

Esophageal tracheal combitube overcomes difficult intubation: flexion deformity of the cervical spine due to rheumatoid arthritis

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Introduction

The effectiveness of the esophageal tracheal combitube (ETC) in pulmonary resuscitation [1], routine surgery [2] and mechanical ventilation in intensive care units [3] is described. Ours is the first report in Japan concerning the use of ETC in managing difficult intubations. This report illustrates the usefulness of ETC in the management of patients with difficult airways in whom general anesthesia was required.

Case report

A 70-year-old woman (body weight, 40 kg; height, 145 cm) with multiple rheumatoid arthritis was admitted for removal of knee implants caused by infection. The patient had a history of flexion deformity of the cervical spine with fusion of the vertebrae due to rheumatoid arthritis. In addition, she had undergone a total knee replacement under spinal anesthesia. The neck was immobile, and neither extension nor rotation of the head could be accomplished. The back of her head could not touch the bed while she was lying on her back. A radiographic examination revealed that the cervical, thoracic, and lumbar portions of the spine were fused (Fig. 1). Spinal anesthesia was selected for removal of the knee implants because a previous spinal anesthesia had been performed successfully. Spinal anesthesia was also thought to be advantageous because

the time required for the procedure was not expected to be unduly long. Nevertheless, spinal tap was not possible due to fusion of the lumbar spine, which had been aggravated as a result of a fall two years previously. Thus, the anesthetic procedure was changed to general anesthesia. First, standard intubation with a direct laryngoscope was performed. The patient was given thiamylal, 250 mg iv for induction of anesthesia. The patient was then managed with 1.5% sevoflurane, 4 l·min⁻¹ of nitrous oxide, and 2 l·min⁻¹ of oxygen. The airway remained patent thus far. Muscle relaxation was produced by succinylcholine 40 mg. Tracheal intubation was unsuccessful due to limited visualization of the glottis. The corniculate cartilage was barely visible. Difficulty in the insertion of the endotracheal tube was attributable to a lack of extension of the neck and the restricted movement of the mandible. An ETC was inserted blind and positioned in the esophagus. Adequate ventilation was achieved during surgery with the use of the ETC. No complications occurred as a result of this blind technique for airway maintenance. Arterial oxygen saturation (Spo₂) by pulse oximetry was consistently more than 99%. The procedure lasted for 2 h and 15 min during which muscle relaxation was maintained by pancuronium. At the end of surgery, muscle relaxation was reversed with intravenous neostigmine, 1.5 mg and atropine, 1.0 mg. Extubation of the patient was performed with the patient awake. The immediate postoperative ventilation of the patient was adequate.

Discussion

The ETC (Fig. 2, Sheridan Catheter, Argyle, N.Y.) is a new double-lumen airway device. The esophageal lumen has a closed distal tip while incorporating eight ventilating eyes at the pharyngeal level to provide ventilatory support during esophageal placement. The esophageal and tracheal lumens are partitioned. Proxi-

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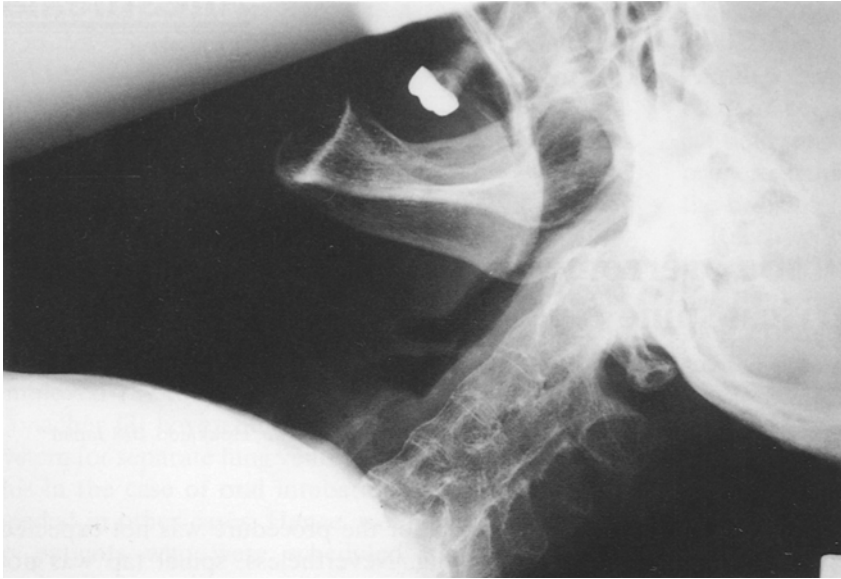


