

Nonintubated Thoracoscopic Surgery for Lung Cancer Originating from an Aberrant Tracheal Bronchus

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Abstract

Tracheal bronchus was the challenging task for anesthesiologist to produce lung isolation in lung surgery. Left-sided double lumen endotracheal tube and combination of endobronchial blocker were both the potential resolutions but sometimes not functioned well. We presented a case with tracheal bronchus and lung cancer lesion located at variant segment of right upper lobe underwent thoracoscopic segmentectomy through nonintubated method. For the patient with tracheal bronchus, lung surgery through nonintubation anesthesia would be adequate and less problematic.

Keywords: Tracheal bronchus; Nonintubated; Thoracoscopy; Lung cancer

Introduction

Tracheal bronchus, an aberrant lobar or segmental bronchus usually supplying the right upper lobe, arises most often from the right tracheal wall with a prevalence ranging from 0.1% to 5% [1]. Patients with a tracheal bronchus are usually asymptomatic. However, in patients requiring tracheal intubation and one lung isolation for thoracic surgery, it can be challenging both in airway management and surgical dissection [1-3]. Nonintubated technique using regional anesthesia and targeted sedation has been recently introduced for thoracoscopic surgery with satisfactory results [4,5]. Nonintubated thoracoscopic surgery for lung cancer originating from a tracheal bronchus, however, has not previously been reported. We describe a case of successful pulmonary resection of anterior segment of right upper lobe, which is supplied from a tracheal bronchus, with a nonintubated technique. Our results indicate that nonintubated thoracoscopic surgery can be used in a challenging group of patients.

Case Report

A 71-year-old, 146-cm, 54-kg, nonsmoking woman presented with a right upper lung tumor during a thoracic computed tomographic (CT) screening for lung cancer (Figure 1A). CT-guided biopsy revealed a pulmonary adenocarcinoma. The preoperative forced expiratory volume in 1 second was 116% of the prediction value. Reviewing her CT scans, another previously undetected ground-glass opacity was also found over the anterior segment of the right upper lobe (Figure 1B). Additionally, a tracheal bronchus was found emerging 2-cm above the tracheal carina from the right trachea wall, which directed the anterior segment of the right upper lobe (Figure 2). After discussion with the surgical team about the options of intraoperative one-lung isolation, a nonintubated technique was opted and the patient agreed upon.

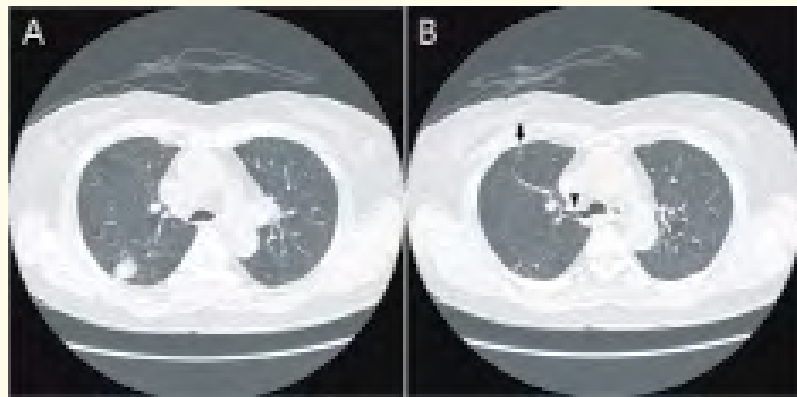


Figure 1: Thoracic computed tomographic scans showing 2 separate right upper lobe lesions. A: A 2-cm irregular tumor located at the posterior segment. B: A ground-glass opacity (arrow) located at the anterior segment, which was directed by an aberrant tracheal bronchus (arrowhead).



Figure 2: A: Aberrant tracheal bronchus (arrowhead) emerging 2-cm above the tracheal carina from the right trachea wall. B: Three-dimensional pulmonary reconstruction showing the aberrant tracheal bronchus (arrowhead) and the main tumor lesion (arrow).

