

# PLACEMENT OF A DOUBLE LUMEN TUBE IN A PATIENT WITH DIFFICULT INTUBATION DUE TO ANKYLOSING SPONDYLITIS

- A Case Report -

LALE KARABIYIK\*, EMINE ALTINAY\*  
AND NURDAN BEDIRLI\*\*\*

## Abstract

During insertion of the double lumen tube in patients with ankylosing spondylitis, cervical neutral position should be maintained to avoid vertebral and spinal injuries. Although flexible fiberoptic bronchoscopic intubation is the gold standard, available FOB size is not compatible with that of the endobronchial lumen of the double lumen tube. This problem should be solved according to institutional capabilities. In this report we present a case of insertion of double lumen tube in neutral position using flexible fiberoptic bronchoscope and airway exchanger catheter in a thoracotomy patient with extremely limited neck mobility due to ankylosing spondylitis.

**Key Words:** Difficult airway, ankylosing spondylitis, flexible fiberoptic bronchoscopic intubation; lung separation, double lumen tube; equipment, airway exchange catheter.

## Introduction

Many thoracic operations often necessitate one lung ventilation (OLV) to enhance surgical view and lung separation. One-lung ventilation in a thoracic surgical patient can be achieved with the use of a double-lumen tube (DLT) or an independent bronchial blocker<sup>1</sup>. However, in practice, due to their double curved shapes and wide external diameter, DLTs are more difficult to insert than standard single-lumen tubes. Flexible fiberoptic bronchoscope (FOB)<sup>2,3</sup>, airway scope<sup>4</sup>, trachilight<sup>5</sup>, bronchial styler<sup>3</sup>, lighted styler<sup>6</sup>, blockers, proseal laryngeal mask<sup>7</sup>, and elective tracheostomy<sup>8</sup> were previously used with success in cases where intubation with DLT was difficult. Patients with difficult intubation further complicate endobronchial intubation with DLT, an already challenging process for the thoracic surgery anesthesiologist, especially those with inadequate experience<sup>1-9,10</sup>.

---

\* Associate Professor.

\*\* Resident.

\*\*\* Specialist.

Department of Anesthesiology and Intensive Care, Gazi University School of Medicine, Ankara 06500, Turkey.

Correspondence author: Lale Karabiyik, MD, PhD, Associate Professor, Gazi University, Faculty of Medicine, Department of Anesthesiology and Intensive Care, 06500-Ankara, Turkey. Tel: (+90 312) 202 5348, Fax: (+90 312) 202 4166, E-mail: lalekarabiyik@yahoo.com

Ankylosing spondylitis (AS) involving the cervical spine can result in a decrease in mobility and total fixation in severe cases. The cricoarytenoid joints and temporomandibular joints may also be involved resulting in a difficult airway, which may not be evident in conventional airway scoring systems. In severe cases, cervical spine and atlantooccipital articulation mobility are reduced and the cervical and thoracic vertebrae remain fixed in flexion position. This portion of the spine is also the most susceptible to fracture, particularly in hyperextension, an event that could lead to damage to cervical spinal cord during airway management maneuvers. Intubation is complicated by limited head and neck mobility due to the fusion of joints. Patients in such conditions should be intubated while maintaining neutral position of the head and neck, and awake fiberoptic intubation is always the safest option<sup>11</sup>.

In this case report, placement of DLT in neutral position using FOB and airway exchange catheter in a thoracotomy patient with extremely limited neck mobility due to ankylosing spondylitis is presented.

### Case report

A 58-year-old man with AS, diagnosed 25 years ago, was scheduled for elective lung surgery in the lateral decubitus position. He had limitation of mobility of the head and neck in flexion, extension and rotation. The thyromental distance was 5 cm and mouth opening was 2.5 cm. Mallampati classification was 4. Moreover, he had a history of coronary artery disease, hypertension and renal insufficiency.

The patient was placed on the operating table in a half sitting position after the operating table was adjusted and padding was added. Standard monitorization were applied before induction. Airway was topically anesthetized with lidocaine 5% (Xylocain Spray Pump 100 mg 50 ml, Astra Zeneca) for awake intubation. He was preoxygenated with 100% oxygen for 5 minutes. Sedation was achieved with bolus iv infusion of midazolam 2 mg, and then remifentanil 0.01  $\mu\text{g}/\text{kg}/\text{min}$  was infused. Since the available FOB was not compatible with the 39 Fr left-sided double lumen tube, an 9.5 mm single-lumen endotracheal tube was successfully introduced over a FOB, and the bronchoscope was removed.

Propofol 2 mg/kg and atracurium 0.5 mg/kg iv were administered to ease the passage of the tube through the vocal cords. Anesthesia was maintained with an infusion of remifentanil 0.2  $\mu\text{g}/\text{kg}/\text{min}$  and propofol 4-10 mg/kg/h. As selective ventilation was required during surgery, a well-lubricated 14 Fr/83 cm airway exchange catheter (Cook Airway Exchange Catheter with Rapi-Fit® Adapters, Cook Incorporated, USA) was inserted into the single-lumen tube until it reached above the carina. After the single-lumen tube was removed, a lubricated left-sided 39 Fr DLT (Broncho-Cath, Mallinckrodt Medical Athlone, Ireland) was advanced into the trachea through the tube exchanger catheter. After this catheter was withdrawn, DLT was advanced into the left main bronchus without guide. The correct position of DLT was confirmed by auscultation. During this procedure, oxygen saturation was maintained at more than 95%. Insertion was uncomplicated and selective ventilation was satisfactory.

