

# Efficacy of HFNO during airway management of a COVID pneumonia patient with super morbid obesity undergoing emergency laparotomy

## ABSTRACT

This case report describes the use of high flow nasal oxygen (HFNO) in a patient with morbid obesity (BMI = 90 kg/m<sup>2</sup>) who underwent emergency laparotomy under general anesthesia. This 54-year-old female patient with American Society of Anesthesia classification 4 E is known to have COVID pneumonia with Obstructive Sleep Apnea. She was admitted in the ICU for 3 days and she was on Bilevel Positive Airway Pressure (BiPAP) alternating with HFNO to keep her SpO<sub>2</sub> 91%–92%, on FiO<sub>2</sub> 60%, and respiratory rate (RR) 40–45/min. The plan for airway management was rapid sequence intubation with preoxygenation using the HFNO. We here report this case to show the usefulness of HFNO, which adds a new dimension in airway management of similar cases.

**Key words:** COVID-19 Pneumonia, HFNO, morbid obese

The prevalence of obesity in Saudi Arabia with BMI  $\geq 30$  is 24.7%.<sup>[1]</sup> In obese patients, when preoxygenation was performed with a facemask, the safe time apnea period was as short as 1–3 min following preoxygenation compared to 7–10 min in healthy adult patients.<sup>[2]</sup> In a study involving 33 patients with morbid obesity (BMI  $\geq 35$  kg/m<sup>2</sup>), HFNO at a flow rate of 50 L/min with the patient's mouth closed was superior to facemask oxygenation in obtaining a high arterial partial pressure of oxygen (PaO<sub>2</sub>). After 3 min of preoxygenation to the patient in a 30° head-elevated position, the median PaO<sub>2</sub> was 380 mmHg in the HFNO group and 337 mmHg in the facemask group. None of the patients experienced complications due to epistaxis or gastric aspiration when using HFNO. Therefore, in obese patients, the effectiveness of HFNO is increased by placing


the patient in a head elevation position.<sup>[3]</sup> HFNO is delivered by an air/oxygen blender, an active humidifier, a single hot circuit, and a nasal connector. It delivers gas that is warm and humid with fluctuations of up to 60 L/min, and is considered to have a number of physiological benefits, including the reduction of anatomical dead space and work of breathing, the provision of a constant fraction of inspired oxygen with adequate humidification and a degree of positive end-expiratory pressure.<sup>[4]</sup> We here report this case to show the usefulness of HFNO, which adds a new dimension in airway management in patients with morbid obesity.

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

**For reprints contact:** WKHLRPMedknow\_reprints@wolterskluwer.com

**How to cite this article:** Hajnour MS, Amlih HF, Shabr FF. Efficacy of HFNO during airway management of a COVID pneumonia patient with super morbid obesity undergoing emergency laparotomy. Saudi J Anaesth 2022;16:368-70.

### Access this article online

<b>Website:</b> www.saudija.org	<b>Quick Response Code</b> 
<b>DOI:</b> 10.4103/sja.sja_327_22	

## MOHAMED SAYED HAJNOUR, HANEEN FAWZI AMLIH, FAISAL FAHAD BIN SHABR

Anesthesia Department, King Saud University Medical City (KSUMC) King Saud University (KSU), Riyadh, Saudi Arabia

**Address for correspondence:** Dr. Mohamed Sayed Hajnour, Consultant Anesthesia, Anesthesia Department, King Saud University Medical City (KSUMC) King Saud University (KSU), Riyadh, Saudi Arabia.  
E-mail: sanadsayed@yahoo.com

**Submitted:** 19-Apr-2022, **Revised:** 04-May-2022, **Published:** 20-Jun-2022

## Case Report

A 54-year-old female patient admitted in the intensive care unit (ICU), American Society of Anesthesiologist 4 E, is known to have COVID pneumonia requiring BiPAP alternating with HFNO to keep the SpO<sub>2</sub> between 91%–92% with FiO<sub>2</sub> 60% and RR around 40–45/min. Her body weight is 200 kg and body mass index (BMI) 90 kg/m<sup>2</sup>. She is suffering of diabetes mellitus on oral hypoglycemic agents, hypertension on medications, bronchial asthma on ventolin inhaler, and also obstructive sleep apnea. She has moderately elevated pulmonary pressure 60 mmHg. She was scheduled to undergo exploratory laparotomy due to incarcerated umbilical hernia. Difficult airway was anticipated due to the complicated respiratory problems. Her arterial blood gases on HFNO were: pH 7.4, PaO<sub>2</sub> 73 mmHg, PaCO<sub>2</sub> 42 mmHg, O<sub>2</sub> saturation 93%, and bicarbonate 31 mmHg. Other biochemical analysis parameters were within normal ranges. She was distressed and not cooperative, therefore, not suitable for awake fiberoptic intubation. The plan was to perform rapid sequence intubation using the GlideScope. The patient came to the operation room (OR) with secured i.v., arterial and central venous lines. Ramp position was ensured on the OR table and HFNO was continued to achieve a prolonged safe apnea period. Induction of anesthesia was achieved with i.v. lidocaine 150 mg followed by etomidate 20 mg, and tracheal intubation was facilitated with rocuronium 150 mg. Tracheal intubation was secured with tube size 7.0 mm using the GlideScope. During the procedure, she received intermittent boluses of ephedrine and phenylephrine to maintain her blood pressure. The duration of surgery was 3 h; then, the patient was transferred to the SICU with the trachea intubated for further follow-up. Three days later the trachea was extubated and she made a good recovery.

