

## **Anesthetic Management of a Parturient Undergoing Cesarean Section with a Tracheal Tumor and Hemoptysis**

Yuet-Tong Ng, MD; Wai-Meng Lau, MD; Chun-Cheung Yu, MD; Jing-Ru Hsieh, MD;  
Peter Chi-Ho Chung, MD

Anesthetic management of a parturient with respiratory failure associated with hemoptysis, dyspnea, and orthopnea is difficult. An anesthesiologist should realize that the patient's major problem is not solved during the surgery. This circumstance is similar to a patient with associated cardiac disease scheduled for non-cardiac surgery. General anesthesia with endotracheal intubation can provide safe oxygenation for both the parturient and the fetus, but with possible unexpected massive hemoptysis and tumor seeding. Prolonged intubation may delay the patient's pulmonary treatment course. Laryngeal mask anesthesia can provide an airway, but must not be secured due to the risk of aspiration. The need of high doses of inhalation drugs may hinder uterine contractions. The addition of a muscle relaxant will change the patient's respiratory patterns and physiology. Regional anesthesia alone might not be tolerated. A decrease in cough strength, as well as dyspnea, orthopnea, and hyper-ventilation may be harmful to both the parturient and the fetus. However, we successfully managed this case using epidural anesthesia combined with assisted mask ventilation instead of spontaneous breathing usually provided by a simple mask in almost all American Society of Anesthesiology (ASA) class I-II parturients during cesarean section. The anesthetic level was maintained at T8 with 18 ml of 2% Xylocaine mixed with 2 ml of 7% sodium bicarbonate with 1:200,000 epinephrine epidurally and with the patient in a supine position with the head up at 30° to prevent cephalic spreading and to ensure better pulmonary ventilation.  
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**Key words:** epidural anesthesia, parturient, respiratory failure, hemoptysis.

For a parturient with hemoptysis and limited pulmonary reserves, no anesthesiologist is able to ascertain whether regional or general anesthesia would be the best choice and safest method for cesarean section (C/S) delivery even in a parturient with lung cancer involving the trachea. We successfully managed a parturient with such a complicated respiratory condition undergoing C/S by using epidural anesthesia combined with assisted mask ventilation.

### **CASE REPORT**

A 33-year-old pregnant patient, G5P2AA2, was scheduled to receive a cesarean section for delivery due to lung cancer with respiratory impairment. She suffered copious coughing with whitish sputum and progressive body weight loss of more than 10 kg since the 29th gestational week. She had been treated for a common cold, but symptoms persisted, and

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From the Department of Anesthesiology, Chung Gung Memorial Hospital, Keelung.

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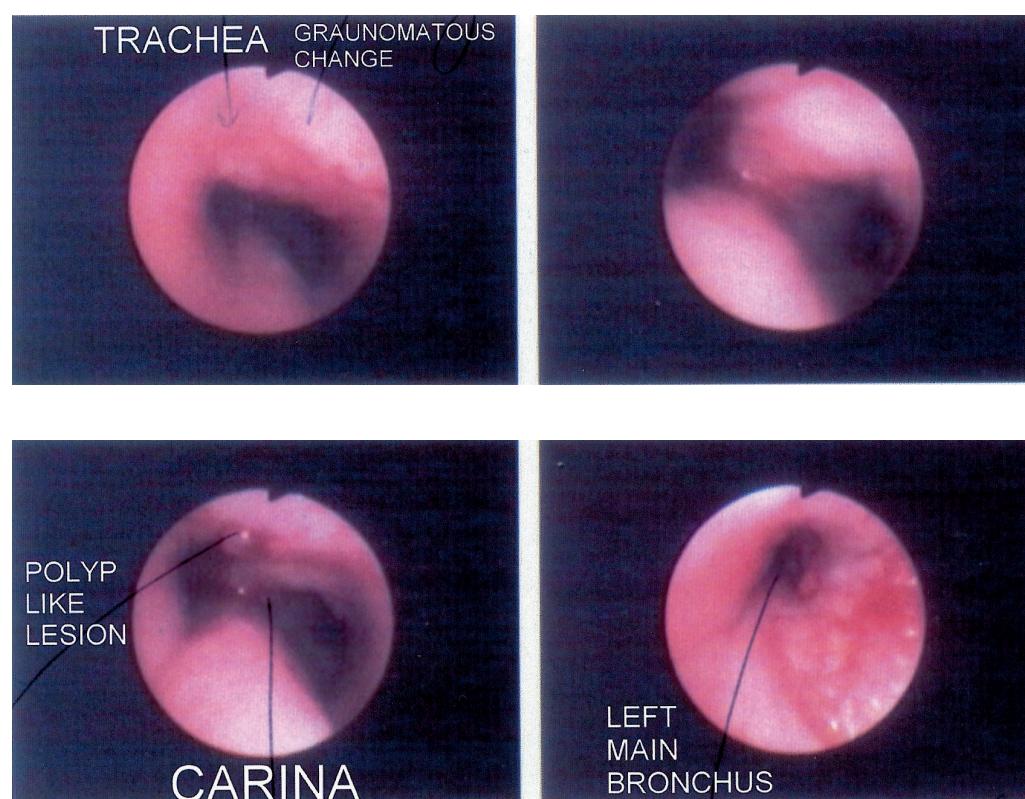
Address for reprints: Dr. Peter Chi-Ho Chung, Department of Anesthesiology, Keelung Chung Gung Memorial Hospital, 222, Mai-Chin Road, Keelung 200, Taiwan, R.O.C. Tel.: 886-2-24313131 ext. 2777; Fax: 886-2-24313161; E-mail: p654084@cgmh.org.tw

