

Oxygen Delivery with High Risk of Hypoxemia Esophagogastroduodenoscopy

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Structured Abstract

Background

An 84-year-old female presented to the endoscopy suite for an esophagogastroduodenoscopy (EGD). Routine monitors were placed, and oxygen was delivered via standard nasal cannula (SNC) with EtCO₂ monitoring at 3 L/min throughout the case. The patient was sedated with propofol boluses at 10mg increments. The patient's SpO₂ remained at 94% or greater during the case. After completion of the exam the patient was transferred to recovery while receiving O₂ at 3 L/min via SNC.

An EGD is considered a reduced airway access case due to patient positioning and the insertion of an endoscope. The endoscope can contribute to airway obstruction, and it prevents the anesthetist from using a mask for oxygen delivery. Therefore, oxygen is typically administered via SNC with EtCO₂ monitoring capability. This form of oxygen administration limits the maximum deliverable FiO₂ to 0.4 because SNCs can only effectively deliver 4-6 L/min of oxygen. Propofol, benzodiazepines, and occasionally opioids are commonly administered sedatives during these procedures, all of which are respiratory depressants. The combination of these factors poses a risk of hypoxemia, especially for patients who are already at risk of hypoxemia due to preexisting conditions. To combat this there are alternative airway devices available for endoscopic procedures, one such being a hi-flow nasal cannula (HFNC). The benefits of using a HFNC are that it can deliver oxygen at a rate of up to 60 L/min with titratable FiO₂ from 0.21-1.0. Additionally, the increased flow rate creates positive pressure that can help reduce upper airway obstruction.

Clinical Question

For patients with an increased risk of hypoxemia undergoing an EGD, does oxygen administration with a HFNC reduce the risk of hypoxic events compared to a SNC?

Evidence Based Discussion

A literature review found studies comparing oxygen delivery via SNC and HFNC for patients undergoing an EGD, with a primary aim of comparing incidence of hypoxemia between groups. Almost unanimously, the randomized controlled trials (RCTs) found that HFNCs significantly reduced the incidence of hypoxemia during an EGD when compared with a SNC. Some studies listed other benefits provided by the HFNC such as fewer procedural interruptions and fewer airway maneuver requirements. The results of the meta-analyses were less consistent, with two of three concluding that HFNCs significantly reduced the incidence of hypoxemia and one concluding there was no significant difference between groups. Additionally, only two studies created a subgroup for patients at an increased risk of hypoxemia. Again, the results were conflicting. One study states that a HFNC might reduce the incidence of hypoxemia for at risk patients, while the other found no significant difference between groups for this population. Both

analyses admit to a limited number of included studies which could have influenced their results. One RCT compared the effects of HFNC and SNC oxygen administration for morbidly obese patients undergoing a colonoscopy. The study did not reach completion due to a midway analysis that revealed no significant difference between groups. However, it is worth noting that the study design severely regulated the oxygen delivering capabilities of the HFNC by restricting it to similar FiO₂ levels of the SNC.

Translation to Practice

The result of the literature review is not in favor of utilizing a HFNC during an EGD for all, or even all high-risk, patients. Practitioners may elect to administer oxygen via HFNC on a patient specific basis. However, further research is required before a policy or protocol is established for HFNC use during EGDs. The primary outcome in most of these studies was the occurrence of hypoxemia. Future research should be aimed at confirming whether HFNCs reduce the occurrence of hypoxemia, but they should also include aims concerning patient outcomes and procedural delays caused by hypoxemia. Additional systematic reviews and meta-analyses should assess the validity of those studies. A cost benefit analysis would indicate if financial support existed for administering oxygen via HFNC for patients undergoing an endoscopic procedure. Currently there is no call to action regarding the use of a HFNC during an EGD.

Keywords: hypoxemia, GI endoscopy, hi-flow nasal cannula, preoxygenation, esophagogastroduodenoscopy

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