## Discussion

Tracheal intubation is challenging in patients with a risk of hypoxemia. Even when pre oxygenation with a facemask can deliver high-concentration oxygen, ventilation must be stopped while attempting tracheal intubation, which may result in further desaturation. In the case we reported, the use of HFNO was crucial and led to sufficient safe apnea time for tracheal intubation without desaturation. In 2020, a case of successful oxygenation during anesthesia induction using HFNC was reported in a patient with severe hypoxemia due to lung cancer with a favorable outcome.<sup>[5]</sup> Another study published in 2021 proved that in patients with moderate to high risk of hypoxemia undergoing gastrointestinal endoscopy under deep sedation, HFNO during the procedure decreased the rate of desaturation

as compared with standard oxygen therapy.<sup>[6]</sup> HFNO can be used effectively to provide respiratory support to patients with COVID-19, and to avoid mechanical ventilation even in patients with severe hypoxemia. During tracheal intubation, HFNO may improve safety as it provides not only adequate preoxygenation, but also a safe apnea period during the procedure. The nasal prongs can be left in place during the entire tracheal intubation, offering oxygen at the pharyngeal level, while a standard bag-valve mask must be removed during laryngoscopy.<sup>[7]</sup> HFNO is a promising new technique that keeps patients safer during anesthesia. It does keep the saturation well for longer period of time, which gives the anesthetists the time required to secure the airway in patients with high risk of hypoxia.<sup>[8]</sup>

**In conclusion**, this case report showed a significant improvement in blood oxygenation during intubation in a critically ill patient. Employing the HFNO technique may reduce the incidences of both desaturation and critical desaturation. HFNO reduces the incidence of hypoxemia during anesthesia and may offer an opportunity to enhance patient safety for high-risk surgical cases. High quality randomized controlled trials are needed on the efficacy of using HFNO in prolonging the safe apnea period to facilitate tracheal intubation in patients with a difficult airway.

## Financial support and sponsorship

Nil.

## Conflicts of interest

There are no conflicts of interest.

## References

1. Al Shaikh A, Aseri K, Farahat F, Abaalkhail BA, Kaddam I, Salih Y, *et al.* Prevalence of obesity and overweight among school-aged children in Saudi Arabia and its association with vitamin D status. *Acta Biomed* 2020;91:e20201333
2. Tanoubi I, Drolet P, Donati F. Optimizing preoxygenation in adults. *Can J Anaesth* 2009;56:449–66.
3. Heinrich S, Horbach T, Stubner B, Prottengeier J, Irouschek A, Schmidt J. Benefits of heated and humidified high flow nasal oxygen for preoxygenation in morbidly obese patients undergoing bariatric surgery: A randomized controlled study. *J Obes Bariatrics* 2014;1:7.
4. Mazzeffi MA, Petrick KM, Magder L, Greenwald BD, Darwin P, Goldberg EM, *et al.* High-flow nasal cannula oxygen in patients having anesthesia for advanced esophagogastroduodenoscopy: HIFLOW-ENDO, a randomized clinical trial. *Anesth Analg* 2020;132:743–51.
5. Binks MJ, Holyoak RS, Melhuish TM, Vlok R, Bond E, White LD. Apneic oxygenation during intubation in the emergency department and during retrieval: A systematic review and meta-analysis. *Am J Emerg Med* 2017;35:1542–6.
6. Guitton C, Ehrmann S, Volteau C, Colin G, Maamar A, Jean-Michel V, *et al.* Nasal high-flow preoxygenation for endotracheal intubation in

- the critically ill patient: A randomized clinical trial. *Intens Care Med* 2019;45:447-58.
7. Cabrini L, Landoni G, Radaelli MB, Saleh O, Votta CD, Fominskiy E, *et al.* Tracheal intubation in critically ill patients: A comprehensive systematic review of randomized trials. *Crit Care* 2018;22:6.
  8. Ricard JD. Hazards of intubation in the ICU: Role of nasal high flow oxygen therapy for preoxygenation and apneic oxygenation to prevent desaturation. *Minerva Anesthesiol* 2016;82:1098-106.