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CLINICAL REPORT

Membranous obstructive *Candida* tracheitis as a complication of endotracheal intubation and tracheostomy

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Abstract This report describes a rare case of acute life-threatening stridor that was due to membranous obstructive *Candida* tracheitis, and this condition occurred after long-term endotracheal intubation and tracheostomy. An obstructive membrane was found 2 cm above the carina by bronchofiberscopy. The removal of the membrane resulted in the complete relief of the airway obstruction.

Keywords Bronchofiberscopy · *Candida* · Endotracheal intubation · Membranous tracheitis

Introduction

The late complications of endotracheal intubation and tracheostomy that can cause tracheal obstruction have been reported, such as fibrin clot, [1] subglottic granuloma, [2] and obstructive *Aspergillus* tracheobronchitis [3]. We report here a patient who suffered from life-threatening stridor and airway obstruction, and this was subsequently found to have been caused by a fluctuating fibrinoid membranous clot containing *Candida* hyphae and spores.

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Case report

A 68-year-old woman (height 145 cm, weight 65 kg), who had a history of hypertension, developed severe bursting headache with a stuporous mentality, and was admitted to our hospital for treatment of subarachnoid hemorrhage. The patient had no history of immune deficiency, chemotherapy, radiation therapy, leukemia, or steroid therapy. She was scheduled to undergo anterior communicating artery aneurysm embolization with Guglielmi detachable coil (Boston Scientific, Cork, Ireland) and Microplex coil system (Microvention, Aliso Viejo, CA, USA). Before the operation, a 7.5 mm (interior diameter) cuffed endotracheal tube was routinely placed and this procedure was uncomplicated. Postoperatively, she had difficulties in being weaned from endotracheal intubation due to her stuporous mentality and the large amount of yellowish sputum that was produced throughout the first three postoperative days. The patient was mechanically ventilated with synchronized intermittent mandatory ventilation mode (fractional inspired oxygen [FiO_2] 0.5, tidal volume 430 ml, frequency 14 breaths per min, and positive end-expiratory pressure 4 cmH_2O). Peak pressures between 25 and 35 cmH_2O were observed. We extubated her on the fourth postoperative day after we had confirmed that she was awake with intact upper airway reflexes. However, she developed progressive dyspnea and hypoxemia immediately, and her trachea was intubated again. Extubation, occurrence of dyspnea and re-intubation were repeated again subsequently and

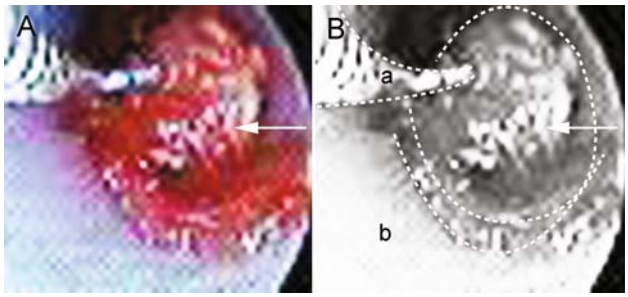

Fig. 1 **a** Removal of the fibrinoid membrane with bronchoscopic forceps. The *arrow* indicates the fibrinoid membrane adherent to the tracheal wall. **b** Schematic illustration of **a**. *a* Bronchoscopic forceps, *b* interior wall of tracheostomy tube

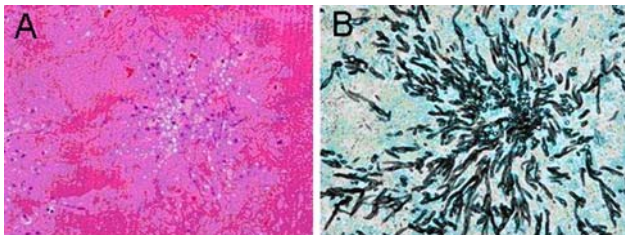

Fig. 2 The microscopic findings show fibrinoid clots containing fungal hyphae and spores, and this is morphologically consistent with *Candida* species. **a** H&E, ×400; **b** Gomori methenamine silver, ×400

tracheostomy was performed on the tenth postoperative day. Five days later we noticed she had some serious dyspnea, tachypnea, and wheezing sounds, and the suction tip did not progress deeply through the tracheal cannula. Although steroids and bronchodilator were started, her stridor and severe respiratory distress continued. White blood cell counts were between 12 000 and 21 000/mm^3 (neutrophils 80%–90%, lymphocytes 7%–13%, monocytes 3%–6%) A blood gas analysis was done, which revealed pH of 7.520, $PaCO_2$ of 31.7 mmHg, and PaO_2 of 81.6 mmHg, with FiO_2 of 0.5. We performed flexible bronchofiberscopy, and this revealed a red fleshy membrane that was adherent to the anterolateral tracheal wall 2 cm above the carina. This membrane was fluctuating simultaneously with respiration and also intermittently to almost completely obstruct the airway in a valve-like manner; further, there was a stenotic region in the trachea. A membranous material (2.0 × 1.0 × 0.2 cm) was extracted with bronchoscopic forceps (Fig. 1); on histological examination, it was found to be mainly composed of fungal spores and hyphae, which were consistent with *Candida albicans*, and fibrino-inflammatory exudates (Fig. 2). The patient's respiratory symptoms resolved after the removal of the fibrinoid clot. There was no growth in sputum culture and blood culture. Repeated bronchoscopies 3 days later and then 1 month later showed no recurrence of the lesion.

Discussion

There have been several previous reports of the complications of airway obstruction associated with airway management procedures such as percutaneous dilatational tracheostomy, [4] removal of a minitracheostomy tube, [5] and the use of a single-lumen [6] or double-lumen endobronchial tube [1, 2].

The present report describes a very rare, but life-threatening complication of endotracheal intubation and tracheostomy. The formation of a fibrinoid membrane in the trachea has been referred to as membranous tracheitis [1]. The pressure of an endotracheal tube on the wall of the trachea might result in local ischemia and subglottic epithelial trauma that affects upward mucus clearance and then there is development of membranous tracheitis [7]. Chest X-ray of the present patient showed that the tip of the endotracheal tube was adjacent to the carina. This explained the location of the fibrinoid clot. The mechanism of the development of this fibrinoid membrane may have been associated with local tracheal trauma from the endotracheal tube and tracheostomy.

Simoni and Wiatrak [8] demonstrated that the organisms that could colonize laryngotracheal stents included *Candida* species in 57% of the cases, and antibiotic therapy directed toward the fungal organisms could help in controlling local inflammation and the formation of granulation tissue. However, we did not prescribe antifungal drugs because the patient had no history of immune deficiency or chemotherapy and there was no growth in sputum culture and blood culture.

It is generally accepted that a closed suction system is superior to an open suction system in reducing infections, although this is controversial [9]. We used a closed suction system for the patient in the intensive care unit.

The condition in our patient was an unusual case of rare membranous tracheitis because of the shape and movement of the tracheal membrane and the superinfection with *Candida*.

In conclusion, if the sudden onset of worsening dyspnea is accompanied by wheezing after the use of airway devices, then the development of a membrane or granuloma in the trachea should be suspected, and bronchofiberscopy is needed to diagnose and manage the membranous tracheitis.

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