

## Value of the Laryngeal Mask Airway during Thoracotomy

*To the Editor:*—The use of double-lumen tubes is common during thoracic surgery. However, changing these tubes intraoperatively is rare and not without risk of losing airway control. We report a case of this alarming event and its subsequent management.

A 64-yr-old man was scheduled for thoracotomy for excision of a tumor of the right upper lobe. Physical examination was unremarkable except for a reduced mandible-thyroid distance. Anesthesia was induced with propofol and fentanyl, and vecuronium was used to achieve muscle relaxation. Ventilation *via* mask was considered to be easy. Rigid bronchoscopy was then performed by a surgeon who commented that tracheal intubation was moderately difficult.

When bronchoscopy was completed, the instrument was removed and ventilation *via* mask was resumed. Hemoglobin oxygen saturation remained 98% or greater throughout the procedure. Laryngoscopy was performed, and only the most posterior portion of the vocal cords could be seen. A 39-Fr left-sided plastic double-lumen tube was inserted, and the patient was turned to the left lateral position. The position of the tube was confirmed using a flexible bronchoscope. The edge of the endobronchial cuff was visible just below the carina.

Surgical dissection of the collapsed right upper lobe began. About 30 min later, the surgeon remarked that the right lung was now being ventilated and further surgery was impossible. Flexible bronchoscopy was repeated, and the endobronchial cuff was now positioned above the carina. Despite numerous attempts to advance the tube distally, with a "blind" technique or with bronchoscopic guidance, the cuff could not be returned to its previous position. It was decided to change to a smaller double-lumen tube. A 16-Fr Neoplex bougie (Porges, France)—kept in each operating room—was lubricated, and introduction through the endobronchial lumen was attempted. However, it could not be easily passed down this lumen, so a 10-Fr bougie was found and easily introduced into the endobronchial tube. The 39-Fr tube was removed, and a 37-Fr double-lumen tube was inserted over the bougie. There was some resistance during its passage, and then removal of the bougie was impossible, even with moderate force. It was suspected that the 37-Fr double-lumen tube had entered the esophagus and taken the flexible bougie with it. The bougie and double-lumen tube were easily removed as a single unit. A 180° bend of the

bougie confirmed our suspicion of the failure of the bougie to guide the double-lumen tube into the trachea. Urgent laryngoscopy was performed, but the larynx could not be seen. Bag-mask ventilation was commenced with some difficulty, and a laryngeal mask airway (LMA) was requested. With the patient still in the lateral position, a size-4 LMA was passed easily, and manual ventilation continued. The surgeon was requested to cover the open chest in preparation for turning the patient back to the supine position. Following the turn, a 37-Fr double-lumen tube was introduced easily and positioned with the aid of flexible bronchoscopy. Hemoglobin oxygen saturation remained greater than 90% throughout the airway manipulation.

The LMA has been useful for emergency airway management during failed intubation in both obstetric and the general surgical population.<sup>1-3\*</sup> In the case we describe where a patient was in the lateral position without a secure airway, the LMA proved a valuable tool to "buy time" while preparation was made to cover a large chest wound and then return the patient to the supine position for reintubation. We suggest that this easy technique should be considered whenever airway management proves difficult. Also, a greater range of bougies should be available for exchanging tracheal tubes.

\* Sarna MC, Clapham MC: Failed tracheal intubation managed with the laryngeal mask. *Anaesthesiology News* Volume 36, 1989.

RICHARD H. RILEY, M.B., B.S.  
HILTON D. SWAN, M.B., B.S.  
*Department of Anaesthesia  
Royal Perth Hospital  
Box X2213 GPO  
Perth WA 6001  
Australia*

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This letter is accompanied by an editorial. Please see: Benumof JL: Laryngeal mask airway: Indications and contraindications. *ANESTHESIOLOGY* 77:843-846, 1992.

## High-frequency Oscillation May Be Useful in Perioperative Respiratory Management of Neonates with Congenital Cystic Adenomatoid Malformation

*To the Editor:*—Recently Nakano *et al.* described the successful management of ventilation in two neonates with congenital cystic adenomatoid malformation (CCAM) using high-frequency oscillatory ventilation (HFOV).<sup>1</sup> We describe a case confirming the effectiveness of

HFOV in perioperative ventilatory management of a neonate with CCAM.