In the operating room, standard monitoring of the electrocardiogram, noninvasive blood pressure monitoring, pulse oximetry and bispectral index (BIS) were applied for this patient. This patient was premedicated with intravenous fentanyl (50 to 100 μ g/mL) and sedated with intravenous propofol 1% using a target-controlled infusion method. The level of sedation aimed to achieve a BIS value between 40 and 60, and incremental intravenous injections of fentanyl 25 μ g were given to maintain a respiratory rate between 12 and 20 breaths/min. The patient was placed in the lateral decubitus position. Before making incisions, local analgesia with 2% lidocaine was applied to dermis and intercostal layer. The first chest wall incision was created for a thoracoscopy, which caused an iatrogenic pneumothorax. The operated lung collapsed gradually. After anterior thoracoscopic working port created, intrathoracic intercostal blockade with 0.25% bupivacaine (1-2 mL for each intercostal space) was performed under thoracoscopy-guided, through T3 to T8 level as our routine. To prevent patient coughing during thoracoscopic manipulation, intrathoracic vagal blockade was produced by infiltration of 0.25% bupivacaine (3 mL) adjacent to the vagus nerve at the level of the lower trachea for right-sided procedures under direct thoracoscopic vision. This vagal blockade effectively inhibited the cough reflex for 3 hours or longer.

Subsequently, with a 3-port procedure, anatomical resection of posterior segment and stapled-wedge resection of anterior segment originating from the aberrant tracheal bronchus were performed with mediastinal lymphadenectomies. After the operation, a 28 French

chest tube was inserted and the incisions were closed. The collapsed lung was reexpanded with positive-pressure mask ventilation and negative-pressure suction through the chest tube. The total operation duration was 145 minutes. Perioperatively, the oxyhemoglobin saturation was satisfactorily above 95%. The pathological report showed that both lesions were primary pulmonary adenocarcinoma with adequate margins but no involvement of lymph nodes. The patient was discharged uneventfully on the 4th postoperative day.

Discussion

Tracheal bronchus has important implications for airway management and lung isolation [1-3], especially for right side thoroscopic procedures. Mostly, it can be managed with a left-sided double-lumen tube (DLT). However, in cases of tracheal bronchus with left-shifted carina and apically retracted left main bronchus, as in our patient (Figure 2), placement of a left DLT into the left main bronchus has been demonstrated to be difficult and the orifice of the bronchial lumen of a DLT can be occluded by the bronchial wall of the left main bronchus even when correctly placed [3]. Other solutions for this challenging scenario includes (1) the use of an endobronchial blocker to occlude the right main bronchus, in combination with a Fogarty catheter to occlude the tracheal bronchus [3], or (2) the use of single lumen tube, in which the cuff of single lumen tube occludes the tracheal bronchus, in combination with a blocker to occlude the right main bronchus [2]. Notably, it is sometimes essential to temporarily reinflate the operated lung for a target bronchus to be correctly dissected. Nonetheless, occlusion of the tracheal bronchus by the cuff of tracheal tubes makes reinflation of lung parenchyma from the tracheal bronchus impossible. Through non-intubation method for lung surgery, patient remain spontaneous breathing and operated lung was spontaneously collapsed after an iatrogenic pneumothorax. Using intercostal blockade and vagal blockade, most surgical technique was feasible. In nonintubated settings, lung reinflation was achieved via assisted mask ventilation exerted by nurse anesthetist, and there is no need for balloon withdraw and reposition during reinflation.

We had previously demonstrated that anatomical lobectomy or segmentectomy can be performed safely without tracheal intubation [4,5]. In this report, the successful treatment in this patient suggests that nonintubated thoroscopic operation may be applied in selected patients with an aberrant tracheal bronchus to perform pulmonary resection for lung cancer.

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