advanced study for tuberculosis was negative. At a gestational age of 34 weeks, dyspnea and hemoptysis became obvious. Left lower lobe consolidation and atelectasis were noted on a chest roentgenogram (Fig. 1). Direct bronchoscopy with bronchial brushing for histological and pathological examination proved adenosquamous carcinoma (Fig. 2). The oncologist then suggested palliative radiotherapy, and C/S for delivery was highly recommended by the obstetrician.

On the day before the operation, the patient demonstrated frequent coughing with hemoptysis, orthopnea, and tachypnea with a respiratory rate of 33 bpm. Arterial blood gas under a nasal cannula at 3l/min demonstrated pH 7.415, PaO<sub>2</sub> 99 mmHg, PCO<sub>2</sub> 21.8 mmHg, HCO<sub>3</sub> 14.0 mmol/l, and BE -7.5 mmol/l. Laboratory examination showed a platelet



**Fig. 1** Chest roentgenogram at 34 gestational weeks showing left lower lobe consolidation and atelectasis.



**Fig. 2** Direct bronchoscopy at 34 gestational weeks demonstrating granulomatous mucosal change extending from the trachea to the entire left main bronchus with left main bronchus narrowing and easy bleeding. Endobronchial TB for which r/o bronchoalveolar cell carcinoma was suspected.

count of  $536 \times 10^3$ ; prothrombin time and activated partial thromboplastin time were within normal limits. Because of the surgery, a discussion between anesthesiologists took place; the possible anesthetic course and outcome were weighed against the potentially fatal clinical conditions. On arrival at the operating theatre, an arterial line, pulse oximetry, and electrocardiogram monitoring were first set up. Meanwhile, an oxygen mask using 6 l/min was used on the patient for spontaneous breathing in a semi-sitting position. Arterial blood gas (ABG) data for further evaluation showed pH 7.453, PaO<sub>2</sub> 140.6 mmHg, PaCO<sub>2</sub> 30.2 mmHg, HCO<sub>3</sub><sup>-</sup> 21.2 mmol/l, BE -2.9 mmol/l, and SaO<sub>2</sub> 100%. Then with the patient in the right lateral knee-chest position with head up at 30°, an epidural catheter was inserted into the L4-5 interspace using the loss of resistance technique. A mixture of 18 ml of 2% lidocaine and 2 ml of 7% sodium bicarbonate with 1:200,000 epinephrine was administered in incremental doses of 5 ml to a total of 20 ml. A surgical level of sensory anesthesia was achieved from T8 to S5. Because of the poor pulmonary reserve, hydration was difficult to adjust, and an elastic bandage was applied to both lower extremities. Ephedrine was prepared and was available to counteract hypotension should the blood pressure fall. After induction, the breathing device was changed to assist ventilation with oxygen therapy of FiO<sub>2</sub> of 1.0 in order to fit the patient's need. The respiratory rate changed to 22 bpm, but hemoptysis still bothered her. In order to avoid further cephalic spreading of the local anesthetics and to achieve a better respiratory condition, the patient was placed in a semi-sitting position with the head up at 30°. A further recheck of the ABGs revealed satisfactory data. The course of the operation was smooth despite the patient complaining of some discomfort during traction of the peritoneum, but this was easily solved by sedation with intravenous administration of 50 mg pethidine after cord clamping. A transient drop in blood pressure with refractory tachycardia after oxytocin infusion was solved by intravenous administration of 8 mg of ephedrine. Although the patient was sedated, respiration was smooth with a rate of 22 bpm under assisted mask ventilation. A 2840-g female baby, with Apgar scores of 7 and 8 at 1 and 5 min, respectively, was delivered. Umbilical cord blood analysis demonstrated acceptable data

