

These results suggest that CCI_{TREND} failed to identify dynamic changes in hemodynamics caused by rapid volume application. CCI_{TREND} underestimated the increase in CI_{TD} following fluid challenge by more than 20% (Figure A), whereas CCI_{STAT} showed good agreement in CCI assessment at all timepoints of measurement (Figure B). Comparable results were observed by other authors during acute hemorrhage⁴ or following an increase in pacing rate.⁵

Therefore, STAT mode of operation should be used whenever dynamic changes in a patient's hemodynamic state are expected.

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Airway management for postoperative respiratory failure: use of the laryngeal mask airway

To the Editor:

We report the case of a morbidly obese patient with acute postoperative respiratory failure and the use of a laryngeal mask airway (LMA) to avoid tracheal re-intubation.

A 52-yr-old male patient presented for inguinal hernia repair under general anesthesia. Past medical history included chronic obstructive pulmonary disease, morbid obesity (body mass index 48 kg·m⁻²), claustrophobia, and sleep apnea. After premedication (midazolam 2 mg *iv*, fentanyl 50 µg *iv*), a rapid sequence induction was performed with *iv* propofol (200 mg) and succinylcholine (160 mg), and tracheal intubation was easy. Anesthesia was maintained with desflurane and nitrous oxide. After an uneventful operation, the patient was extubated, as he was wide awake, followed commands, and was breathing spontaneously (respiratory rate = 20/min, tidal volume = 500 mL, SpO₂ = 99% with supplemental oxygen). However, shortly after his arrival in the postanesthesia care unit, the patient developed upper airway obstruction and acute respiratory failure (pH = 7.26, pCO₂ = 68 mmHg, pO₂ = 53 mmHg). To avoid additional sedation associated with tracheal re-intubation and the risk of prolonged weaning from the ventilatory support due to his body habitus, non-invasive ventilation was considered a therapeutic option as the patient demonstrated good pharyngeal reflexes. However neither a facial nor nasal mask was tolerated. In contrast, a LMA #5 (LMA North America, Inc, San Diego, CA, USA), placed after topical anesthesia of the upper airway was tolerated without gagging or agitation. Pressure support ventilation (10 cm H₂O, positive end-expiratory pressure 5 cm H₂O) was applied for alveolar recruitment. Thereafter, the patient's breathing pattern normalized, as did the arterial blood gas analysis. The LMA was removed after two hours of ventilatory support. The patient was transferred to the floor and discharged home the next day.

In comparison to conventional mask ventilation, LMA results in higher tidal volumes and lower dead space ventilation during spontaneous ventilation.¹ In anesthetized patients, the LMA is not associated with significant gastric insufflation² and has been used for emergence from anesthesia in patients with severe reactive airway disease.³ However, its utility in the management of transient postoperative respiratory failure is largely unknown. Postoperative non-invasive

ventilation is applied if tracheal intubation may be disadvantageous for the patient.⁴ However, fitting a facial or nasal mask may be difficult in patients with a beard or large nose, or in the presence of severe agitation. Insertion of the LMA does not require laryngoscopy, and as the present case report points out, additional sedation may not be required for airway tolerance.

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Using a CO₂ detector to confirm endotracheal intubation in SARS patients

To the Editor:

Severe acute respiratory syndrome (SARS) is a new respiratory viral epidemic with devastating impact on economics and the practice of medicine.¹ SARS struck Taiwan in the Spring of 2003, causing many deaths, serious morbidity and closure of provincial hospitals. The high infectious rate by droplet transmission places anesthesiologists at a substantial risk during tracheal intubation. Two physicians were infected during intubation resulting in mortality at the early stage of SARS in Taiwan. In addition to wearing personal protective equipment (PPE), using powered air purifying respirators (PAPR) during tracheal intubation can completely eliminate SARS-CoV contamination. PPE

consisted of double gowns, double gloves, Tyvek hood (Texas America Safety Company, Brownwood, TX, USA), N95/100 mask (3M, Taipei, Taiwan), goggles and face shield.

However, wearing PPE with PAPR renders the user with impaired hearing, vision and communication. Verifying correct tracheal intubation by using a stethoscope for auscultation became difficult. There were 31 SARS patients who required tracheal intubation for mechanical ventilation at the Taipei-Veterans General Hospital. A total numbers of 37 intubations were performed because four patients had double intubations and one patient had triple intubations. In order to prevent cough with high viral content during intubation, after preoxygenation the tracheal intubation was facilitated by *iv* administration with propofol and succinylcholine. We then connected the disposable colorimetric end-tidal CO₂ detector (the Nellcor® EasyCap™ II) to the endotracheal tube to verify the correct endotracheal tube placement.

The CO₂ detector device (the Fenem FEF™ CO₂ detector) was first introduced for confirmation of tracheal intubation in 1988.² It is a small, portable plastic attachment connected between the tube and catheter mount of the breathing system. It is also a semi-quantitative capnometer devoid of electronics. The EasyCap™ II detector detects carbon dioxide in exhaled gases via a chemical coloured membrane and changes colour from purple to yellow. Such a change indicates the presence of CO₂ in the exhaled gas which passes. In our experience, the colour of the colorimetric end-tidal CO₂ detector changed from purple to yellow within six cycles of breathing ventilated by ambu-bagging after endotracheal intubation in SARS patients.

None of the anesthesiologists who performed the intubation procedure under the guideline was infected. The use of the disposable colorimetric end-tidal CO₂ detector could be a simple and reliable way of confirming correct tracheal intubation in SARS patients while wearing PPE with PAPR.

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