

# Postoperative Nausea and Vomiting after Oral and Maxillofacial Surgery under General Anesthesia

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## Abstract

Postoperative nausea and vomiting (PONV) is one of the most common complications that may ensue following oral and maxillofacial surgeries (OMFS) under general anesthesia. In an effort to identify factors that affect PONV, we will incorporate recent studies and literary reviews. Identifying patient risk factors will allow clinicians to optimize prophylactic and antiemetic regimens for patients undergoing oral and maxillofacial surgeries under general anesthesia. The efficacy and safety of protocols and treatments to prevent PONV will also be addressed. This review is intended to educate the practicing clinicians of the prevalence and risk factors of PONV in OMFS under general anesthesia, as well as the available treatments to prevent this common and unpleasant problem.

## Introduction

Postoperative nausea and vomiting (PONV) is defined as nausea and/or vomiting occurring within 24 hours of surgery (Apipan et al. 2016). PONV is also one of the most frequent adverse complications after surgery and is strongly related to patients' dissatisfaction (Wang et al. 2021). Despite this, few papers have reported the incidence and independent risk factors associated with PONV in the context of OMFS (Apipan et al. 2016). Patients who are more likely to experience PONV after surgery include: patients of female gender, history of motion sickness, general anesthesia, and nasogastric insertion (Son et al. 2016). The goal here is to identify and address the risk factors contributing to PONV and to discuss treatments and anesthetic plans that reduce incidences of PONV.

## Risk Factors with PONV

- Female
- Age < 30
- Non-smoker
- History of PONV/motion sickness
- Volatile Agents
- Nitrous Oxide
- Opioids
- Longer Durations of Anesthesia/Operation Time (>4 hours)

(Apipan et al. 2016)

## Complications from PONV

Postoperative nausea and vomiting (PONV) is one of the most unpleasant and frequent complications after surgery (Dobbeleir et al. 2018). It reduces patient satisfaction, increases length of hospital stay after surgery, and increases hospital healthcare costs (Dobbeleir et al. 2018). Furthermore, vomiting in patients who undergo OMFS is extremely dangerous as it may predispose them to aspiration (Jacob et al. 2021). Compared with single-jaw surgery, bimaxillary surgery was followed by a higher incidence of PONV despite antiemetic prophylaxis (Wang et al. 2021). In a prospective cohort study, 72.2% of patients experienced nausea and 43.1% developed vomiting after bimaxillary surgery (Wang et al. 2021). Occurrences of PONV may be life-threatening in bimaxillary patients, whose jaws are wired shut together to immobilize the bones while they are healing (Wang et al. 2021). Maxillomandibular elastic tractions, facial swelling, and pain may all affect mouth-opening, and thus, increase the risk of aspiration which can lead to asphyxia (Wang et al. 2021). Therefore, wire cutters must be available and should be with the anesthesiologist at all times in the operating room and when transporting the patient from the operating room to the PACU to gain a quick emergency airway access and/or to allow the patient to vomit to reduce the risk of aspiration and asphyxia (Wang et al. 2021).

## PONV Prophylaxis

The pathophysiology of PONV is complex and involves various pathways and receptors (Wang et al. 2021). No single drug used for preventing PONV is effective enough, therefore, multimodal approach or combined antiemetics should be used to prevent PONV in high-risk patients (Wang et al. 2021). A 5-hydroxytryptamine 3 receptor antagonist, such as Ondansetron, with dexamethasone is a recommended combination for PONV prophylaxis (Wang et al. 2021). However, even with combined therapy, the incidence of PONV was up to 50% in orthognathic patients and higher in bimaxillary cases (Wang et al. 2021). Therefore, a third drug of another category, such as scopolamine, a muscarinic antagonist, should be considered to prevent PONV (Wang et al. 2021).

## Other Considerations for PONV

Studies have shown that the activation of the central cholinergic system, especially the M3 muscarinic acetylcholine receptor, plays an important role in the pathogenesis of PONV (Wang et al. 2021). Scopolamine, a muscarinic antagonist, has been effectively used for PONV prevention (Wang et al. 2021). Penehyclidine is a new muscarinic antagonist that selectively blocks M3 muscarinic receptor (Wang et al. 2021). Studies have shown that prophylactic penehyclidine administered before surgery helped to prevent PONV (Wang et al. 2021). A single bolus of penehyclidine at induction with antiemetics of other classes was effective in preventing PONV (Wang et al. 2021). However, a single dose penehyclidine was associated with increased emergence agitation, whereas a low-dose bolus followed by a continuous infusion of penehyclidine was even more effective in preventing PONV without a significant increase in emergence agitation (Wang et al. 2021). In another study, the incidence of PONV was lower in patients undergoing OMFS with TIVA vs sevoflurane; however, the recovery time was found to be longer in the TIVA group compared to the sevoflurane group (Şimşek et al. 2020). Therefore, clinicians should plan the patient's anesthetic method accordingly with the patient's risk factors and weigh out the pros and cons of each anesthetic. Clinicians should consider TIVA with propofol for patients undergoing OMFS with high risk factors of PONV, because although the recovery time was found to be longer, the incidence of PONV was significantly lower in patients who underwent OMFS with TIVA (Şimşek et al. 2020).

## Discussion

Because orthognathic surgeries are associated with even a higher incidence of PONV, this review recommends administering additional antiemetics such as ondansetron (Zofran) prior to extubation especially if interdental wires are planned to reduce risk of vomiting and aspiration (Jacob et al. 2021). Results from this review conclude that PONV prophylaxis is best given round the clock for the first 24 hours and longer if opioids continue to be used (Jacob et al. 2021). If treatment for PONV is required within 6 hours of PONV prophylaxis, it should ideally be with a different class of anti-emetic drug to that used initially to have better effect in preventing PONV (Jacob et al. 2021). It is important to assess each individual risk factor for PONV, and patients' past medical, surgical, and anesthetic history should be noted and evaluated in preoperative holding. Identifying these independent risk factors for PONV is important and will allow anesthesia providers to optimize prophylactic, antiemetic regimens. And in order to achieve a comprehensive preoperative interview to identify the patient's history and risk factors for PONV, there is a great need for good communication among anesthesiologists, surgeons, and other team members.

## Conclusion

The practicing clinicians should be mindful of the patient's history, risk factors, and of all perioperative possibilities. Identifying these risk factors will allow clinicians to optimize prophylactic and antiemetic regimens for patients undergoing oral and maxillofacial surgeries under general anesthesia. Communication and collaboration between surgeons and anesthesiologists are important, and clinicians should carefully weigh out the pros and cons when directing an anesthetic plan for patients with risk factors of PONV. Patients' previous history coupled with the clinician's expertise will direct the anesthetic plan towards the best postoperative outcome for the patient.

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