with no metabolic acidosis. When the patient had recovered spontaneous breathing and consciousness, she was transferred to the medical intensive care unit for post-surgical care. After 2 days of intensive care with stable vital signs, she was transferred to the general ward for further evaluation and treatment of her pulmonary problems.

## DISCUSSION

In general, either regional or general anesthesia is safe and presents no difficulty in a parturient scheduled for C/S in American Society of Anesthesiology (ASA) class I or II. However, when anesthetizing a parturient with compromised cardiopulmonary disorder, special attempts and a detailed evaluation should be taken into consideration. In this case, the patient suffered from respiratory impairment and complained of extreme difficulty with lying in a supine position when awake. It seems that the priority of regional blockage was thus lost, and general anesthesia could provide a safe way for steady hemodynamics and oxygenation for both the parturient and the fetus. Actually, anesthetic management of this case might be even more difficult than managing a case with lung cancer scheduled for tumor resection. Anesthesiologists should realize that the patient's major problem will not be solved during this surgery, and secondary trauma should be minimized in order to provide the chance for the patient to continue her therapeutic course of treating her major problem. This circumstance is similar to a patient with associated cardiac disease scheduled for non-cardiac surgery.

When devising an anesthetic plan for such a parturient with lung cancer with dyspnea, cough with sputum, and even hemoptysis undergoing cesarean section, anesthesiologists should first weigh the risks and benefits of either regional or general anesthesia.

A sufficient level of regional anesthesia can usually provide excellent operating conditions with good maternal comfort and neonatal outcome in a normal parturient undergoing C/S. However, this might impair the abdominal muscle function and cough strength in a patient with respiratory failure. In addition, an awake parturient with respiratory compromise may find it difficult to lie in a supine position for regional blockage. A study of nonpregnant

patients using low spinal anesthesia showed a decrease in cough strength of 34% and 94% with upper thoracic blockade,<sup>(1)</sup> while midthoracic levels of epidural sensory blockade decreased cough strength by only 38%.<sup>(2)</sup> In this patient, because of the limited pulmonary reserve, even a small change in positioning would cause her to complain of orthopnea, and she might show clinical signs of hyperventilation with shallow breathing. A further decrease in muscle strength might cause her condition to deteriorate, and endotracheal intubation would be the inevitable outcome to maintain life support.

General anesthesia can not only provide safe oxygenation for both the parturient and the fetus, but can also ensure the quality of operative conditions for the surgeon. A more stable hemodynamic status for the parturient can be maintained. However, from another point of view, an anesthesiologist must face the possible events of aspiration pneumonia. During induction of general anesthesia, because of a smaller functional residual capacity coupled with an increase in oxygen consumption, the risk of hypoxemia with maternal apnea can be prominent.<sup>(3)</sup> Prolonged maternal hyperventilation may produce fetal asphyxia with severe hypoxemia and metabolic acidosis.<sup>(4)</sup> In addition, profuse bronchial secretions, coughing, straining, and prolonged elimination of inhalation anesthetics can cause complicated consequences.

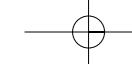
General anesthesia with endotracheal intubation might have been more harmful to this parturient. First, bronchoscopy examination at 34 weeks of the pregnancy clearly demonstrated tumor invasion to the trachea, carina, and even to the left main bronchus with an indication of easy bleeding. Sliding an endotracheal tube inside the trachea would have probably increased the chance of traumatic tumor bleeding and even distal tumor seeding. Second, massive hemoptysis with positive pressure ventilation has also been reported with a nearly fatal outcome.<sup>(5)</sup> This can induce maternal hypoxemia with ultimate fetal asphyxia. Third, prolonged intubation might increase the risk of pneumonia, and difficult weaning from mechanical ventilation would increase the time and the costs of post-critical care and would thus have delayed her pulmonary treatment program. The use of a laryngeal mask (LMA) should only be considered in obstetric patients in the

pre-induction period; it can provide a method to secure an airway, but endotracheal replacement under direct fiberoptic bronchoscope was finally indicated.<sup>(6)</sup> The need for a high dose of inhalation drugs in LMA may hinder uterine contractions, and the concomitant addition of muscle relaxants might also change the patient's respiratory patterns and respiratory physiology. If prolonged intubation is indicated, an exchange of tubing would be recommended as described previously.