*Case Report.* A pregnant woman, with polyhydramnios and a tumor in the fetal left hemithorax detected by routine prenatal ultrasound

TABLE 1. Perioperative Changes in Ventilator Settings and Values of Arterial Blood Gas Analysis

| Time                                 | Immediate Postnatal | Preoperative NICU | Preoperative OR | Before Lobectomy | Postoperative OR | 4 Days Postoperatively |
|--------------------------------------|---------------------|-------------------|-----------------|------------------|------------------|------------------------|
| Mode                                 | Manual              | HFOV              | Manual          | HFOV             | HFOV             | CPAP                   |
| FiO <sub>2</sub>                     | 1.0                 | 1.0               | 1.0             | 0.6              | 0.5              | 0.3                    |
| P <sub>aw</sub> (cmH <sub>2</sub> O) | nm                  | 17                | nm              | 22               | 15               | nm                     |
| f (Hz)                               | nm                  | 15                | nm              | 15               | 15               | nm                     |
| PaO <sub>2</sub> (mmHg)              | 29                  | 118               | 41              | 120              | 181              | 91                     |
| PaCO <sub>2</sub> (mmHg)             | 81                  | 33                | 62              | 20               | 18               | 63                     |
| pH                                   | 6.95                | 7.37              | 7.11            | 7.45             | 7.54             | 7.45                   |

NICU = neonatal intensive care unit; OR = operating room; HFOV = high-frequency oscillatory ventilation; P<sub>aw</sub> = mean airway pressure,

nm = not measured; f = frequency; CPAP = continuous positive airway pressure.

examination, was transported to our hospital after the premature rupture of the membranes at 33 weeks of gestation. Consequently, a 1806-g male neonate was delivered vaginally in the lying-in room. Apgar scores at 1 and 5 min were 4 and 6, respectively. Immediately after birth, his trachea was intubated, and he was transported to the neonatal intensive care unit (NICU) for ventilatory management. He suffered from severe hypoxia despite manual ventilation during transport. His lungs were then ventilated with high-frequency oscillation (HFO) (Hummingbird BMO-20N) at the frequency of 15 Hz and mean airway pressure of 17 cm H<sub>2</sub>O. This ventilation improved his arterial blood gases (table 1). The diagnosis of CCAM was confirmed using chest roentgenogram, which revealed fine cystic masses in the left lung with a mediastinal shift to the right. Poor oxygenation and hypotension caused by compression of the heart and lung by the cyst led to an emergency left lower lobectomy. As the ventilator had no battery, manual ventilation had to be performed during transfer from the NICU to the operating theater. Interruption of HFOV led to severe hypoxemia on arrival in the operating room. Resumption of HFOV rapidly improved oxygenation considerably. HFOV at gradually reduced ventilator settings was continued during anesthesia. The lower lobe of his left lung was occupied by a solid lesion, resulting in compression and collapse of the left upper lobe. The lobectomy improved the gas exchange by releasing compression of the remaining lobe. During return to the NICU, manual ventilation was not associated with decreased oxygenation. The patient was successfully separated from HFOV 4 days after operation. Thereafter, ventilation could be controlled using continuous positive airway pressure. On postoperative day 15, his trachea was extubated with no complication.

Nakano *et al.* have recommended fetal anesthesia during elective cesarean delivery and prompt use of HFOV for neonates without prior mask ventilation,<sup>1</sup> because spontaneous respiration immediately after birth and conventional ventilation increase the risk of hypoxemia in neonates by enlarging and rupturing lung cysts. Our inability to ventilate the lungs with HFOV during transfer to the operating room suggests that cesarean section or vaginal delivery in the operating room

would have been beneficial compared with delivery in the lying-in room in the obstetric ward. Our report supports the use of HFOV as described by Nakano *et al.*<sup>1</sup> and suggests that this technique might be useful in the perioperative period for other neonatal cystic lung lesions such as congenital lobar emphysema,<sup>2</sup> if conventional ventilation is inadequate.

NOBUHIRO MAEKAWA, M.D.  
*Associate Professor*

KAHORU NISHINA, M.D.  
*Resident*

KATSUYA MIKAWA, M.D.  
*Instructor*

HIDEFUMI OBARA, M.D.  
*Professor and Chairman*

*Department of Anaesthesiology  
Kobe University School of Medicine  
Kusunoki-cho 7, Chuo-ku  
Kobe, 650, Japan*

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2. Goto H, Boozalis ST, Benson KT, Arakawa K: High-frequency jet ventilation for resection of congenital lobar emphysema. *Anesth Analg* 66:684-686, 1987

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### Memory during Anesthesia

*To the Editor:*—In their recent article on memory during anesthesia,<sup>1</sup> Cork *et al.* mention, but do not detail, data that appear in conflict with their own conclusions. They note that three patients remembered specific words from the list presented during anesthesia. These patients were excluded from the study, presumably to test implicit memory in the absence of explicit recall. Of the remaining patients (who showed

no free recall of list items), more than a third (9 of 25) "reported vague, dreamlike recollections of other intraoperative events." We are not told how closely these experiences corresponded to actual intraoperative events. However, the word "recollections" suggests that the authors believe them to be true, explicit memories. Indeed, the authors remark, "The use of a pure nitrous oxide/opioid technique without