

## Safety issues of endobronchial intubation for one-lung ventilation in video-assisted thoracoscopic surgery in neonates: Can we extubate on the table?

Sir,

Advances in pediatric anesthesia have made it possible for complex surgical procedures such as video-assisted thoracoscopic surgery (VATS)<sup>[1]</sup> in neonates. However, VATS in neonates remains a challenge because of a different anatomy and challenging physiology compared to older children.<sup>[2]</sup> Different techniques described for one-lung ventilation (OLV) in pediatric patients may sound assuring, but it is practically difficult and challenging to execute. Moreover, techniques describe for older children cannot be extrapolated to neonatal practice.

We report our experience of anesthetic management of a term neonate (20 days) weighing 3200 g with an isolated left diaphragm eventration for VATS repair. The child had a saturation of 97% in room air. After intravenous induction, right main stem bronchus (MSB) was intubated with a 3.5 mm ID endotracheal tube (ETT). OLV was confirmed by auscultation of the chest as a compatible fiberoptic bronchoscope was not available. Right radial artery was cannulated and the neonate was positioned. Thoracic cavity was insufflated with CO<sub>2</sub> to attain a pressure of 4 mmHg. Pressure control ventilation was used with a set pressure of 15 mmHg; respiratory rate = 30/min; positive end-expiratory pressure (PEEP) = 4. During the surgery, there was a continuous rise in the end-tidal CO<sub>2</sub> (ETCO<sub>2</sub>) level, so the set pressure was gradually increased to 30 mmHg and the intrathoracic pressure decreased to 2 mmHg to achieve the required minute ventilation. Intermittent manual ventilation was required with 100% oxygen to wash out the retained

CO<sub>2</sub>. A blood gas sample analysis of PaCO<sub>2</sub> corroborated with the high ETCO<sub>2</sub>. The operation lasted for 70 min, and the ETT was withdrawn by 1.5 cm for both-lung ventilation toward the end of surgery. The PaCO<sub>2</sub> at the end of surgery was significantly raised with respiratory acidosis, and hence, the child was shifted to neonatal intensive care unit for mechanical ventilation in the postoperative period. Ventilator support was gradually weaned off, and trachea was extubated 5 h later, and the perioperative outcome was uneventful.

OLV, though preferable, is not mandatory for all VATS procedures.<sup>[2]</sup> Neonates are more prone to desaturation during OLV due to increase oxygen consumption, more V/Q mismatch in lateral decubitus position,<sup>[2-4]</sup> and decrease functional residual capacity.<sup>[2,4]</sup> The main concerns are hypoxemia, hypercarbia, hypothermia, and hemodynamic instability during CO<sub>2</sub> insufflation. The options available for OLV in neonates are limited. Endobronchial intubation and blocker<sup>[4]</sup> can be used for OLV in newborn.

The safety margin of MSB intubation for OLV is low due to tracheobronchial injury, obstruction of upper lobe bronchus, inability to provide endotracheal suction or PEEP to nondependent lung,<sup>[4]</sup> and minimal peri-tube leakage of air can underestimate the ETCO<sub>2</sub>. There is no established gold standard for OLV and ventilation strategies during VATS in neonates, and there are limited data on the safety concern for anesthetic management of VATS in neonates.

Vigilant monitoring during OLV in neonates is required as  $\text{ETCO}_2$  can underestimate hypercarbia. Blood gas analysis can guide us for postoperative ventilator requirement apart from intraoperative hemodynamic monitoring. Whether to extubate on the table has to be decided as per the perioperative events and has to be individualized.

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**Conflicts of interest**

There are no conflicts of interest.

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