

EDITORIAL

Preoxygenation by high-flow nasal oxygen in the non-hypoxemic patient: the early stages

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The Difficult Airway Society widely recommends preoxygenation before the induction of general anesthesia. It decreases the risk of hypoxemia by enhancing oxygen reserves through denitrogenating of functional residual capacity. Several procedures have been proposed and evaluated in that purpose (Figure 1). The bag-mask is the most traditional method, and it allows preoxygenation in “tidal volume” for three minutes or in “forced capacity” by deep inspirations and expirations at a rate of 8 cycles/min. Theoretically, NIV has advantages for preoxygenation, it allows higher PaO₂ values to be obtained in hypoxemic patients,¹ but it presents numerous contraindications. The effectiveness of preoxygenation with HFNO has not yet been demonstrated in hypoxemic patients but could be useful for patients at low risk of hypoxemia, especially in scheduled surgery.

On the one hand, HFNO can be used as a method of preoxygenation in surgical non-hypoxemic patients. Theoretically, it could decrease hypoxemia during a planned or unplanned difficult intubation. The combination of preoxygenation with HFNO and apneic oxygenation significantly increases the duration of apnea without arterial desaturation.² On the other hand, this method of preoxygenation could be appropriate for anticipated difficult ventilation or intubation.

If its application has to be routine during the induction of general anesthesia, it would be worthwhile to assess the increased financial cost (mate-

rial and a significant amount of oxygen). Besides, the contraindications to the use of HFNO have not yet been determined. Some questions are still subject to debate. For example, is it legitimate to use a high gas flow rate in some diseases such as la-

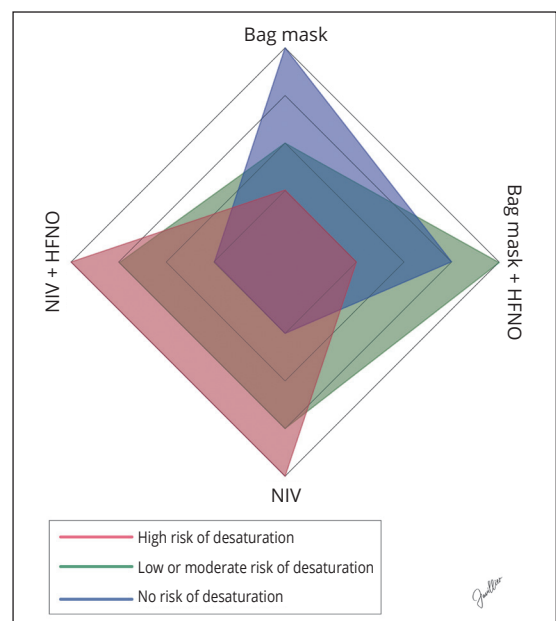


Figure 1.—The choice of preoxygenation technique could depend on the risk of hypoxemia. For patients at low risk of desaturation, the conventional bag-mask technique, optionally combined with High Flow Nasal Oxygenation (HFNO) may be sufficient. With an increased risk of desaturation, the best preoxygenation technique would be the Non-Invasive Ventilation (NIV). Globally, the higher the risk of hypoxemia is, the more multimodal preoxygenation should be used.

ryngeal papillomatosis without any risk of pulmonary dissemination? Another consideration could be related to the safety concerning the use of laser technique in ENT surgery.

In the same way, general anesthesia for non-fasting patients represents a high-risk procedure. Currently, it is recommended to use a rapid sequence induction. In these patients, HFNO combined with apneic oxygenation, could be a possible indication. Nevertheless, by producing a positive pressure in the upper airway, no one can guarantee the safety of this oxygenation mode, especially in terms of gastric insufflation. McLellan has recently demonstrated the absence of gastric insufflation among healthy volunteers.³ The next step will be to confirm its safety in patients under general anesthesia.

Considering preoxygenation, the NIV (non-invasive ventilation) demonstrated superiority to HFNO in hypoxemic⁴ and obese patients.⁵ Other authors have also investigated the NIV/HFNO combination.⁶ It is suggested to correlate the patient's risk of desaturation (comorbidity, pulmonary condition, absence of airway obstruction) with the selection of the optimal method of preoxygenation.⁶ The higher the risk of desaturation is, the more preoxygenation options should be combined.⁶

In this issue of *Minerva Anestesiologica*, Tremey *et al.* studied in a randomized study the feasibility of preoxygenation and apneic oxygenation with HFNO in patients without comorbidities during a scheduled surgery. On the one hand, the use of HFNO did not demonstrate lower SpO₂ values than the bag-mask. Both intubation times and PETCO₂ values were statistically similar. On the other hand, patient satisfaction in terms of submandibular pain was better than with the bag-mask.⁷

Consequently, HFNO method appears safe in the preoxygenation of patients without prior risk of hypoxemia. The apneic oxygenation could pro-

vide an increased level of safety. In the patient without risk of difficult ventilation/intubation, the advantage of preoxygenation with HFNO over the bag-mask has yet to be established.

Further studies will be required to accurately determine: 1) the ideal preoxygenation time with HFNO; 2) the oxygen flow rate to be used; and 3) the usefulness of a Jaw-Thrust during the apneic oxygenation phase prior to intubation. In its next recommendations, the DAS will have to position the place of HFNO in non-hypoxemic patients.

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