Perioperative role of high flow nasal oxygen therapy in elderly patients undergoing emergency lower limb amputation

Sir,

A high-flow nasal oxygen delivery system may be a superior alternative to improve oxygenation, reduce the risk of desaturation and be used to manage hypoxaemic respiratory failure.[1] The heated and humidified oxygen allows delivery of gases at temperatures between 33° and 43°C and 95%–100% humidity via nasal cannula at flow rates starting from 20 to 60 L/min.[2] It also provides positive end-expiratory pressure, nearly to a value of 1 cm of H_2O for every 10 L/min flow.[3]

A 73-year-old male, known case of hypertension, having a body mass index (BMI) of 37.5 kg/m^2, presented to our emergency department with complaints of shortness of breath with cough, expectoration and pain in the left leg for 10 days with blisters all over the portion and foul-smelling discharge for the last two days. He was posted for emergency below-knee amputation. The decision to amputate is usually a difficult situation, and it becomes even more challenging in emergencies because it might present as an additional complicating factor. The patient was conscious and oriented with the following vital parameters: pulse110 beats per min, blood pressure 130/80 mm of Hg, afebrile, respiratory rate 18 per min, oxygen saturation 88% on room air. Chest auscultation revealed decreased air entry, bilateral basal coarse crepitations. Local examination of the left limb revealed greyish black discoloration with blisters. All his baseline biochemical parameters were normal except raised total leucocyte count, which was 31 × 10^9/mm^3. Chest radiogram was suggestive of community-acquired pneumonia. Broad spectrum antibiotics, pantoprazole and inhalational steroids like budesonide were advised. Considering risk factors like obesity (BMI >36 kg/m^2), old age, lower respiratory tract infection and emergency surgery, the patient was not a fit candidate for general anaesthesia. After explaining the anaesthesia and surgical risks and obtaining written informed consent, emergency left lower limb amputation under low dose unilateral subarachnoid block (SAB) was planned. SAB was performed as per the standard protocol. Operative vitals recorded were pulse 103 beats per min, blood pressure 138/88 mm of Hg, respiratory rate 28 per min, oxygen saturation 91% on a face mask at an oxygen flow of 8 L/min. We started

Table 1: Perioperative arterial blood gas [ABG] values

Parameters	Normal Range	Pre-operative	Intraoperative Period	Post-operative Period
Mode of Oxygenation		Face Mask 8 L/min	HFNC (Flow 20 L/min)	HFNC (Flow 20 L/min)
FiO_2 (%)	<21	50	60	50
pH	7.35-7.45	7.33	7.34	7.36
PaO_2	80-100 mm Hg	69	88	92
$PaCO_2$	35-45 mm Hg	28.9	34	36
HCO_3	22-24 meq/L	15.5	16.3	17.9
Lactate	0.8-1.0 mmol/L	0.6	0.6	0.5

FiO_2: Fractional inspired oxygen concentration; PaO_2: Partial pressure of oxygen; $PaCO_2$: Partial pressure of carbon dioxide; HCO_3: Serum bicarbonate; HFNC: High flow nasal cannula

oxygenation via a high flow nasal cannula (HFNC) at a rate of 20 L per min using fractional inspired oxygen concentration of 60% with dew point temperature of 36°C (Inspired ™ O_2FLO Respiratory Unit, Vincent Medical Manufacturing Co., Hong Kong). HFNC in our case improved oxygenation and work of breathing. The patient continued to receive HFNC throughout the surgery. Vitals were maintained. The surgery was uneventful and lasted for 120 min. After the surgery, the patient was monitored in the post-anaesthesia care unit. Post-surgery arterial blood gases (ABGs) were normal. Perioperative ABGs were also analysed [Table 1]. On the third post-operative day, the patient was shifted to the ward. In our case, high oxygen flow provided by Inspired™, along with its proposed benefits, may have offered supra-atmospheric intraluminal airway pressures and helped us to maintain the functional residual capacity and spontaneous ventilation.[4] Although sepsis is a relative contraindication for SAB, we chose it considering the risk-benefit ratio in the absence of coagulopathy. In our case, apart from providing positive end-expiratory pressure (to wash anatomical dead space), minute volume was reduced, leading to decreased breathing frequency by which we achieved more regular respiration. HFNC was better tolerated by our patient for a long duration.

However, due consideration should be taken while using HFNC in any patient with altered level of consciousness, haemodynamically unstable, with reduced upper airway reflexes as it increases the risks of aspiration, may increase the risk of epistaxis, and high flow can lead to worsening of pneumothorax[5] and gastric distension which further jeopardises respiration. Nevertheless, we did not notice any such events in our case.

This case demonstrates the usefulness of the HFNC and applies it to new paradigms in ventilatory assistance to patients with respiratory distress during emergency amputation. HFNC has already been utilised to manage a difficult airway, in the post-extubation and pre-intubation period in the operation theatre and intensive care.

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 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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Conflicts of interest

There are no conflicts of interest.

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REFERENCES

1. Dave N, Kranappu K. Comments on published article. Indian J Anaesth 2020; 64:351.
2. Zhang R, He H, Yun L, Zhou X, Wang X, Chi Y, *et al*. Effect of postextubation high-flow nasal cannula therapy on lung recruitment and overdistension in high-risk patient. Crit Care 2020;24:82.
3. Spence EA, Rajaleelan W, Wong J, Chung F, Wong DT.

The effectiveness of high-flow nasal oxygen during the intraoperative period: A systematic review and meta-analysis. Anesth Analg 2020;131:1102-10.
4. Kulkarni KS, Desai PM, Shringarpure AM, Sarkar M. Use of high-flow nasal cannula for emergency pericardiocentesis in a case of anterior mediastinal mass. Saudi J Anaesth 2018;12:161-2.
5. Mandal S, Barman SM, Sarkar A, Goswami J. SponTaneous respiration using IntraVEnous anaesthesia and Hi-flow nasal oxygen (STRIVE Hi) in tracheal stenting. Indian J Anaesth 2019;63:941.

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