Case Report

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Study and reflection on anesthesia for tracheobronchopathia osteochondroplastica

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Abstract

Tracheobronchopathia osteochondroplastica (TO) is a rare disease that may cause unexpected difficult intubation. There is no available consensus on the management of difficult intubation that is associated with TO. A 45-year-old woman was scheduled for modified radical mastoidectomy, canaloplasty, and tympanoplasty under general anesthesia. We encountered significant resistance during tracheal intubation, although the laryngeal view was normal with the video laryngoscope. A fiberoptic bronchoscope was then used to facilitate intubation, and we noted that the trachea was obviously narrowed due to cartilaginous ring hypertrophy. The tracheal tube was fully lubricated with tetracaine gel, and smoothly inserted into the trachea. After the operation, bronchoscopy and a computed tomography (CT) scan were performed to confirm the diagnosis of TO. Fiberoptic bronchoscopy-assisted tracheal intubation is safe and effective choice for the patients in whom subglottic intubation is difficult. CT scan and bronchoscopy might be helpful for preoperative airway assessment. Identifying patients with TO is important to avoid unexpected tracheal intubation impediment. Assessment of the subglottic airway should also be taken seriously.

Keywords

Tracheobronchopathia osteochondroplastica, intubation, fiberoptic bronchoscopy, airway assessment, subglottic airway assessment, fiberoptic bronchoscopy-assisted tracheal intubation, cartilaginous ring hypertrophy

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Introduction

Tracheobronchopathia osteochondroplastica (TO) is a rare disease with clinical

features such as dyspnea, wheezing, hemoptysis, and dry cough, but not all patients have symptoms or a confirmed diagnosis.[1,2] In some cases, patients who have been diagnosed before have not been identified as needing additional preparation before proceeding to surgery and anesthesia.[3]

Owing to the rarity of the disease, TO patients experience unexpected difficulties in subglottic intubation in many cases, which creates a difficult situation. There are no specific guidelines or expert consensus that can be used as a guiding reference when such difficulties occur, which contributes to further confusion or indecisiveness.[4] Thus, our assessment and management of the airway have always been focused on the glottis alone, such as intubation scoring, while less attention has been paid to the subglottic airway; this is usually for technical and methodological reasons. However, using TO as an example, without established guidelines or expert consensus, anesthesiologists face significant challenges if difficulties occur after induction of general anesthesia.[5]

Case report

The patient was a 45-year-old woman with bilateral chronic otitis media who was scheduled for modified radical mastoidectomy, canaloplasty, and tympanoplasty under general anesthesia. The patient denied any other medical history. Her laboratory examination, electrocardiogram, and radiograph results revealed no abnormalities (Figure 1), and her airway score was within the normal range.

When tracheal intubation was performed after general anesthesia was induced, the visual laryngoscope showed that the glottis was clearly visible with no abnormality. However, when placing a size 7.0 tracheal tube into the glottis, the insertion could not be completed because there was high resistance. A foreign body in the airway was suspected, and fiberoptic bronchoscopy-guided tracheal intubation was performed instead. Tetracaine gel was applied to fully lubricate the tracheal tube, and fiberoptic bronchoscopy detected multiple nodular protrusions on the tracheal wall with mucosal hypertrophy in the surrounding areas, resulting in tracheal lumen stenosis. There was slight resistance to advancement of the tracheal tube, but it was greatly reduced compared with that in the previous attempt, and tube insertion was not impeded. The tube insertion depth was 21 cm. After the fiberoptic bronchoscopy examination showed no occurrence of bleeding or tissue loss, the tube was connected to the anesthesia machine. There was no significant abnormality in airway pressure (Ppeak = 16 cmH_2O, Pmean = 6 cmH_2O), and the operation and anesthesia processes were completed without other complications. After the surgery was completed, another fiberoptic bronchoscopy examination was conducted to reconfirm that there was no

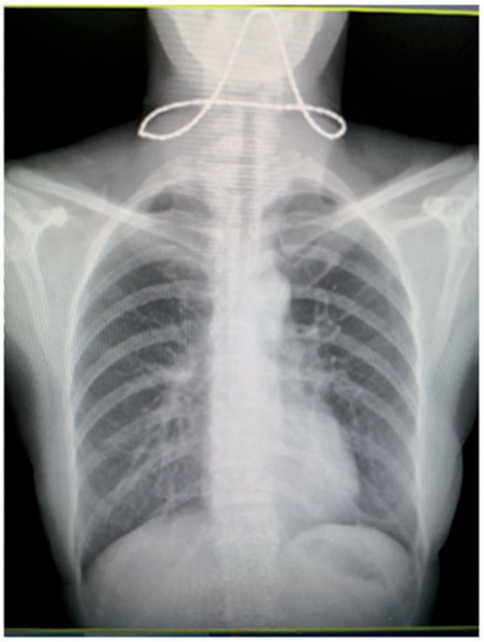

Figure 1. Radiographs revealed no abnormalities.

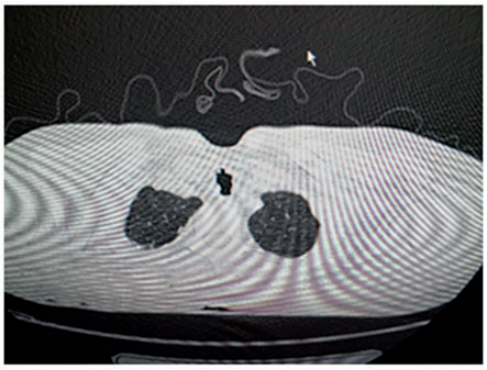

Figure 2. Computed tomography showed that the tracheal wall was not smooth. It had a thickened mucosa and a narrowed tracheal lumen.

bleeding or tissue loss. The patient was advised to go to the respiratory medicine department for further examination.

