

CASE REPORT

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# Perioperative challenges for same sitting bilateral upper limb surgery in a patient of obstructive sleep apnoea, morbid obesity, hypothyroidism, and orthopnea

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## Abstract

**Background:** Analgesia, sedation, and anesthesia all can be dangerous in patients with obstructive sleep apnoea and have been associated with critical events during perioperative management. The risk further increases when obstructive sleep apnoea is associated with other comorbidities. Although regional anesthesia when feasible is preferred over general anesthesia, it is not a clear cut decision always. The dilemma and challenges for the management of such cases still persist.

**Case presentation:** We present here a case of 58-year-old male, weighing 98 kg (body mass index 41.86 kg/m<sup>2</sup>), presented with bilateral forearm bone fractures that was planned for bilateral upper limb surgery in the same sitting. He was newly diagnosed as having obstructive sleep apnoea, a known case of morbid obesity, hypothyroidism, and orthopnea. He was also having anticipated difficult airway. The case was managed successfully under bilateral regional anesthesia. However, patients' apprehension led to a new challenge which required different management strategies including titrated sevoflurane-based sedation.

**Conclusions:** The case highlights the dilemmas and challenges faced by anesthesiologists, use of sevoflurane sedation, need of noninvasive ventilator support, and the limitations in the usual anesthesia machine and interface in the management of patients with obstructive sleep apnoea with multiple comorbidities.

**Keywords:** Morbid obese, Brachial plexus block, Anesthetic management, Obstructive sleep apnoea, Sedation, Noninvasive ventilation

## Background

Anesthesia and OSA is a dangerous combination, and if not properly planned, the patient is likely to land up with increased perioperative morbidity. When associated with obesity, it poses greater risk, especially perioperative airway maintenance (Isono 2009). Analgesia, sedation, and anesthesia all pose risks, and these risks are independent of surgery and increases with the OSA severity (Bright 2009). Unfortunately, sufficient good quality data to have a strong evidence-based management protocol for such patients is still lacking. The regional anesthesia (RA) is advised as preferable in

peripheral surgeries (American Society of Anesthesiologists Task Force on Perioperative Management of patients with obstructive sleep apnea 2014). However, when the peripheral surgery is in the upper limb and that also for bilateral, RA is not without dilemma. We present a case of OSA with multiple other comorbidities, which underwent bilateral upper limb surgeries in the same sitting. The case highlights the dilemmas and challenges faced by anesthesiologists, sevoflurane sedation, need of noninvasive ventilator support, and the limitations in the usual anesthesia machine and interface.

## Case presentation

A 58-year-old male, weighing 98 kg (body mass index 41.86 kg/m<sup>2</sup>), presented with bilateral forearm bone

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fractures. He was having hypothyroidism, on thyroxin 100 mcg/day. History and examination revealed daytime somnolence, tiredness and snoring, and orthopnea with neck girth of 53 cm. Room air saturation was 93% in sitting position with respiratory rate 22/min, breath holding time 15 s, and BP of 148/92 mmHg with clinical metabolic equivalent of task of 5. Chest X-ray showed a hyper-inflated lung with cardio-thoracic index of > 50%; baseline PaCO<sub>2</sub> of 46 mmHg and pulmonary function test showed obstructive pattern and right ventricular systolic pressure of 30 mmHg in echocardiography. Airway assessment was significant for double chin, buffalo hump, short and thick neck with the modified Mallapati score 4, and thyromental distance of 5 cm.

The comorbidities, their anesthetic implication and different possible anesthesia were discussed and informed high-risk consent was obtained. Ultrasound-guided right internal jugular vein was catheterized as peripheral venous access was not possible. Thirty-seven milliliters (26 ml of 0.5% bupivacain, 11 ml 2% lignocain plus 5 mcg dexmedetomidine) of LA was prepared as per the highest safe dose. On the left side, nerve stimulator-assisted, ultrasound-guided supraclavicular brachial plexus block (BPB) with 20-ml solution and, on the right side, radial, median, and ulnar nerve blocks (total 17 ml) were performed. The patient was positioned in a propped-up, and oxygen was supplied through a face mask. However, the patient was apprehensive; blood pressure and heart rate shoot up and requested sedation (Fig. 1); dexmedetomidine 30 microgram/hour was started and Richmond agitation-sedation score within 0 to -1 was maintained. After half an hour through the surgery, the patient started snoring followed by desaturation. A nasopharyngeal airway was placed, but

ineffective. So, noninvasive ventilatory support was planned with oro-nasal mask interface and naso-pharyngeal airway in-situ, through a circle system on pressure support mode with a PEEP of 10 cm H<sub>2</sub>O. The method was ineffective due to leakage around the interface and property of the connector. So, he was allowed to breathe spontaneously in manual mode (putting the selector switch of the closed circuit in manual side), but was apprehensive again. So, sevoflurane + N<sub>2</sub>O sedation was also added and MACage maintained within 0.4–0.5 (Fig. 2). He was generating an adequate tidal volume clinically, maintained end tidal carbon dioxide between 38 and 42 mmHg, 100% saturation, and was sleeping comfortably. Dexmedetomidine was stopped 30 min before the end of the surgery. After wearing off of sedatives, the mask was removed and response and satisfaction of the patient were noted. The patient was pain free for a period of 6 h post-surgery, and thereafter, analgesia was maintained with paracetamol and diclofenac sodium injections and discharged from the high dependency unit next day.