Fig. 1. Lateral roentgenogram of the fusion of cervical supine. The occiput of the patient could not touch the bed while she was lying on her back

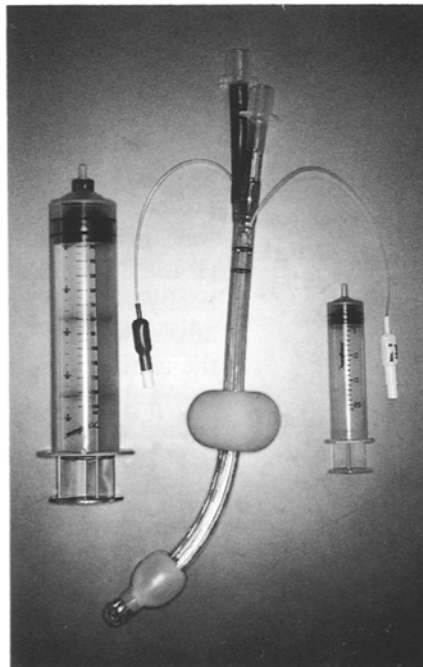
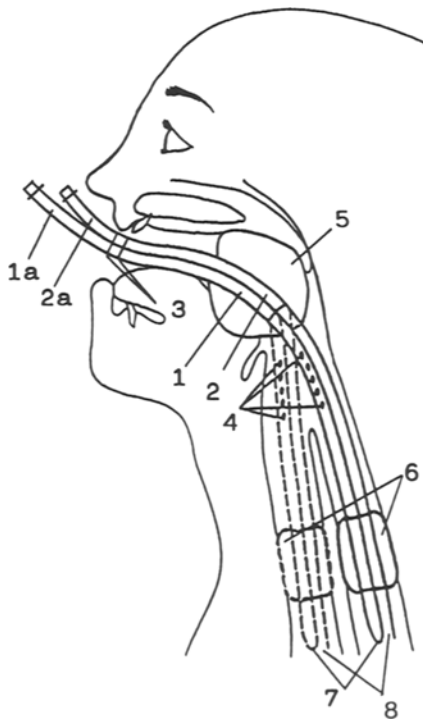


Fig. 2. The esophageal tracheal combitube (ETC) in esophageal (*continuous line*) and tracheal positions (*dotted line*). 1, esophageal lumen; 2, tracheal lumen; 1a, connector leading to the esophageal lumen; 2a, connector leading to the tracheal lumen; 3, printed ring-marks for indicating depth of ETC; 4, ventilating eyes of the esophageal lumen at the oropharyngeal level; 5, oropharyngeal balloon cuff; 6, distal cuff; 7, distal blocked end of the esophageal lumen; 8, distal open end of the tracheal lumen

mal to the eight ventilating eyes is a large oropharyngeal balloon cuff which, when inflated, seals the hypopharyngeal area. The distal cuff seals off either the esophagus or the trachea, depending upon the site of placement, when inflated with 15 ml of air. The ETC provides the patient with a patent airway when inserted in either the esophagus or the trachea. We used the ETC for management of patients who were difficult to intubate.