### Discussion

Ankylosing spondylitis produces a rigid spine that restricts neck movement, and thus, direct laryngoscopy and tracheal intubation may be impossible. Patients with AS are also prone to spinal fractures even at minor movements, especially extension, resulting in neurological deficit and even death<sup>9,11</sup>. Due to their size and configuration, the insertion of DLTs into the trachea is more difficult than the insertion of single-lumen endotracheal tubes. When the separation of lungs is strictly indicated, despite the presence of a difficult airway, awake intubation with fiberoptic bronchoscopy can be attempted with DLT or with single-lumen tube<sup>1-9,10</sup>. The FOB available in our department was not compatible with the endobronchial lumen size of the DLT; therefore, taking into consideration the equipment available, we initially performed endotracheal intubation with a single-lumen tube using FOB.

In the event that intubation is achieved with a single-lumen tube; it is recommended that either an endobronchial blocker is inserted through this tube or exchanged with a DLT<sup>12</sup>. In our case, we preferred the latter due to availability of an exchange catheter of a size and length that could pass through

the endobrochial lumen of the DLT considered for exchange. This exchange was planned to be conducted through an airway exchange catheter and successfully executed. Tracheal laceration after the use of an airway exchange catheter for DLT placement has been reported previously<sup>13</sup>. In our case, the catheter used for tube exchange was of sufficient length and atraumatic soft-tipped, and no complications were observed after these procedures.

Although intubation with DLT is recommended using FOB, single-lumen tube intubation in our case was achieved through FOB without laryngoscopy because small-caliber FOB was unavailable in our department. The standard single-lumen tube was then

exchanged for a DLT by using the tube exchanger catheter. Neutral position of fixed thoraco-cervical vertebrae was maintained throughout these attempts. To our knowledge, this case is the first evaluating the intubation of DLT in As patients with difficult airways.

In conclusion, the clinician should be able to master different methods of lung separation and become familiar with the devices available for difficult cases, especially when a small-caliber fiberoptic bronchoscope is unavailable. Methods to overcome the difficulty of intubation with DLT should be developed within the frame of practitioner's experience and facilities of each institution.

## References

1. SLINGER P, CAMPOS JH: Anesthesia for thoracic surgery, in Miller RD (ed): Miller's anesthesia. 7<sup>th</sup> ed. Philadelphia, PA: Elsevier Churchill Livingstone, 2010, pp. 1819-1887.
2. NAKANISHI K, TERAOKA K, NABETA T, YOROZUYA T, KUZUME K, NAGARO T: Successful oral fiberoptic intubation by a double-lumen tube under the ventilation only via nostrils with a child size mask in a patient with limited mouth opening. *Masui*; 2009, 58:616-9.
3. ORHAN ME, GÖZÜBÜYÜK A, ZIZLAN A, DERE U: Unexpected difficult intubation due to lingual tonsillar hyperplasia in a thoracotomy patient: intubation with the double-lumen tube using stylet and fiberoptic bronchoscopy. *J Clin Anesth*; 2009, 21:439-41.
4. POON KH, LIU EH: The Airway Scope for difficult double-lumen tube intubation. *J Clin Anesth*; 2008, 20:319.
5. CHEN KY, TSAO SL, LIN SK, WU HS: Double-lumen endobronchial tube intubation in patients with difficult airways using Trachlight and a modified technique. *Anesth Analg*; 2007, 105:1425-6.
6. O'CONNOR CJ, O'CONNOR TA: Use of lighted stylets to facilitate insertion of double-lumen endobronchial tubes in patients with difficult airway anatomy. *J Clin Anesth*; 2006, 18:616-9.
7. TSUCHIHASHI T, IDE S, NAKAGAWA H, HISHINUMA N, TAKANO T, NISHIZAWA M: Differential lung ventilation using laryngeal mask airway and a bronchial blocker tube for a patient with unanticipated difficult intubation. *Masui*; 2007, 56:1975-7.
8. SHIH CK, KUO YW, LU IC, HSU HT, CHU KS, WANG FY: Application of a double-lumen tube for one-lung ventilation in patients with anticipated difficult airway. *Acta Anaesthesiol Taiwan*; 2010, 48:41-4.
9. BRODSKY JB: Lung separation and the difficult airway. *Brit J Anaesth*; 2009, 103:66-75.
10. CAMPOS JH: Lung isolation techniques for patients with difficult airway. *Curr Opin Anesthesiol*; 2010, 23:12-7.
11. ABRAMSON S, FRIEDMAN K, HAGBERG C: Airway management of a patient with history of difficult airway, in Hung O, Murphy MF (eds). Management of the difficult and failed airway, McGraw-Hill Companies, 2008, pp. 365-372.
12. COHEN E: Methods of lung separation. *Minerva Anesthesiol*; 2004, 70:313-8.
13. THOMAS V, NEUSTEIN SM: Tracheal laceration after the use of an airway exchange catheter for double-lumen tube placement. *J Cardiothor Vasc Anesth*; 2007, 21:718-9.