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Review

Post-operative nausea and vomiting: Update on predicting the probability and ways to minimize its occurrence, with focus on ambulatory surgery

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HIGHLIGHTS

- Postoperative nausea and vomiting (PONV) is still not uncommon after surgery and anaesthesia.
- It is still not possible to guarantee that an individual patient will not experience PONV.
- There are several factors contributing to the occurrence of PONV.
- There is a need for proper risk assessment.
- There is a need for further studies how to identify patients at risk.

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ABSTRACT

Postoperative nausea and vomiting "*the little big problem*" after surgery/anaesthesia is still a common side-effect compromising quality of care, delaying discharge and resumption of activities of daily living. A huge number of studies have been conducted in order to identify risk factors, preventive and therapeutic strategies. The Apfel risk score and a risk based multi-modal PONV prophylaxis is advocated by evidence based guidelines as standards of care but is not always followed. Tailored anaesthesia and pain management avoiding too liberal dosing of anaesthetics and opioid analgesics is also essential in order to reduce risk. Thus multi-modal opioid sparing analgesia and a risk based PONV prophylaxis should be provided in order to minimise the occurrence. There is however still no way to guarantee an individual patient that he or she should not experience any PONV. Further studies are needed trying to identify risk factors and ways to tailor the individual patient prevention/therapy are warranted.

The present paper provides a review around prediction, factors influencing the occurrence and the management of PONV with a focus on the ambulatory surgical patient.

1. Introduction

Postoperative nausea and vomiting (PONV) is one of most frequent side effect after anaesthesia [1], occurring in 30% of unselected in patients and up to 70% of "high-risk" in patients during the 24 h after emergence [2]. Its incidence following ambulatory surgery is not uncommonly reported as lower than in inpatient surgery, but PONV may be under-recognized in the outpatient setting, where patients quickly leave direct medical oversight [3]. For the ambulatory patients Post Discharge Nausea and Vomiting [4] (PDNV) must also be acknowledged. Even though predischarge PONV predicts PDNV some patient do not experience emetic sequelae until after discharge. Nausea and vomiting may start and persist up to days after anaesthesia and thus strategies providing long-lasting protections should be sought (Figs. 1 and 2).

The present paper aim at providing an overview around PONV with a focus on prediction and factors that influence the risk for and severity of PONV in the patient scheduled for ambulatory surgery and anaesthesia.

Postoperative nausea and vomiting (PONV) is not only common but is one of most distracting side effects after surgery/anaesthesia [5]. Avoiding pain and PONV is highly prioritized [6]. PONV has

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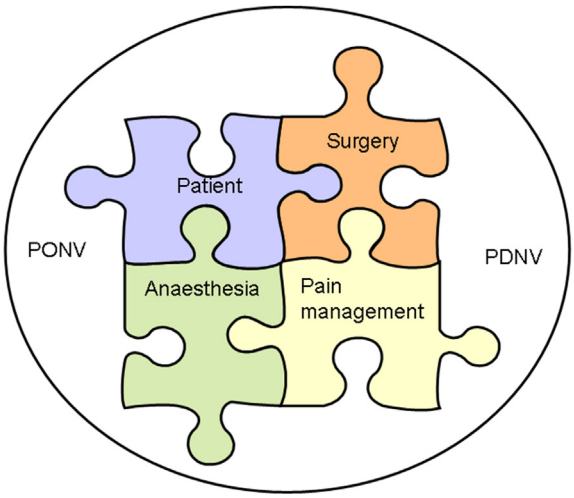

Fig. 1. Major factors with impact on the risk for PONV.

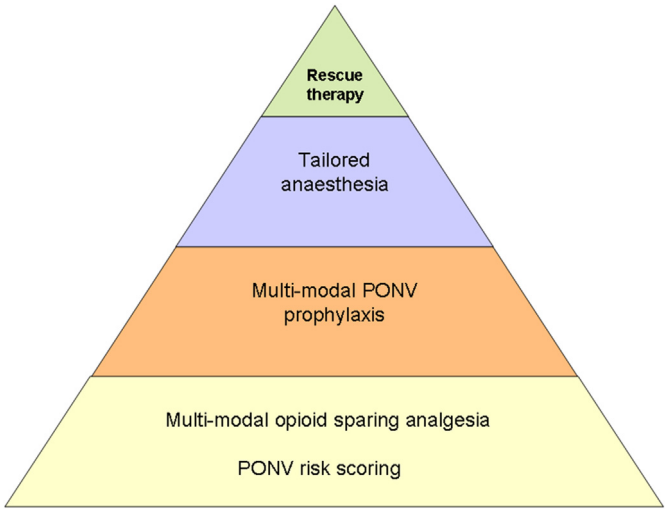

Fig. 2. The PONV prophylaxis/prevention escalating pyramid.

major impact on quality of care [7] but it has also impact on patients transfer along the ambulatory pathway; delaying discharge [8] and may cause unanticipated admission [9,10]. PONV may also on rare occasions lead to dehydration; hypovolemia compromising safety.