**Discussion**

The numbers of obese are increasing worldwide and getting these patients for perioperative care is not uncommon. They come with a multitude of medical and psychosocial problems. OSA is a risk of critical complications, including death during the first postoperative day (Subramani et al. 2017). Morbid obesity, male gender, undiagnosed and/or partially treated/untreated OSA, sedatives, opioids, and lack of monitoring are risk factors for near-death or death (Subramani et al. 2017). So general anesthesia (GA) comes with its own major risks. In the present patient, multiple predictors of critical complications were already present. The patient was suspected to have OSA in preanesthetic clinic and was referred to pulmonary medicine, but proper implementation of management was not feasible as the surgery was required early. As the patient was having OSA of moderate to severe grade (clinical criteria), avoiding GA



**Fig. 1** Monitor showing blood pressure and heart rate list and change



**Fig. 2** Showing noninvasive respiratory support and volatile anesthetic agent (sedation) related parameters

and opioid is likely to reduce the probability of increased postoperative risk (Bright 2009). Therefore, our team decided for RA after discussing with the patient.

With the advent of ultrasonography, uses of peripheral nerve blockade become easier and preferred over GA for obese patient (Ingrande et al. 2009). The BPB can be extremely useful in patients with significant co-morbidities such as morbid obesity and those with potential airway difficulties (Raju and Coventry 2014). But the bilateral BPB is a traditional contraindication and is usually avoided by anesthesiologists due to concerns about a phrenic nerve block, pneumothorax, and LA toxicity (New York School of Regional Anesthesia 2013). Although the evidence suggests that ultrasound-guided bilateral BPB in expert hands is no longer a contraindication, this evidence can be applied for selected patients only (Mejia-Terrazas et al. 2015). Even ultrasound-guided nerve blockade in obese patient is more difficult to perform and analgesia may not be as complete (Schroeder et al. 2012). In the present case too, our dilemmas were deep rooted based on the multiple comorbidities which have already affected cardio-respiratory functional limits. The upper limit of LA was also a limiting factor along with difficulties in plexus visualization. Therefore, we decided to use nerve stimulator as well along with ultrasound and spacing of injections, as ultrasound-guided block and spacing blocks apart in time can reduce the potential toxicity issues (Holborow and Hocking 2010).

The patient was unable to lie down in a supine, while the surgical field exposure was difficult in a sitting position. Therefore, the patient was kept in 30° propped-up throughout. Although we have avoided opioids, benzodiazepine and intravenous anesthetics for sedation, we had to start dexmedetomidine which is likely to cause less (if any) respiratory depression due to patient's apprehension and shooting up of BP; patient landed up in upper airway obstruction. The American Society of Anesthesiologists' practice guideline recommends pre-operative initiation of CPAP in the perioperative management of patients with OSA, particularly in severe OSA (American Society of Anesthesiologists Task Force on Perioperative Management of patients with obstructive sleep apnea 2014). However, non-availability of CPAP facility in most of the anesthesia machine ventilators is a limitation. Although we have tried pressure support + PEEP to mimic pressure throughout the respiratory cycle, it failed due to interface used. Therefore, we had to keep sevoflurane-based sedation under titration (MACage monitoring) with spontaneous breathing putting the selector switch of the closed circuit in manual side, which was found to be effective.

## Conclusions

Case management differs from person to person and depends on the available facilities. The present case management may not be up to the perfection, but this indeed highlights a few facts: (a) titrated multimodal approach for such patient is feasible, (b) nerve stimulator aids ultrasound for effective RA procedures in morbid obesity, (c) CPAP facility is probably an option needed to be added to all anesthetic machines, and (d) access to different types of noninvasive mask interfaces should be there while managing such patients. Lastly, monitored sevoflurane sedation is an option to avoid opioid, benzodiazepine, and intravenous anesthetics for sedation in severe OSA patients. Getting patient on board for decision making is also important for success in such cases.

## Abbreviations

BP: Blood pressure; BPB: Brachial plexus block; CPAP: Continuous positive airway pressure; GA: General anesthesia; LA: Local anesthetic; OSA: Obstructive sleep apnea; PEEP: Positive end expiratory pressure; RA: Regional anesthesia

## Availability of data and materials

It is a case report. Few photographs and video are present with the author and submitted to the journal.

## Authors' contributions

HMRK participated in the case management, literature search, and manuscript preparation and editing. CKP participated in the case management, literature search, and manuscript preparation. MK participated in the case management and literature search. AA participated in the case management and manuscript preparation. All authors read and approved the final manuscript.

## Ethics approval and consent to participate

Not required as per institute protocol.

## Consent for publication

Taken from the patient and the institute.

## Competing interests

The authors declare that they have no competing interests.

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