Considering these circumstances, an anesthetic method of epidural anesthesia plus assisted mask ventilation was highly indicated in this patient instead of spontaneous breathing given using a simple mask in almost all ASA class I-II parturients during a C/S. In addition, a semi-sitting position with the head up at 30° will decrease the shunt effect, and assisted mask ventilation by the anesthesiologist will also mask the unwanted effects of the limited pulmonary reserve. Monitoring of the airway pressure, end-tidal CO<sub>2</sub>, and O<sub>2</sub> saturation provided a safer environment for anesthesia. The patient's metabolic needs and a slowing down of the respiratory rate were achieved by an adequate minute ventilation with a skillful hand. The level and density of the blockade were well controlled to minimize motor weakness and respiratory compromise.<sup>(7)</sup> With careful attention and thorough preoperative evaluation associated with the choice of anesthetic technique best suited to an individual patient's needs, a parturient with such respiratory compromise can pass the peripartum period without undue difficulty.

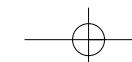
## REFERENCES

1. Egbert LD, Tamersy K, Deas TC. Pulmonary function during spinal anesthesia: The mechanism of cough depression. *Anesthesiology* 1961;22:882-5.
2. Sharrock NE, Castellano P, Sanborn KV, Mineo Robert. Correlation of cough strength and hemodynamics with recovery from sensory block during epidural anesthesia. *Reg Anesth* 1989;14:S87.
3. Moya F, Morishima HO, Shnider SM, James LS. Influence of maternal hyperventilation on the new born infant. *Am J Obstet Gynecol* 1965;91:76-84.
4. Motoyama EK, Rivard D, Acheson F, Cook CD. Adverse effects of maternal hyperventilation on the foetus. *Lancet* 1966;1(7423):268-8.
5. Wang YL, Hong CL, Chung HS, Ho AC, Yu CL, Liu HP,



- Lee YH, Tan PP. Massive hemoptysis after the initiation of positive pressure ventilation in a patient with pulmonary tuberculosis. *Anesthesiology* 2000;92:1480-2.
6. Mark Godley, Reddy A.R.R. Use of LMA for awake intubation for Caesarean Section. *Can J Anesth* 1996;43:299-

- 302.
7. Gazioglu K, Kaltreider NL, Rosen M, Yu PN. Pulmonary function during pregnancy in normal women and in patients with cardiopulmonary disease. *Thorax* 1970;25: 445-50.



## 合併呼吸道腫瘤及咳血的產科麻醉處理

伍乙棠 劉偉明 余振翔 謝敬儒 鍾志豪

合併呼吸衰竭及肺癌侵犯氣管咳血的剖婦產麻醉是非常困難的，麻醉醫師應明瞭病患本身的主要病灶並未在此手術中改善，正如同心臟病患接受非心臟手術的危險性，手術過程中麻醉醫師也必須致力於保護產婦與嬰兒的安全。但選擇適當的麻醉方法（全身麻醉或半身麻醉）卻讓麻醉醫師傷透腦筋。誠然全身麻醉提供母子足夠的氧氣，但大量的咳血與插管可能引致腫瘤出血及擴散卻是麻醉醫師也需考量難題。延遲拔除氣管內管也會影響肺癌的治療；喉頭罩雖可考慮但也有吸入性肺炎的危險。高濃度吸入性麻醉藥可影響子宮收縮，且給予的肌肉鬆弛劑也會改變病患的呼吸型及生理。單純的半身麻醉方法，病患不一定能忍耐，咳嗽力量的降低、呼吸力量的衰竭及過度換氣會危害產婦及嬰兒的生命，在此我們提供報告-以硬脊膜外麻醉合併氧罩輔助式輕度正壓給氧方法來解決與一般孕婦麻醉過程中自行呼吸的不同，以硬脊膜外麻醉藥物給予2%苦息樂卡因18ml加入7%碳酸氫鈉2ml及01.mg的腎上腺素，再以半平躺方式有效控制麻醉深度，成功地完成剖婦產，並持續肺腫瘤療程。（長庚醫誌 2003;26:70-5）

**關鍵字：**硬脊膜外麻醉，孕婦，呼吸衰竭，咳血。