Several approaches have been recommended to over-

come the problem of difficult or impossible intubation. Among these, the use of a flexible fiberoptic tracheal intubation is the preferred method. Fiberoptic tracheal intubation is appropriate for patients whose head and neck are immobile as a result of rheumatoid arthritis or ankylosing spondylitis [4]. However, there are two major disadvantages with the use of the fiberscope [5]. One drawback is that its vision is easily obscured by airway secretions and/or blood; the other is the high cost of the fiberscope.

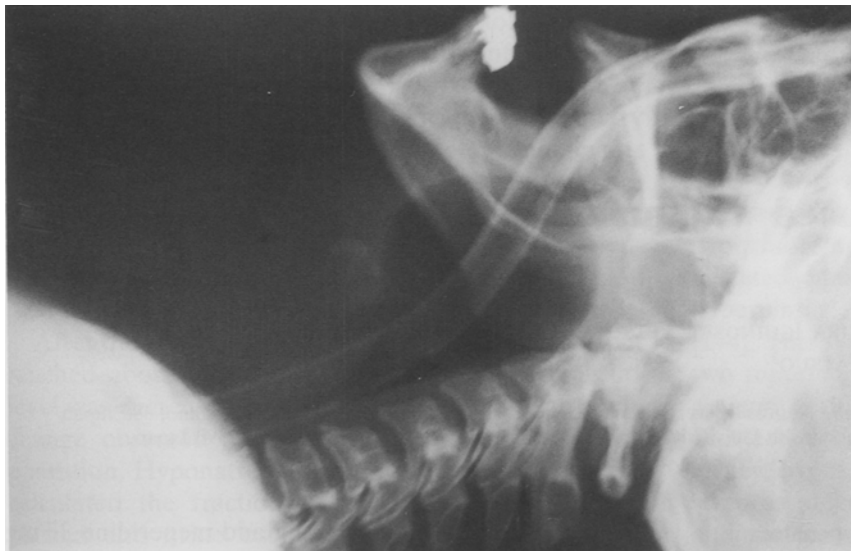


Fig. 3. Lateral roentgenogram of the oropharyngeal balloon that anchors the ETC behind the hard palate and inhibits accidental removal. (Picture is not from this case)

Blind tracheal intubation is an invaluable technique, and many methods to monitor the entrance of the tube into the trachea have been proposed. One of the reported methods consists of monitoring the position of the tube by continually listening to the respiratory sounds through the tube [6]. Another method proposed is the monitoring of end-tidal carbon dioxide [7]. Regardless of which method is used, spontaneous breathing is essential for performance of this blind technique.

Another blind device for establishing an airway is the esophageal obturator airway (EOA) [8]. The use of this apparatus is generally not recommended because inadvertent insertion into the trachea would completely obstruct the patient's airway; the ETC avoids this disastrous complication because it can provide satisfactory ventilation regardless of whether it is positioned in the esophagus or the trachea. The ETC can be inserted blind without having to recognize common anatomical landmarks. Further, the placement of this tube does not require moving the head or neck. Even though the cervical spine was fused, and thus immobile in our patient, the ETC was readily inserted without any difficulty. In contrast to the EOA, the ETC is kept in place without having to support all the face mask connections. The oropharyngeal balloon anchors the ETC behind the hard palate and inhibits its accidental removal (Fig. 3).

The advantages of endotracheal intubation lie not only in its effectiveness in maintaining a patent airway, but also in its preventive effect against gastric regurgitation. The ETC in place also prevents complications attributable to aspiration of regurgitant materials. The laryngeal mask airway (LMA) is another device for securing an airway in difficult-to-intubate cases [9].

LMA has been reported to be inferior to the ETC in its protective effects against aspiration [10]. There is no doubt that endotracheal intubation is the most definitive method of maintaining a patent airway. However, the occasional difficulties encountered in its placement preclude its use in specific situations. In summary, our experience with the present case has shown that the ETC is a useful alternative to the endotracheal tube when endotracheal intubation is difficult or unsuccessful.

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