Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.
Preferential use of total intravenous anesthesia in ambulatory otolaryngology surgery during the COVID-19 pandemic

Matthew Stewarta,⁎, Adam Thalerb, Patrick Huntb, Leonard Estephana, Maurits Boona, Colin Huntleya

aDepartment of Otolaryngology–Head and Neck Surgery, Thomas Jefferson University Hospital, 925 Chestnut St., 6th Floor, Philadelphia, PA 19146, USA
bDepartment of Anesthesiology, Thomas Jefferson University Hospital, 111 South 11th St., Suite 8490 Gibbon, Philadelphia, PA, USA

ARTICLE INFO

Keywords:
COVID-19
Coronavirus
Otolaryngology
Outpatient surgery
Same day surgery

ABSTRACT

The novel coronavirus (SARS-CoV-2 or COVID-19) pandemic has impacted nearly every aspect of otolaryngologic practice. The transition from office-based evaluation to telemedicine and the number of postponed elective surgical cases is unprecedented. There is a significant need to resume elective surgical care for these patients at the appropriate time. As practices begin to move towards resuming elective and same day ambulatory surgery, safety of both the patient and healthcare team is of paramount importance. Usage of total intravenous anesthesia (propofol and remifentanil) over volatile gas anesthesia (e.g., sevoflurane) may increase the number of patients able to safely receive care by reducing potential spread of the virus through reduction in coughing and significantly decreasing the time spent in the recovery room.

1. Introduction

1.1. Importance

The novel coronavirus (SARS-CoV-2 or COVID-19) was declared a pandemic by the World Health Organization on March 11, 2020 and has since had an unprecedented disruption to medical and surgical care across the world. As the United States begins to resume elective surgical cases, the otolaryngologist is presented with numerous challenges. First, many otolaryngology procedures are aerosolized when involving direct contact with the aerodigestive tract, oral mucosa, or spaces lined by respiratory epithelium (e.g., nasal cavity, nasopharynx, mastoid, etc.) – all of which may have significant viral concentration in a COVID-19 positive patient [1,2]. As a result, the surgeon and operating room personnel may be at risk without adoption of precautions. Second, despite even the most thorough screening of symptoms in patients, there is a growing awareness of asymptomatic carriers of COVID-19 and the possibility of false-negative preoperative COVID-19 tests [3,4]. In addition, there may be limited access to testing in some areas. The asymptomatic carrier in combination with limited availability and reliability of testing puts health care workers at significant risk of infection, particularly the otolaryngologist operating in tissue with a potentially highly concentrated viral load. In this article, we propose a method of general anesthesia that may help to reduce the risk of viral spread while increasing an outpatient surgery center’s capacity to provide care to patients.

1.2. Recommendations

We suggest ambulatory surgery centers explore using total intravenous anesthesia (TIVA) using propofol and a short acting opioid such as remifentanil in the setting of COVID-19. We believe utilizing TIVA may reduce upper airway activity and allow for quicker patient recovery times as compared to using volatile anesthesia, increasing the safety of the healthcare team as well as patients with our rationale explained in detail below. Our suggestions are intended to be supplemental, yielding first to institutional requirements and social distancing guidelines in the midst of the current pandemic.

2. Rationale

2.1. Coughing reduction

As widely reported, one of the most common methods of transmission of COVID-19 is via droplet transmission following a cough. Although it is assumed that symptomatic patients displaying fever or cough would likely be identified in preoperative screening, this is not the case for asymptomatic patients. Volatile anesthesia (e.g.,...
sevoflurane or desflurane) represents a group of anesthetics often used for otolaryngologic procedures. This option is cost effective and is typically well tolerated. In the setting of COVID-19, however, there is potential for a significant disadvantage to using volatile anesthesia as compared to TIVA: there is a significantly increased risk of upper airway reactivity, namely a cough, when utilizing volatile anesthesia [5–7]. Due to this reason alone, our ambulatory surgery center has transitioned all cases to use TIVA over volatile anesthesia for protection of all involved.