Numerous studies have been conducted aiming at increasing the understanding of the ethiology, trying to identify risk factors; patient related risks, surgery associated to high risk and anaesthesia/analgesia related factors. There are also huge numbers of studies evaluating different preventive and therapeutic strategies. All of these are aiming at reducing the occurrence, severity and duration of emetic symptoms throughout the perioperative period [11]. PONV is usually "self-limiting" but may last for up to 2–3 days and thus interfere with resumption of activities of daily living [4].

1.1. Method for assessment, how PONV should be followed and presented

Postoperative nausea and vomiting - PONV - include a variety of symptoms; all from mild nausea up to severe repeated vomiting. When assessing studies around PONV study design and way of defining and recording the "outcome" is of importance. PONV may not be the same and thus complicating analysis of different study results and comparing papers conclusion. Also clinical implication should be acknowledged; a short episode of mild nausea should possibly be weighed less than intense long-lasting/repeated episodes of vomiting. One episode of retching is likewise probably less distressing than hours of nausea.

Vomiting may be objectively assessed during the hospital stay, while nausea and retching are subjective experience, assessed by questioning or recording of complaints. Relaying on personnel observation only may underestimate the true incidence [12]. The questioning may be conducted at several occasions or merely once, obtaining possibly somewhat different responses. Apfel et al. [13] provided a comprehensive review around methodology for studies on PONV in 2002.

It seems obvious that method for assessing postoperative emesis and the observation period is of huge importance. One may argue that free of PONV is the ultimate outcome and any signs or symptom is a merely to be seen as a failure.

1.2. Patient factors, likelihood of becoming nauseated

The exact pathophysiology for emesis is not well understood. Vomiting – getting rid of potentially dangerous intake – is a defence mechanism. The emetic centre is most certainly scanning, reacting on, possibly irritating, dangerous triggers starting the emetic event [14]. There are a number of endogenous triggering substances. Multiple receptors in the chemo-trigger zone are involved and multiple substances have anti-emetic potentials [15,16] e.g. acetylcholine, dopamine, and serotonin. The exact triggering sequence for the individual patient is however not known. From populations studies we know that female, none-smoking and younger age are known patient factors.

Prediction of the risk for PONV has been suggested since long [17]. The best scoring system has been argued. The Apfel score; age <50 years of age, female, non-smoking, and history of PONV, has become highly accepted [18]. The Sinclair score include also length and type of surgery [19]. The risk factors for post discharge nausea and vomiting (PDNV) also been assessed by Apfel group. These include female gender, age less than 50 yr, history of nausea and/or vomiting after previous anaesthesia, opioid administration in the post-anaesthesia care unit and nausea in the post-anaesthesia care unit [20]. Female gender is associated to more PONV than men also among elderly patients [21]. Both the Apfel and Sinclair scores are not only feasible but most adequate tools for preoperative prediction and it may be worth doing a pre-discharge assessment providing patients information/advise and possibly rescue antiemetics if having a high risk score for PDNV.

Emesis may from an evolutional perspective be seen as a protective measure, getting rid of inappropriate intakes. There are without doubt several patient factors having huge impact on risk that should be assessed and current risks scores should be implemented and adhered to.

1.3. Trigger factors, anaesthesia

The impact of the composition of the fresh gas flow the FiO2 and whether nitrous oxide is mixed or not has been debated since long. Oxygen, high oxygen fraction, perioperative use of FiO2 0.8, has been studied in several studies. The meta-analysis from 2008 could not find clear evidence for any PONV preventive effect of a high FiO2 during surgery [22]. A more recent meta-analysis by Hovaguimian et al. published in 2013 concluded that an intra-operative high FIO2 decreases the risk of surgical site infections (SSI) in surgical patients receiving prophylactic antibiotics, has a weak beneficial effect on nausea, and does not increase the risk of