Use of the Arndt wire-guided endobronchial blocker via nasal for one-lung ventilation in patient with anticipated restricted mouth opening for esophagectomy

Chee-Yueh Angie Ho*, Chun-Yu Chen, Min-Wen Yang, Hung-Ping Liu

Department of Anesthesia, Chang Gung Memorial Hospital, 5, Fu-shin Street, Kweishan, Taoyuan 333, Taiwan, ROC

Received 19 October 2004; received in revised form 10 March 2005; accepted 11 March 2005; Available online 18 April 2005

Abstract

Functional separation of the lungs may be accomplished by several methods. Patient with restricted mouth opening has limited options for one-lung ventilation. We report the use of wire-guided endobronchial blockade, a new tool for achieving one-lung ventilation in a patient with restricted mouth opening requiring nasotracheal, fiberoptic intubation for esophagectomy and reconstruction with gastric tube substitution.

© 2005 Elsevier B.V. All rights reserved.

Keywords: Wire-guided endobronchial blockade; Restricted mouth opening; One-lung ventilation

1. Introduction

One-lung ventilation is a commonly used technique to facilitate surgical visualization during thoracic surgical procedures. In some circumstances, lung isolation is mandatory; it may be difficult to achieve in restricted mouth opening or critically ill patients. These anticipated difficult endotracheal intubation complicated one-lung ventilation. We report the successful one-lung ventilation in restricted mouth opening patient by using the new endobronchial blocker through nasal endotracheal intubation.

2. Case report

A 65-year-old man was scheduled for esophagectomy and reconstruction with gastric tube substitution because of esophageal cancer. Four years ago, he suffered from left buccal cancer and received radical neck dissection, free flap reconstruction following marginal mandibulectomy. Postoperative radiotherapy was completed. After radiotherapy, trismus was noted with limited neck movement and mouth opening of only 0.5 cm. All preoperative laboratory values, chest radiographs, and electrocardiograms were unremarkable.

In the operating room, routine monitors and a radial arterial catheter were placed. Anesthesia and relaxation were induced with fentanyl 150 μg, propofol 100 mg and rocuronium 40 mg. A flexible fiberoptic bronchoscope was (FOB) used as a guide to pass a conventional endotracheal tube (inner diameter, 7.0 mm) through the right nostril into the tracheal. An Arndt wire-guided endobronchial blocker (WEB) (Arndt Endobronchial-Blocker Set, Cook, Inc., Bloomington, IN) was placed coaxially through the nasal endotracheal tube using a pediatric bronchoscope and a special bronchoscopy port. The special bronchoscopy port offers multiple access ports. The proximal end of the endotracheal tube was attached to a multiport adapter that allow simultaneous introduction of the bronchoscope and the endobronchial blocker while maintaining ventilation of the lungs. The endobronchial port (WEB blocker port), which is oriented at 30° to the bronchoscopy port, has a Tuohy-Borst type valve that locks the blocker in place and maintain an airtight seal. Prior to placement WEB, the elliptical balloon of the blocker must be deflated. By using fiberoptic guidance, the blocker was advanced until it could be seen below single-lumen tube, and then twirled the fingertips until the distal tip entered the right main bronchus. The elliptical balloon of the blocker was inflated under direct visualization and the FOB withdrawal. Lung separation was accomplished without difficulty with inflation of the blocker balloon. A right thoracotomy was performed. The airway pressure under one-lung ventilation was up to 31 cmH₂O, and no desaturation was noted through the whole procedure. The surgical procedure proceeded uneventfully with good visualization of the operative field. After completion of surgery, the blocker balloon was...
deflated and the WEB was removed. Right lung was reexpanded and the trachea was extubated after obtaining sufficient spontaneous ventilation.

3. Discussion

Selective ventilation of one-lung ventilation has been accomplished by several methods [1,2]. Tracheal intubation of patients with restricted mouth opening may be difficult and challenging because the maximum mouth opening cannot be increased, even by administering neuromuscular blocking drugs [3]. Fiberoptic intubation remains a recommended technique for airway management [4]. Nasal intubation may be advantageous for this purpose and easier to place, especially in patients with difficult airway [4,5]. This patient’s restricted mouth opening has limited option for one-lung ventilation. The larger outer diameter and distal curvature of the double-lumen tube would have made nasal intubation difficult, if not impossible. Nasotracheal intubation and one-lung ventilation using a Univent tube has been previously reported [5]. However, Univent placement may be traumatic because of the larger outer diameter of these tubes [6]. The short length of a conventional single-lumen tube also prohibits endobronchial intubation via nasal route. The Fogarty occlusion embolectomy catheter as a bronchial blockade to achieve lung isolation has been described [7], but it also has several disadvantages [8]. Placement may be difficult, as it is lack of guide-wire device, lack of communication channel in the center, therefore suction or oxygen insufflation is not possible. An air leak from the breathing circuit can be a common problem, especially when the Fogarty tube is placed inside single-lumen endotracheal tube.

We describe a patient with anticipated anatomical constraint of mouth opening, which disallowed the passage of the double-lumen tube or Univent. The Arndt WEB and the special bronchoscopy port have been proved to overcome many of the pitfalls of current endobronchial blocker technology. Selective WEB through a conventional endotracheal tube has been described in many literatures as a new alternative method to achieve one-lung ventilation in morbidly obese or critically ill patient [9,10]. Advantage of the Arndt device is the airway adaptor that contains ports for anesthesia circuit, the bronchoscope, the bronchial blocker as well as attachment to the endotracheal tube. Ventilation is easily maintained during placement of the blocker. Removal of the wire following placement provides a central channel that allow some degree of suctioning through the channel to deflate the operative lung and improve surgical visualization. The bronchial blocker port has a self-sealing diaphragm that can be tightened down around the bronchial blocker to hold it in place, thereby preventing movement of the blocker and its potential dislodgement from the desired site. Because the Arndt blocker requires a single-lumen endotracheal tube, it maximizes the cross-sectional diameter, and eliminates the need for tube exchange if mechanical ventilation is contemplated in the postoperative period.

The Arndt wire-guided endobronchial blocker system offers a new tool to achieve one-lung ventilation in adults. It offers the clinician alternative for managing one-lung ventilation in a challenging patient who required nasal intubation because of severe restricted mouth opening.

References