

## Wooden chest syndrome: A curious case of fentanyl induced rigidity in adults

Sir,

Wooden chest syndrome (WCS) is an underrated, underestimated complication under anaesthesia. We report a case of WCS with a normal induction dose of fentanyl during general anaesthesia.

A 35-year-old male of American Society of Anesthesiologists (ASA) grade 1 and weighing 60 kg was posted for laparoscopic cholecystectomy. Preanaesthetic check-up was unremarkable. On the day of surgery, he had a blood pressure (BP) of 164/90 mm of Hg and heart rate (HR) of 100/minute. Intravenous (IV) midazolam 1 mg followed by fentanyl bolus of 100 µg was injected over a period of 30 seconds. He was preoxygenated for 3 minutes, after which an increase in serial two BP readings of 164/110 and 162/112 mmHg and HR readings of 106/min and 110/min respectively (2 minutes apart) was observed. This was followed by induction with intravenous (IV) propofol 120 mg. Bag and mask ventilation was unsatisfactory with no visible chest rise despite adequate head tilt and jaw thrust. An oropharyngeal airway was negotiated with difficulty. Subsequently, injection succinylcholine 120 mg was administered. Laryngoscopy revealed a significantly

narrowed glottic opening (Cormack Lehane grade 2b) and intubation was successful at the first attempt. Thereafter, auscultation revealed a completely silent chest with no capnogram trace. The patient was ventilated with 100% oxygen. After deepening the plane with sevoflurane, endotracheal tube position was reconfirmed and endotracheal suctioning revealed free catheter passage. IV hydrocortisone 100 mg and dexamethasone 8 mg were administered. Ventilation with volume control mode was unsuccessful with an unusually high airway pressure (35 cmH<sub>2</sub>O) and non-delivery of tidal volume, that was overcome by switching to pressure regulated volume mode. Intraoperative arterial blood gas (ABG) analysis showed pH of 7.28. The duration of inadequate ventilation was around 5 minutes. Intraoperatively, the patient continued to have tachycardia, hypertension and high airway pressure which were relieved gradually intraoperatively. Post-induction ABG analysis revealed respiratory acidosis [pH 7.18, partial pressure of carbon dioxide (pCO<sub>2</sub>) 90 mm of Hg at a fractional inspired concentration of oxygen (FiO<sub>2</sub>) of 1 and a positive end-expiratory pressure (PEEP) of 8 cm of water.] Dexmedetomidine infusion was started, titrated and stopped prior to reversal. The surgery lasted for about 1.5 hours. Extubation and the postoperative period were uneventful. ABGs analysed before and 15 minutes post-extubation was within normal limits.

Fentanyl-induced skeletal muscle rigidity causing ventilatory failure is known to occur in WCS.<sup>[1]</sup> Fentanyl has a high affinity for opioid receptors; therefore, it produces a longer duration of analgesia compared

to other agents.<sup>[2]</sup> Although the exact mechanism is debated, the dopaminergic pathway-mediated mu opioid receptor activation along with some contribution from delta and kappa receptors is thought to be the main culprit.<sup>[3]</sup> It is not uncommon in preterm or term infants with high-dose opioid.<sup>[4]</sup> WCS usually occurs at much higher doses of fentanyl (12–15 µg/kg in an adult), or when the drug is injected at a rapid rate.<sup>[5]</sup> It has been reported to occur in adults with prolonged lipophilic opioid infusion, and with high-dose opioid, e.g., during cardiac surgery, but is uncommon with low/standard induction dose. It is characterised by breath-holding spells, tense abdominal muscles, firm locked jaw, stiff extremities, hypoxia, hypertension and rarely fever. Chest wall rigidity decreases chest wall compliance making spontaneous and assisted ventilation difficult.<sup>[1]</sup> Rosal *et al.*<sup>[3]</sup> have mentioned increased airway pressure and respiratory failure in ventilated patients as an early manifestation of this particular syndrome. In our case, the presentation was similar. It was successfully managed with timely diagnosis and prompt interventions (succinylcholine, dexmedetomidine and bronchodilators). Although naloxone is a promising drug for the management, it has its own side effects and can worsen laryngospasm, induce cardiac arrhythmias and trigger pulmonary oedema.<sup>[5]</sup> Intraoperative cardiac arrest, even with low dose fentanyl, has been reported.<sup>[6]</sup> Although most common with the rapid administration of large doses, this rare adverse effect may occur with small doses especially in neonates and infant.<sup>[7]</sup> Our idea of reporting this case is to highlight its importance and create awareness so that its timely diagnosis can be lifesaving.

#### Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his consent for his images and other clinical information to be reported in the journal. The patient understands that his name and initials will not be published and due efforts will be made to conceal identity, but anonymity cannot be guaranteed.

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#### Conflicts of interest

There are no conflicts of interest.

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