

Unusual airways management during one-lung ventilation in thoracic surgery

ABSTRACT

Airways management in thoracic surgery is usually more difficult than in other surgery. We reported a case of a patient who underwent surgery of evacuation of empyema where after a correct insertion of a left double-lumen tube 37 Fr (DLT), one-lung ventilation was not permitted by the high airways pressure. In fact, the hole of bronchial tip was just against the left bronchial wall retracted probably from inflammatory process. We introduced blindly an Arndt blocker 9 Fr inside the tracheal lumen of DLT until the orifice of the right upper lobe bronchus, the distance was checked before. After the positioning of the blocker, the DLT was pulled up to above the carina, and the single-lung ventilation was permitted. Sometimes, an unusual use of different devices permits to manage complications. In fact, in this case, the Arndt bronchial blocker helps us to solve an important ventilatory problem.

Key words: Arndt bronchial blocker; double-lumen tube; One-lung ventilation

Introduction

Correct airways management in thoracic surgery is so complicated that it requires extensive skills even for expert anesthesiologists.^[1,2]

In fact, one-lung ventilation in thoracic surgery is assured usually with one or the other device, but in this case, we used the two devices simultaneously to resolve an important ventilatory problem.

Case Report

The patient was a 68-year-old male with a previous history of pleuritis from tuberculosis etiology. The patient was

hospitalized due to a fever, night sweats, fatigue, and dyspnea for about 1 month. The chest–abdomen computed tomography examination showed a “loculated right pleural effusion characterized by thickened walls with enhancement and the presence of air bubbles, fibrothorax with reduced volume of the hemithorax, apical pleural thickening, extensive and diffuse pleural calcified plaques, fibrotic shoots fragmented with areas of consolidation in the lower lobe of the left lung.”

After improvement of his clinical conditions, due to a placement of pleural drainage, the patient underwent surgery of evacuation of the loculated empyema.

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PAOLO PRIMIERI, PAOLO ANCONA, ELISABETTA GUALTIERI

Department of Anesthesiology and Intensive Care, Catholic University of Rome, Rome, Italy

Address for correspondence: Dr. Paolo Primieri, Department of Anesthesiology and Intensive Care, Catholic University SH of Rome, L.go A. Gemelli 8, Rome 00168, Italy. E-mail: p.primieri@libero.it

The patient was intubated with a left-sided double-lumen endotracheal tube 37 Fr. The intubation appeared smooth and proper placement of the double-lumen tube (DLT) was evaluated by bronchoscope.

The patient was positioned on his left side, and the correct positioning of the DLT was Re-evaluated. Before opening, the pleural, left one-lung ventilation was set as controlled pressure ventilation with positive end-expiratory pressure of 5 cm H₂O and initially paw of 15 cm H₂O, increased to a pressure of 25 cm H₂O due to a failure to reach an adequate tidal volume.

The high airway resistance was detected by manual ventilation of the left lung.

The ventilation was changed to controlled volume ventilation; however, a tidal volume of 150–200 ml determined the achievement of peak paw exceeding 38–40 cm H₂O.

A further control was carried out with the bronchoscope, and it showed the correct placement of the DLT. The bronchial cuff was seen at the level of the carina while the hole of the bronchial lumen was positioned against the lateral wall of the left main stem bronchus.

At the first time, the surgery begun because it did not involve resection of parenchyma, but only cleaning the pleural cavity and during this step, we alternated phases of double-lung ventilation with phases of apnea.

During maneuvers on the airways, oxygen saturation (SpO₂) was maintained >95% with a fraction of inspired oxygen of 0.5 and simultaneously hypercapnia was established with end-tidal CO₂ values between 50 and 60 mmHg.

After 30 minutes from beginning of surgery the surgeon requested one-lung ventilation to continue the surgery, in the presence of a swollen parenchyma, a fibrous thickening of the pleura, and numerous nonremovable tacks.

Therefore, we introduced the bronchoscope in the tracheal lumen of the DLT to the orifice of the right upper lobe bronchus, and this distance was recorded. The bronchoscope was extracted, and we introduced an Arndt blocker (Cook Ltd. - 9 Fr) through the same tracheal lumen to the depth previously recorded.

The dimension of the tracheal lumen did not permit us to introduce the two devices simultaneously. Subsequently, the cuff of the blocker was inflated and the surgeon checked if

the lung was ventilated or not. After the DLT was pulled up to above the carina and the patient was ventilated as if the DLT was a single tube. Adequate ventilation permitted to raise the PaCO₂ values to 38–40 mmHg while the SpO₂ was always above 95%. The patient was extubated without complications in the surgery room and after an appropriate observation, he was transferred to the ward.

