Bronchial blocker as an aid in the management of endo-bronchial cuff malfunction of double-lumen tube during one-lung ventilation

Sir,

A 59-year-old male, weighing 57 kg and 157 cm tall with single vessel coronary artery disease was posted for coronary artery bypass grafting (CABG) through left thoracotomy. After anaesthesia induction, left lung isolation was achieved with 37 F left double-lumen tube (DLT) (BronchoCath, Mallinckrodt, USA). Tracheal intubation was uneventful. The correct position of DLT was checked with Ambu® aScope™ (Ambu A/S, Ballerup, Denmark) and lung isolation was confirmed clinically by auscultation. During the course of left internal mammary artery (LIMA) harvesting, surgeon deemed the lung isolation inadequate. On troubleshooting for inadequate lung isolation, the pilot balloon of bronchial cuff was partially deflated and it was re-inflated with 3 ml of air to obtain an adequate seal. Repeat bronchoscopic examination revealed the correct position of bronchial cuff in the left bronchus. Within 15 min, lung isolation was again found to be inadequate. A possible diagnosis of bronchial cuff leak/bronchial pilot balloon assembly malfunction was made. A Coopdech endo-bronchial blocker (Daiken Medical Co. Ltd, Japan.) was inserted through the bronchial lumen of the DLT. The DLT was withdrawn under bronchoscopic guidance till the deflated bronchial cuff was visible above the carina to accommodate the cuff of bronchial blocker (BB) in left main bronchus. The insertion depth of the BB required for lung isolation was determined to be 42.5 cm [Figure 1] and the cuff was inflated with 4 ml of air. The ventilating port of BB was connected to bronchial limb of Y connector and the patient end of BB was connected to bronchial lumen of DLT [Figure 2]. With this technique, lung isolation was re-established and maintained. The rest of LIMA harvesting and CABG were uneventful. The post-operative course was uneventful and trachea was extubated after 4 h of mechanical ventilation. One of the possible complications during insertion of BB through the bronchial lumen of DLT is that it can offer some resistance with a risk of damage to the BB cuff. A backup plan in the event of failure of combined use of DLT and BB consisted of exchanging the DLT with single-lumen tracheal tube using airway exchange catheter. Subsequently, a BB can be placed under bronchoscopic guidance for lung isolation.

DLTs are the most commonly used method of lung isolation.\(^1\) The cuffs of DLTs are delicate and sometimes stressed by contact with teeth during intubation. Brodsky and Lemmens reported tracheal cuff injury 11 times and bronchial cuff injury once out of 1169 left DLT placements.\(^2\) The clinical consequences of
cuff injury appear immediately or may be delayed depending on the extent of cuff injured. Bronchial cuff injury manifests as inadequacy/failure to isolate the ipsilateral lung during one-lung ventilation. In our patient, the identification of bronchial cuff malfunction was delayed even though the initial check for lung isolation was satisfactory. Groves et al. also reported significant bronchial cuff leak of DLT only after 15 min of surgical incision.\textsuperscript{[3]}

The best solution for malfunctioning bronchial cuff of DLT is to replace the DLT carefully. However, the anaesthesiologist must consider important issues like surgical stage, patient position, aspiration risk and ventilation/oxygenation compromise. The management of delayed recognition of bronchial cuff leak using a nasal cannula connected to oxygen flowmeter to keep the cuff inflated has been described.\textsuperscript{[3]} The reported disadvantages of this method are need for constant vigilance, complexity, excessive cuff pressure if a leak is eliminated unexpectedly and with large cuff leak, this method would be ineffective. But the use of BB in a situation, as described in our case, is easier and effective over wide ranges of cuff leak since the function of defective endo-bronchial cuff is entirely taken over by the BB. The elective combined use of DLT and BB for selective lobar isolation has been described with successful results.\textsuperscript{[4]} Nino et al. reported the use of BB as a rescue device for an ill-fitting DLT.\textsuperscript{[5]} Therefore, we conclude that the use of BB as a rescue device for DLT cuff leaks should be considered in circumstances where patient repositioning or surgical stage may not be feasible for replacing the DLT.

**Declaration of patient consent**
The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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There are no conflicts of interest.

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Anaesthesia for frameless stereotactic neurosurgery in a patient with Cheyne-Stokes respiration

Sir,

Frameless stereotactic biopsy is commonly employed for precision neurosurgery to increase diagnostic yield and patient safety. This technique avoids patient discomfort and allows for better airway management.[1] Most patients receive general anaesthesia and perioperative complications are rare. There are no previous reports on anaesthetic management in a patient with Cheyne–Stokes respiration (CSR) and hence this report.

A 52-year-old gentleman presented with complaints of progressive drowsiness since 2 months. Frame-based stereotactic biopsy for right capsuloganglionic lesion extending into the brainstem performed elsewhere did not yield conclusive results. Currently, he presented to our hospital with drowsiness and drooping of the left eyelid. On examination, he was drowsy but arousable with weakness on the right side and left third nerve palsy. Cardiac workup did not suggest evidence of heart failure. Magnetic resonance imaging revealed left midbrain [Figure 1a] and right capsuloganglionic lesion, suggestive of lymphomas. He was scheduled for a frameless stereotactic navigation-guided biopsy of the right capsuloganglionic lesion. Pre-anaesthetic evaluation revealed oxygen saturation (SpO₂) of 91% with irregular respiration (hyperventilation with periods of apnoea). Considering various factors, i.e., apnoea-hyperventilation breathing pattern, history of snoring, midbrain pathology, neurological status, minimally invasive diagnostic nature of the surgery and proposed early discharge, we planned awake surgery with incision-site local anaesthetic infiltration with 6 mL of 1% lignocaine and dexmedetomidine to retain spontaneous respiration close to his preoperative physiological status. Dexmedetomidine infusion was started at 0.5 µg/kg/h and titrated between 0.5 to 1 µg/kg/h during surgery after 1 µg/kg bolus dose over 10 min. No other opioid/non-opioid analgesia or sedation was used. Conscious sedation was maintained with Ramsay sedation score between 2 and 4.

After establishing a path to the target using neuronavigation system (Brainlab Varioguide® frameless stereotactic system), burr-hole was made and needle passed to yield biopsy tissue. A total of three biopsies were taken and the procedure was completed in 20 min [Figure 1b]. Patient remained cooperative, immobile and comfortable for surgery with no additional neurological deficits. Though, CSR persisted throughout surgery [Figure 2], patient was stable with SpO₂ in the range of 96%–99%, heart rate 64–88/min and mean blood pressure 62–84 mmHg with supplemental oxygen at 6 L/min. Post-operative imaging demonstrated biopsy tract within the lesion. He was discharged with the same neurological status on prednisolone and levetiracetam medications.