2.2. Recovery time reduction

Our tertiary care center has seen a significant impact on recovery time and time to discharge for same day surgery patients who receive TIVA over volatile anesthesia. To illustrate this point, we reviewed 59 patients who underwent upper airway stimulation for obstructive sleep apnea at a same day surgery center. Twenty-nine patients received volatile anesthesia with sevoflurane, and 30 received TIVA. There was a 42.5-minute average reduction (p < .0001) in the amount of time it took a patient to reach an Aldrete score of ≥9/10, indicating the patient had largely recovered from anesthesia and is appropriate to discharge [8]. We suspect that sevoflurane is more slowly eliminated than TIVA (as propofol and remifentanil) due to its longer half-life in addition to its wider distribution into tissues as compared to TIVA [9]. Further, utilizing TIVA may lead to a decrease in postoperative nausea and vomiting which can also increase the time in recovery for patients who receive sevoflurane [10]. Thus, utilizing TIVA may allow for patients to be discharged faster, and thus have a direct and positive impact on an ambulatory surgery center’s ability to provide safe care while efficiently moving patients through the recovery room. This diminishes the recovery time required, may limit the number of staff members involved in the patients care, and may limit the number of unnecessary person-to-person interactions.

3. Conclusions

Utilization of total intravenous anesthesia with propofol and remifentanil instead of volatile anesthesia may reduce the risk of COVID-19 exposure to healthcare personnel and other patients in the hospital by a decrease in airway reactivity, coughing, and subsequent droplet transmission from asymptomatic and false-negative patients. Further, a significant decrease in recovery time may allow for ambulatory surgery centers to safely provide care to more patients by reducing each patient’s time to discharge.

Declaration of competing interest

None.

References

[1] Jackler R. COVID-19 and ear surgery. https://www.entnet.org/sites/default/files/uploads/covid-19_and_ear_surgery_rk_jackler_stanford.pdf, Accessed date: 7 May 2020.
[2] Kowalski JP, Sanabria A, Ridge JA, Ng WT, de Bree R, Rinaldo A, et al. COVID-19 pandemic: effects and evidence-based recommendations for otolaryngology and head and neck surgery practice. Head Neck 2020. https://doi.org/10.1002/hed.26164.
[3] Xiao AT, Tong YX, Zhang S. False-negative of RT-PCR and prolonged nucleic acid conversion in COVID-19: rather than recurrence. J Med Virol 2020. https://doi.org/10.1002/jmv.25855.
[4] Cheng X, Liu J, Li N, Nisenbaum E, Sun Q, Chen B, et al. Otolaryngology providers must be alert for patients with mild and asymptomatic COVID-19. Otolaryngol Head Neck Surg 2020. https://doi.org/10.1177/19445599209204649.
[5] Hohlrieder M, Tiefenthaler W, Klaus H, Gabl M, Kavakebi P, Keller C, et al. Effect of total intravenous anaesthesia and balanced anaesthesia on the frequency of coughing during emergence from the anaesthesia. Br J Anaesth 2007;99:587–91. https://doi.org/10.1093/bja/aei271.
[6] Hans P, Marechal H, Bonhomme V. Effect of propofol and sevoflurane on coughing in smokers and non-smokers awakening from general anaesthesia at the end of a cervical spine surgery. Br J Anaesth 2008;101:731–7. https://doi.org/10.1093/bja/aen271.
[7] Klock P, Czestick L, Klafta J, Ovassapian A, Moss J. The effect of sevoflurane and desflurane on upper airway reactivity. Anesthesiology 2001;94:963–7. https://doi.org/10.1097/00000542-200106000-00008.
[8] Aldrete J. The post-anesthesia recovery score revisited. J Clin Anesth 1995;7:89–91.
[9] Wissing H, Kuhn I, Rietbrock S, Führ U. Pharmacokinetics of inhaled anaesthetics in a clinical setting: comparison of desflurane, isoflurane and sevoflurane. Br J Anaesth 2000;84:443–9. https://doi.org/10.1093/oxfordjournals.bja.a013467.
[10] Vari A, Gazzanelli S, Cavallo R, De Toma G, Tarquini S, Guerra C, et al. Post-operative nausea and vomiting (PONV) after thyroid surgery: a prospective, randomized study comparing totally intravenous versus inhalational anesthetics. Am Surg 2010;76:325–8.