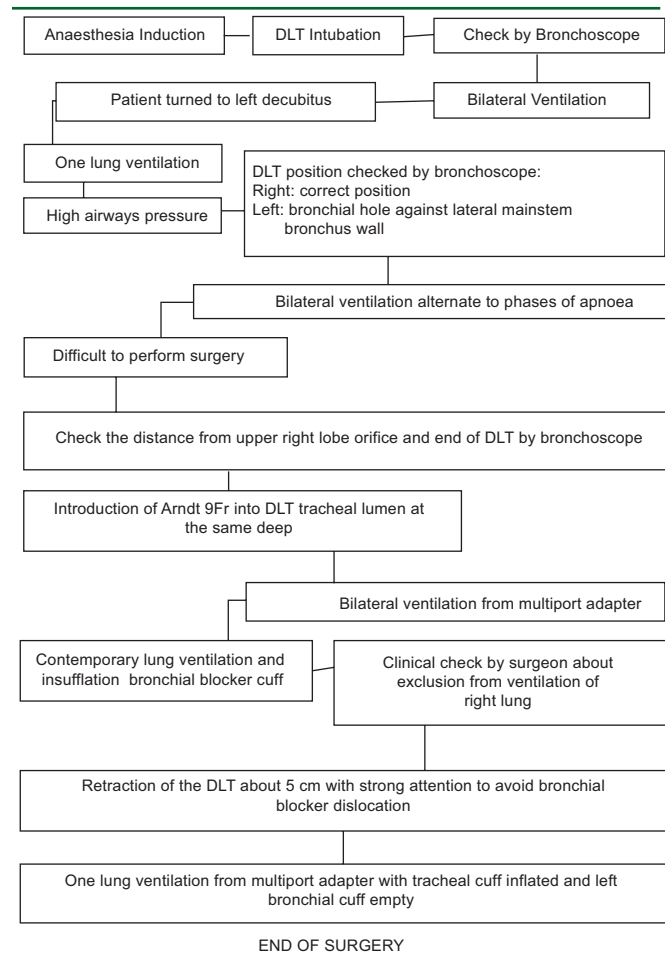
Discussion

This very challenging experience, as the diagram summarizes [Table 1], allows us to emphasize some points.

Probably, the difficulty ventilation, clinically evident after placing the patient on the left side lateral decubitus position, is related to the previous fibrosis and inflammatory status of the contralateral lung, which could have led to an anomalous traction of the left main stem bronchus.

We never thought that the high airway pressures were caused by a bronchospasm because the lung auscultation did not

Table 1: Diagram step by step of procedures



present the typical expiratory noise of an airway constriction, and the SpO₂ was always more than 95%.

There was certainly an underestimation on our part of by the status of lung fibrosis and the presence of a chronic inflammation. We could not, however, imagine that this status of the lungs could alter the anatomical arrangement of the main left bronchus also because the ventilator impairment was manifested after the lateral decubitus.

The preintubation bronchoscopy although it is useful for identifying anatomical abnormality is not routinely performed by us because it is time consuming.^[3,4]

Furthermore, in this clinical case, the difficulty was not to insert the left DLT, but it was to ventilate a cause of the conflict between the tip of the tube and the bronchus wall.

When the difficult ventilation occurred, we thought about a dislocation of DLT and its position has been repeatedly checked with the bronchoscope, so we reasoned that the only other thing to do was to reposition the patient in the supine position and replace the DLT with a bronchial blocker (BB).^[5,6]

This possibility was not considered for several reasons: to replace an endotracheal tube always has a risk of losing control of the airways, the repeated intubations increase the trauma of the upper airways, and we thought that the surgery would be simpler, less complicated, and short term.^[7]

The use of the BB in an unusual way seemed to be the only possible alternative avoiding tube replacement.^[8]

The blindly procedure was necessary because it is difficult to introduce into a tracheal lumen a bronchoscope size 3.5 coupled with an Arndt BB 9 Fr.

We usually prefer the EZ-blocker in cases of difficult intubation or prolonged postoperative ventilation, but in this case, Arndt blocker was the right device.^[9,10]

We reiterate that in thoracic surgery, in front of anatomical variables, it is necessary to know the different devices for airway management as well as to be able to use the bronchoscope to solve all the situations that may occur in this type of surgery.

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Conflicts of interest

There are no conflicts of interest.

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