The patient's chest computed tomography (CT) scans showed that the tracheal wall was not smooth, and it had a thickened mucosa and a narrowed tracheal lumen (Figure 2). TO is characterized by the presence of osteochondral calcified nodules under the mucosa of the cartilaginous part of the trachea and the main bronchial wall.[6] The patient's CT results showed that TO was characterized by calcified nodules that protruded into the tracheal cavity and resulted in diffuse and irregular tracheal stenosis. The membrane behind the airway wall was not involved. Tracheobronchial amyloidosis and Wegener's granuloma can cause nodular thickening of the central airway wall, which is similar to TO, but CT results showed that these two diseases can involve the posterior membrane of the airway wall.[1] The bronchoscopy that was conducted on our patient in the Respiratory Medicine department revealed TO (Figure 3). The histopathological diagnosis showed visible calcification in the tracheal mucosa. The final diagnosis was then confirmed to be TO.

After obtaining the patient's signed consent, we conducted follow-up visits with the patient at 1 month, 6 months, 1 year, 1.5 years, 2 years, and 2.5 years after surgery, which all showed no occurrence of respiratory tract abnormalities.

Discussion

We encountered significant resistance during tracheal intubation in this case, which caused the first tracheal intubation to be interrupted. Fiberoptic bronchoscopy detected multiple nodular protrusions on the tracheal wall with mucosal hypertrophy in the surrounding areas, resulting in tracheal lumen stenosis. After surgery, the results of the CT, the bronchoscopy that was performed by the respiratory department, and histopathological examination supported the final diagnosis of TO.[1]

Reports have shown that TO may cause difficulty with tracheal intubation,[3] although there is no relevant test in place in tracheal intubation scoring to determine such abnormalities under the glottis. Moreover, for many of our patients, chest CT and bronchoscopy are not included in preoperative examinations, although they are useful tests that may assist in or confirm the diagnosis of TO.[3,5] Similarly, our patient also encountered unexpected subglottic intubation difficulties.

In summary, we have reflected and gained experience in several aspects, which are described below. It is recommended that when encountering such patients, the strategy of reducing the tracheal tube size and lubricating the catheter can be used. If time is insufficient, the first choice should be to reduce the catheter tube size.[3] In cases where intubation with a double lumen tube is required, if the intubation is impeded due to resistance, we suggest using a bronchial blocker because double-lumen tubes are stiffer and thicker than single-lumen tubes. Therefore, switching to a single-lumen tube-guided bronchial blocker can avoid possible tracheal damage and

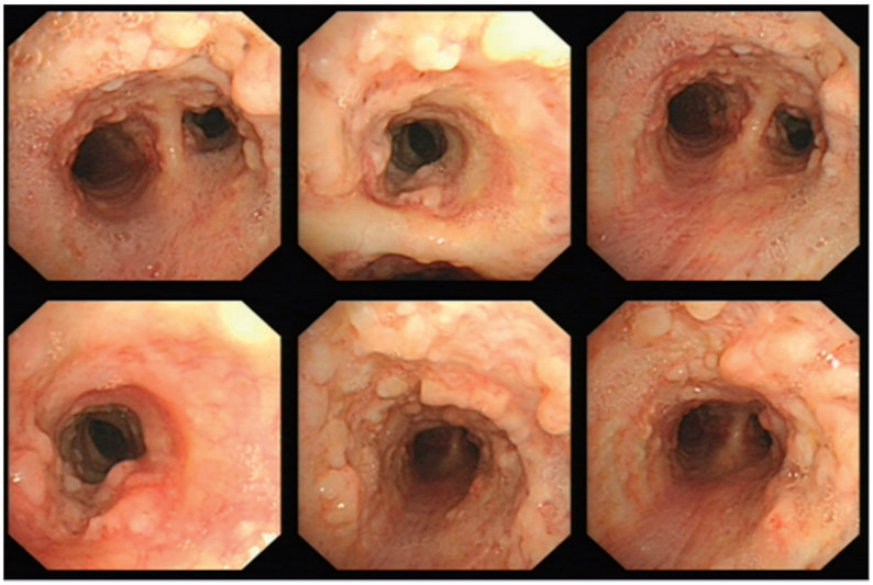

Figure 3. Bronchoscopy diagnosis: tracheobronchopathia osteochondroplastica. Multiple submucosal nodular protuberances were visible on the trachea wall beginning from the subglottic level down to the bronchi. The surrounding mucosa was hypertrophic, the cartilage ring was intact, and no secretions were observed. The glottis and the vocal cords on both sides were normal. The carina is sharp and in the center. Nodules could be seen in the left and right main bronchial walls, and the lumen of the bronchial orifice was narrow.

irritation.[7] The subglottic airway assessment should also be taken seriously. Although difficulty in subglottic intubation is less likely to occur, there is significant pressure on the anesthesiologist when it happens. Although the TO lesion tissue is relatively tough, the risk of bleeding and tissue loss during intubation is less of a concern.[8] There will still be some TO lesions that might be vulnerable to touch bleeding. Additionally, some cases of TO coincide with chronic inflammation, such as amyloidosis, which tend toward easy bleeding when touched.[9] It is also necessary to perform a fiberoptic bronchoscopy examination before removing the tracheal tube. Identifying patients with such rare diseases is particularly important to avoid impeding tracheal intubation and increasing the psychological pressure on anesthesiologists.[3] We call on anesthesia experts to issue related guidelines and expert consensus. Finally, ultrasonography may have value in the diagnosis and evaluation of TO.[10]

Declaration of conflicting interest

The authors declare that there is no conflict of interest.

Ethics statement and informed consent

Written informed consent was obtained from the patient for publication of this case report.

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