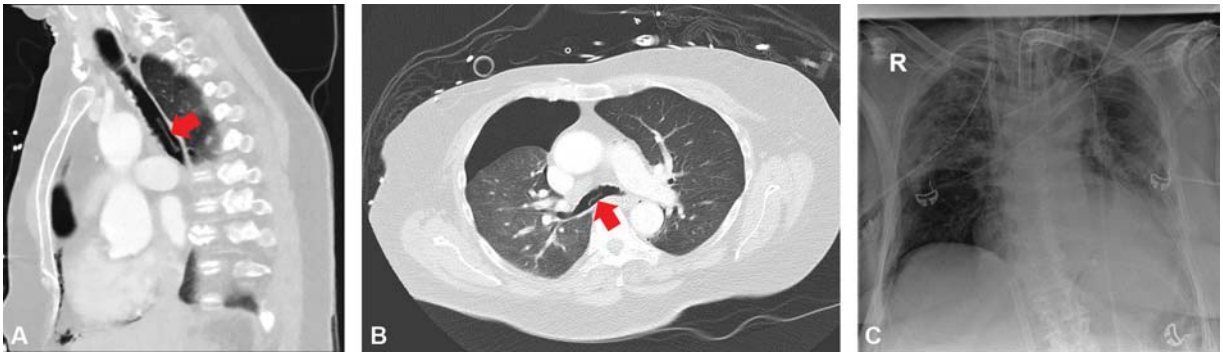

Fig. 2 Radiology findings. Computed tomography shows the blister pack (*red arrow*) in the (**A**) distal trachea and (**B**) pneumothorax on the right. (**C**) Postoperative chest X-ray shows re-expansion of the right lung as well as correct position of the tracheostomy and the extracorporeal membrane oxygenation (ECMO) cannulas.

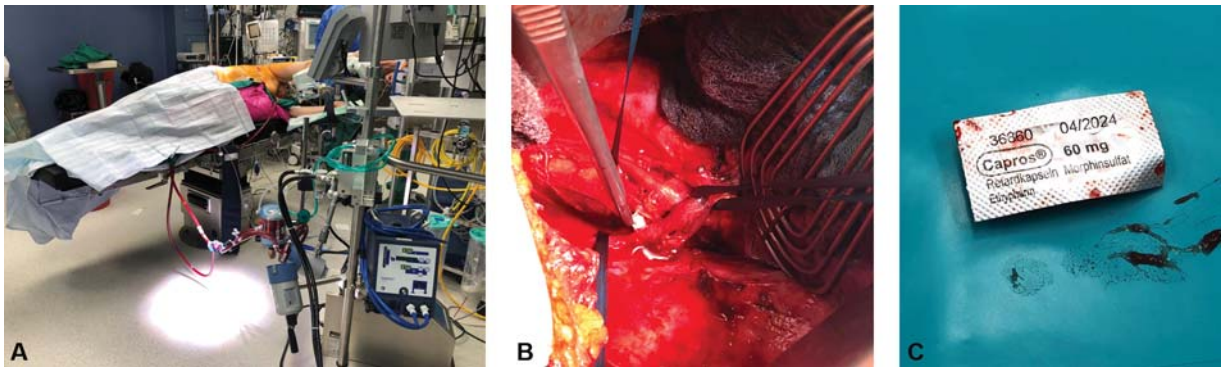

Fig. 3 Operative setting. (**A**) Prior to thoracotomy, the patient was put on venovenous extracorporeal membrane oxygenation (vv-ECMO). (**B**) The blister pack perforated the trachea. (**C**) The sharp-edged blister pack tablet after removal from the trachea.

decided to discontinue therapy and the patient eventually died in the presence of her children and family.

Discussion

While foreign body aspiration is more common in children than in adults,[1,2] advanced age and multimorbidity are considered to increase the frequency of occurrence in the adult population in the coming years.[2] In the vast majority of cases, foreign bodies can be removed by means of a flexible or rigid bronchoscopy.[1,2] A recent case series from South Korea showed a success rate of 91% for flexible bronchoscopy and only 2 out of 139 patients eventually underwent surgery.[2] Clinical presentation of foreign body aspiration among adults ranges from chronic aspiration to life-threatening acute airway obstruction.[1–3] Sharp-edged blister tablet packs are a particular case where size and configuration of the blister not only cause local injury but also considerably hamper endoscopic retrieval.[4] There are case reports describing the difficulty involved in retrieving blister packs from the esophagus as well as from the airways.[4] In our case, the patient had a long history of rheumatoid arthritis and had accidentally aspirated a large 60-mg morphine slow-release blister pack tablet (►**Fig. 3C**). Clinical presentation was dramatic with asphyxia, hypoxic cardiac arrest, hemoptysis, and need for cardiopulmonary resuscitation. Moreover, the lodged-in blister pack had caused transmural tracheal wall injury with tension pneumothorax and massive air leak with impossibility of stable mechanical ventilation. To the best of our knowledge, our report is the first description of acute tracheal perforation by a blister pack tablet. While the application of vv-ECMO for elective airway surgery is well established,[5] there exists only limited experience with emergency utilization of ECMO for acute tracheobronchial obstruction.[6,7] In our case, surgical intervention with thoracotomy was unavoidable for both retrieval of the blister pack and reconstruction of the trachea. As ventilation was already difficult and the distal trachea was obstructed by the lodged-in foreign body, there was no chance for single-lung ventilation. Therefore, we decided to use vv-ECMO, which is available at our university hospital around the clock. The application of ECMO instantly alleviated the acute situation and provided excellent conditions for technically demanding emergency surgery. Tracheal reconstruction was successfully achieved, and the patient could be weaned off from ECMO on postoperative day 3. Unfortunately, the patient had already sustained hypoxic brain injury probably during the initial episode of asphyxia and cardiopulmonary resuscitation. Consequently, the family decided to discontinue therapy despite the technical success of the operative procedure.

In conclusion, the application of vv-ECMO is useful to facilitate emergency airway surgery in case of tracheobronchial obstruction and/or perforation.

Note

The legal representatives consented to publish the information disclosed in this case report.

Funding

None.

Conflicts of Interest

None declared.

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