

Selective lobar blockade in minimally invasive coronary artery bypass grafting: A technical advantage in patients with low respiratory reserve that precludes one-lung ventilation

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ABSTRACT

Minimally invasive cardiac surgery/coronary artery bypass grafting (MICS CABG) is performed through a small 2 inch left thoracotomy incision. Lung isolation is must during MICS CABG. Oxygenation with one-lung ventilation can be difficult, especially during supine position. We report a case of a 53-year-old male patient who underwent MICS CABG with the selective lobar blockade.

Key words: Minimally invasive cardiac surgery/coronary artery bypass grafting; One-lung ventilation; Selective lobar collapse

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A 53-year-old male patient presented with complaints of breathlessness and chest discomfort on exertion relieved by taking rest for the past 4 months. Risk factors for coronary artery disease included dyslipidemia and a positive family history. Transthoracic echocardiogram revealed left ventricle ejection fraction of 40% with hypokinetic septum. E/E^I on transthoracic echocardiogram was 5.87. Coronary angiogram revealed significant single-vessel coronary artery disease (90% ostial left anterior descending [LAD]). Carotid Doppler revealed a 30–40% narrowing of right carotid artery at the level of the carotid bulb. His biochemical and hematological parameters were within normal limits. The vital parameters were stable (sinus rhythm with heart rate of 81/min). He was taken up for minimally invasive coronary artery bypass surgery. A day before surgery, an infusion of levosimendan 1 ml/h (12.5 mg in 50 ml normal saline) was started as per our protocol. Intraoperative monitoring apart from the American Society of Anesthesiologists standards included transesophageal echocardiography (multi-plane 5 MHz Transesophageal Probe GE Vingmed

Ultrasound, Horten, Norway). The patient was induced with fentanyl, propofol, and rocuronium. Postinduction, a Cook bronchial blocker (9 Fr), was placed in the left main bronchus with the help of a pediatric bronchoscope for left-lung isolation to facilitate surgery through left minithoracotomy. Maintenance included gas mixture (O₂:air, 50:50 with sevoflurane 1%) with intermittent doses of vecuronium and propofol infusion. Immediate postinduction transesophageal echocardiography findings were consistent

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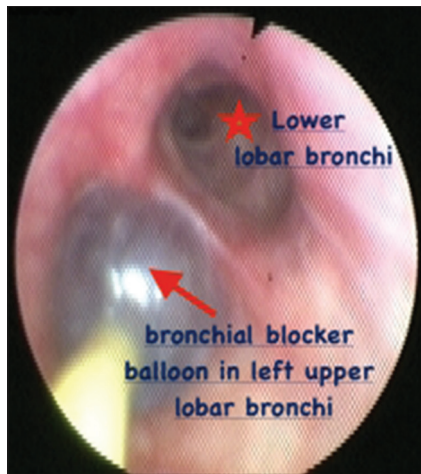


Figure 1: Bronchial blocker occluding left upper lobar bronchi

with preoperative echocardiogram. Left lung was isolated to facilitate surgery. During one-lung ventilation (OLV), FIO_2 was increased to 100%. The patient did not tolerate OLV and saturation dropped to 80% with pO_2 of 45 mmHg. Two-lung ventilation was resumed immediately. The second attempt at OLV was given with partially inflated left lung and continuous positive airway pressure circuit connected to bronchial blocker with 10 cm of H_2O positive end-expiratory pressure. This too was unsuccessful. Following this, the bronchial blocker was placed in the left upper lobar bronchi occluding both left upper and lingular lobar bronchi [Figure 1]. Surgery was resumed with collapse of left upper and lingular lobe. The patient was ventilated with pressure-controlled ventilation mode (PS of 10 cm H_2O) to keep left lower lobe out of surgical field [Figure 2]. After harvesting LIMA, the patient was heparinized with 15,000 units. Postheparin arterial blood gas analysis was within normal limit (pCO_2 33.5 mmHg and pO_2 96 mmHg). Activated clotting time was used to monitor the adequacy of anticoagulation. LIMA to LAD anastomosis was completed uneventfully. Chest was closed after heparin reversal and achieving hemostasis. The patient was extubated after 1 h with stable hemodynamics. The patient did well from here on and was discharged in a hemodynamically stable condition on the 4th day.

DISCUSSION

Minimally invasive cardiac surgery/coronary artery bypass surgery (MICS CABG) is performed through a small left anterior thoracotomy measuring 2–2.5 inches.^[1] OLV is required during MICS CABG. OLV can be difficult during supine position, only proviso being the larger right lung being ventilated.^[2]

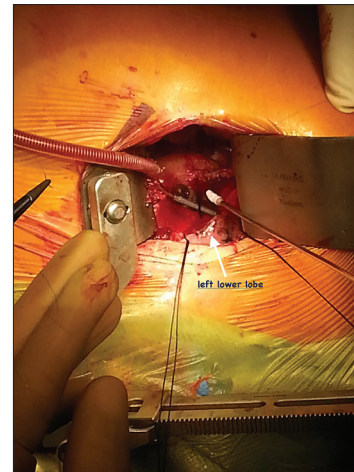


Figure 2: Inflated left lower lobe away from surgical field

Hypoxemia during OLV is defined as a persistent saturation level $<90\%$ despite all corrective measures taken. The incidence of hypoxemia varies from 5% to 10% during OLV.^[2] Selective lobar blockade provides better oxygenation in comparison to total one lung collapse during OLV.^[3-6]

After two failed trials of OLV in our case, we decided to block just left upper and lingular lobe to facilitate the OPCAB MICS CABG. However, danger of doing this was the constant presence of an inflated lung in surgical field. Pressure-controlled ventilation with 10 cm of H_2O precluded the lung from the surgical field with normal blood gas analysis. With selective lobar blockade, we could achieve good oxygenation and in turn successfully complete OPCAB MICS CABG.

To the best of our knowledge, this is the first case for the selective lobar blockade in cardiac surgery.

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Conflicts of interest

There are no conflicts of interest.

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