

Letter to the editor

Removal of dried tenacious mucus plug from the trachea of an asthmatic patient with bronchoscopic forceps

Tetsuo Takaya, Toshiyasu Suzuki, and Mamoru Takiguchi

Department of Anesthesiology, Tokai University School of Medicine, Bohseidai, Isehara, Kanagawa 259-1193, Japan

We successfully removed a dried tenacious mucus plug from an asthmatic patient with forceps under bronchoscopic visualization. The patient was a 67-year-old man who had been treated with corticosteroids and β -adrenergic agonists for 6 years for emphysema and frequent asthmatic attacks. He was admitted to a hospital because of bronchopneumonia. Twelve days after admission, his condition was complicated by status asthmaticus. He was treated with intravenous aminophylline, subcutaneous epinephrine, and terbutaline without any remarkable improvement. On the 14th day after admission, endotracheal intubation (8.0-mm endotracheal tube) and mechanical ventilation were required because of loss of consciousness. Inhalation of 2% isoflurane in oxygen was started with an anesthesia machine the next day. His asthmatic condition responded well to this therapy, and he became dependent on isoflurane inhalation. An occasional bronchoscopic examination was performed for suction of sputum in the trachea. Meticulous respiratory care was impossible because of the shortage of medical staff and equipment. This resulted in active humidification of airways not being done during the isoflurane inhalation therapy. On the 18th day, when he was transferred to our ICU, the breath sounds were weak and wheezes were heard in all lung fields, particularly in the expiratory phase. A chest radiograph revealed overinflation of both lungs. With the use of a Servo Ventilator (MODEL 900D, Siemens-Elcoma, SoIna, Sweden) with its own isoflurane vaporizer, inhalation of 3% isoflurane in oxygen was started under intermittent positive pressure ventilation (i.e., volume-controlled ventilation mode) after the administration of muscle relaxant. The expired tidal volume (V_T), expired minute volume (V_E), and peak airway pressure (peak P_{aw}) were 230 ml, $3.6 \text{ l}\cdot\text{min}^{-1}$, and $60 \text{ cmH}_2\text{O}$, respectively. The preset inspired minute volume (MV) was $12 \text{ l}\cdot\text{min}^{-1}$ at the respiration rate of $16 \cdot \text{min}^{-1}$, and the ratio of inspiration to expiration time was 1:1.9 with a working pressure of $60 \text{ cmH}_2\text{O}$. The arterial blood gases (ABG) were PO_2 270 mm Hg, PCO_2 78.2 mm Hg, pH 7.329, HCO_3^- $41.5 \text{ mmol}\cdot\text{l}^{-1}$, and BE $+12.4 \text{ mmol}\cdot\text{l}^{-1}$. This high BE value was considered to be based mainly on renal compensation

for chronic respiratory acidosis. Because isoflurane did not improve his condition remarkably, enflurane was started at 3%, but there was no further improvement. When airway obstruction was suspected from the clinical signs, we stopped the inhalation of enflurane and decided to perform a bronchoscopic examination to clarify the cause. A dried tenacious mucus plug was identified in the trachea at the tip of the endotracheal tube, occupying 80% or more of the tracheal lumen. After an attempt to aspirate the plug through a flexible fiberoptic bronchoscope failed, it was successfully removed with bronchoscopic forceps.

A diffused redness and edema of the bronchial mucous membranes and a small amount of sputum were observed in the bronchi peripheral to the carina. Airway narrowing due to the bronchospasm was, however, not observed, and all orifices of the lobar bronchi were open. Immediately after bronchoscopy, the patient's condition remarkably improved. Peak P_{aw} dropped to $40 \text{ cmH}_2\text{O}$ and V_E increased to $10 \text{ l}\cdot\text{min}^{-1}$. Preset MV was changed to $8 \text{ l}\cdot\text{min}^{-1}$. ABG 30 min later were PO_2 165 mm Hg, PCO_2 56.2 mm Hg, pH 7.437, HCO_3^- $38.3 \text{ mmol}\cdot\text{l}^{-1}$, and BE $+12.2 \text{ mmol}\cdot\text{l}^{-1}$ (FIO_2 0.5). V_T , V_E , and peak P_{aw} were 500 ml, $8 \text{ l}\cdot\text{min}^{-1}$, and $25 \text{ cmH}_2\text{O}$, respectively. The inhalation of isoflurane was stopped after 3 hs because of his stable condition. Although weaning from the ventilator was attempted several times, it was not successful because of his insufficient tidal volume. On the 12th day after admission to the ICU he was transferred back to the previous hospital for long-term respiratory care with the ventilator.

This case suggests that bronchoscopic examination should be performed as soon as possible in patients whose status asthmaticus is refractory to any bronchodilator and any inhalational anesthetics [1,2]. Bronchial forceps should always be prepared in the ICU to remove such a dried tenacious mucus plug [3,4].

References

1. Parnass SM, Feld JM, Chamberlin WH, Segil LJ (1987) Status asthmaticus treated with isoflurane and enflurane. *Anesth Analg* 66:193-195
2. Johnston RG, Noseworthy TW, Friesen EG, Yule HA, Shustack A (1990) Isoflurane therapy for status asthmaticus in children and adults. *Chest* 97:698-701
3. Fanta CH (1985) Clinical aspects of mucus and mucous plugging in asthma. *J Asthma* 22:295-301
4. Garvin JM (1990) Nearly fatal partial obstruction of the upper airway. *Postgrad Med* 87:81-84

(Received for publication on July 19, 1996; accepted on January 19, 1998)