

Local anesthetic infiltration to the trachea facilitates spontaneous ventilation in a patient with giant lung bullae undergoing an emergent non-pulmonary surgery

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To the Editor:

Bullous lung disease is an uncommon cause of respiratory distress.(Greenberg, Singhal, & Kaiser, 2003) However, patients with giant bullae are sometimes scheduled for non-thoracic surgery. Specific problems associated with anesthesia in patients with bullae, such as perioperatively acute enlargement or rupture of the bullae, are challenging to the anesthesiologists. The anesthetic technique that most authors recommend is avoiding positive pressure ventilation and keeping spontaneous ventilation throughout the total procedure.(Morgan, Mikhail, Murray, & Larson, 2005) However, as during emergency, tracheal stimulation by endotracheal tube (ETT) may sometimes elicited coughing or bucking reflex. These may subsequently produce high thoracic pressure and barotraumas. Hereby we share our experience in spontaneous ventilation and the act of using a modified application for infiltrating local anesthetics (LA) around the ETT in a patient with multiple giant bullae disease who was scheduled for emergent laparotomy.

A 40-year-old male with peptic ulcer perforation was scheduled for emergent exploratory laparotomy. The patient's preoperative chest X-ray examination (Fig. 1A) revealed multiple giant bullae over the bilaterally upper lung fields. The largest bullae occupied more than one-third of the left hemithorax with mild mediastinal shift towards the right. Standard monitors including electrocardiography, noninvasive cuff blood pressure, and pulse oximeter were set with adequate preoxygenation and

immediate availability of two chest tube packs was prepared preoperatively in the operating room. Anesthesia was induced with fentanyl 100 μ g, etomidate 18 mg, succinylcholine 100 mg and 2% xylocaine 100 mg intravenously. The trachea was intubated with 7.5# modified ETT with cuff under Sellick maneuver. The modified ETT is a regular tracheal tube with an epidural catheter (B|BRAUN, Perfix[®] catheter, 20G) fixed along the wall of the lesser curvature of the ETT by a 3M[™]Trgaderm[™]. The tip of epidural catheter was fixed above the distal end of the cuff at a distance of 1 mm away (Fig. 1B). Anesthesia was maintained under spontaneous ventilation with sevoflurane 1.5% delivered in air (1 L/min) and oxygen (1 L/min) mixture. Precautionary measure included the avoidance of nitrous oxide during anesthesia.(Morgan et al., 2005; Munson, 1974) Arterial line and central venous catheter were placed for close perioperative monitoring. To reduce the stimulation of the ETT in situ, 2 ml of 2% lidocaine was infiltrated around the modified ETT cuff intermittently via the epidural catheter. The whole surgical course was smoothly completed with stable hemodynamic recording for the one-and-a-half-hour operation. The patient breathed spontaneously without bucking or coughing despite manipulation of the gastric organ during operation. No hypoxemia or hypercarbia was noted intraoperatively. At emergence from general anesthesia and when the patient was fully waked up, the ETT was smoothly extubated without signs of coughing or

bucking and the patient was sent to the post-anesthesia care unit (PACU). The patient was neither cyanotic nor in any respiratory distress in uneventful stay. A postoperative chest X-ray that was taken at the PACU was similar to the preoperative film except for mild infiltration over the bilateral lower lung fields. The infiltration was first rule out artifact due to overexposure the film and was not seen on the follow up chest X-ray that was taken on the next day.

A lung “bullae” is defined as a sub-pleural air cyst that forms as a result of dissolution of alveolar walls with enlargement of air spaces.(Greenberg et al., 2003) Surgery is indicated in patients who have incapacitating dyspnea with a large bulla that encroaches upon more than 30% of either hemithorax and for patients who have complications related to bullous disease such as infection or pneumothorax.(Palla et al., 2005) Intraoperative barotrauma could be catastrophic in these patients. Thorough preoperative assessment and preparation should be made for this possibility.

Anesthesia for patients with bullae should avoid nitrous oxide and positive-pressure ventilation in order to limit the risk of barotrauma from a ball valve mechanism.(Morgan et al., 2005) Keeping spontaneous breathing smoothly without coughing or bucking throughout the total procedure including the emergence from general anesthesia were recommended. Either the laryngeal mask airway (LMA) or the ETT are used to maintain patent airway with spontaneous ventilation, the ETT has

clearly been the preferred method of advanced airway management in emergency surgery. Because the ETT allows the greatest control of the airway and protects the airway or lungs for aspiration of regurgitated material. Also, one of the contraindication of the LMA is patients at risk of aspiration. Our patient is a case of peptic ulcer perforation at risk for aspiration. This is the reason that LMA was not considered in our patient. Moreover, the stimulations (such as peritoneal traction from surgery or discomfort of the cuffed ETT) that may impact spontaneous ventilation should be solved. Adequate anesthesia/analgesia and improving cuffed ETT tolerance were deliberated. Rene` M. Gonzalez *et al.*(Gonzalez et al., 1994) used the Laryngealtracheal Instillation of Topic Anesthesia (LITA™) tube (Sheridan Catheter Corp., Argyle, NY) for prevention of ETT-induced coughing during emergence from general anesthesia. CT Chien *et al.*(Chi-Tsung Chien, 2009) used similar method for improving ETT tolerance in awake-sleep-awake deep brain stimulation procedure. We modified a regular ETT in accordance to the principle of the LITA™ tube.

Spontaneous ventilation was using this application to infiltrate LA and inhibited cough reflex through the complete course of the operation. Besides for our LA in situ blocked, there are other various methods to block ETT stimulation. These include direct spraying LA into the tracheal and larynx or through the ETT, deepening of inhalant agent, or addition of agonistic agent such as opioids or intravenous

anesthetics. The application of LA to the tracheal or larynx through direct spraying or instillation via the ETT may be unpredictable and may produce micro-aspiration due to unanticipated laryngeal blockade. Effects of infiltration of LA via the ETT are sometimes non-effect as medications are direct into the larynx instead of the area around the stimulant, i.e. the mucosa that contacts the ETT cuff. Moderate dose of sevoflurane in combination with opioids should suppress the stimulation of peritoneal traction from surgery and the cough reflex of the majority of patients who are tracheally intubated. However, deep anesthesia may also suppress ventilation in a spontaneous ventilation patient and it is not feasible during the anesthetic emergence. Coughing or bucking during emergence from general anesthesia is a serious problem which could augment intrathoracic pressure and may result in bullae rupture. Our method of injecting LA only allows precise infiltration of LA to the mucosa that is adjacent to the cuff of the ETT. With the suppress of abolishment coughing or bucking in our case, we recommend the use of our method in patients who require spontaneous ventilation in general anesthesia and abolishment of ETT cuff stimulation. For these reasons, our modified method provides benefits to decrease intraoperative risks of barotraumas in patients with giant bullae who need general anesthesia for non-thoracic surgery.

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Legends

Figure 1A. Preoperative chest X-ray demonstrates multiple giant bullae over bilaterally upper lung fields (white arrows) and the largest bulla occupied more than one-third of the left hemithorax.

Figure 1B. The modified ETT is a regular tracheal tube with an epidural catheter (B|BRAUN, Perfix[®] catheter, 20G) fixed along the wall of the lesser curvature of the ETT by a 3M[™]Trgaderm[™]. The tip of epidural catheter was fixed above the distal end of the cuff at a distance of 1 mm away (black arrow).

