



Special article

Management of postoperative nausea and vomiting

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A B S T R A C T

There still appears to be insufficient interest in the management of postoperative nausea and vomiting. They are considered as inherent and inevitable discomforts after surgical operation. However, this disagreeable complication can be effectively managed. To do this, the risk must be suitably assessed and acted on accordingly. There are a wide variety of prophylactic options available associated with the anaesthetic technique, as well as appropriate anti-emetic treatment. In this article, the risk factors are reviewed and series of operative and postoperative recommendations are made.

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Manejo de las náuseas y vómitos postoperatorios

R E S U M E N

Las náuseas y vómitos postoperatorios no han recibido el suficiente interés hasta la fecha. Se han considerado molestias inherentes e inevitables tras muchas intervenciones quirúrgicas. Sin embargo, esta desagradable complicación tiene un manejo que puede resultar eficaz. Para ello hay que valorar adecuadamente el riesgo y actuar en consecuencia. Existe una amplia variedad de opciones profilácticas disponibles relacionadas con la técnica anestésica, además del oportuno tratamiento antiemético. En este artículo se revisan los factores de riesgo y se efectúan una serie de recomendaciones operatorias y postoperatorias.

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Introduction

The most common and disagreeable symptoms following a surgical procedure are nausea and vomiting (PONV), along with pain. PONV occurs in approximately 30% of adult

patients, and reaches over 70% in high-risk cases during the first 24 hours.¹ Vomiting increases the risk of aspiration and can be associated with evisceration, opening of anastomotic sutures, and other risks. PONV delays patient discharge from the Reanimation Department, and can also be the cause of

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delays or re-hospitalisation following discharge from major outpatient surgery. A multifocal approach to the problem is essential.

Management of this condition must commence in the preoperative period with a risk evaluation for PONV and planning of strategies for reducing this risk. Patients with considerable risk must receive pharmacological prophylaxis, since once PONV arises, it is not easy to suppress.

Risk factors

The risk of suffering PONV is related to three different groups of factors: the patient, the anaesthetic technique, and the type of surgery.¹

1) Patient related:

- Feminine sex.
 - Non-smoker.
 - Background of PONV or motion sickness.
- Other possible lesser risk factors are: low ASA risk, history of preoperative anxiety, and migraine.

2) Anaesthesia related:

- Use of volatile anaesthetics.
 - Use of nitrous oxide.
 - Balanced anaesthesia compared to total intravenous anaesthesia.
 - Neostigmine dosage greater than 2.5 mg.
 - Use of intra- and post-operative opiates.
- Other possible lesser risk factors are: general anaesthesia compared to local anaesthesia and long-term opiates compared to short-term opiates.

3) Surgery related:

- Duration of the procedure. Every 30min of increased duration of the surgical procedure is considered to increase risk by 60% over the estimated baseline rate.²

Other possible lesser risk factors are: neurosurgery, intra-abdominal, laparoscopic, orthopaedic, thyroid, breast, maxillofacial, otorhinolaryngological, and gynaecological surgery. The perioperative restriction of fluids and the administration of crystalloids compared to colloids can also be considered as risks.

Here we must point out that the general understanding of these risk factors still has no concrete clinical application. In order to avoid PONV, we must select and stratify the most influential factors through a scoring system that allows for estimating the magnitude of risks as exactly as possible. PONV scoring system precision must be based on its ability to be able to differentiate between patients that could potentially be suffering from PONV and those who are not; the most efficient way to test it would be by calculating the area under a ROC curve.³

Eight different scoring systems have been validated, although given the wide differences in the statistical power of the predictors used, it is not surprising that, as Gang¹ observed in a fundamental review, these predictive systems provide only a moderate level of reliability, with ROC curves that range between 0.56 and 0.78. In any

case, and in spite of their logical limitations, the different studies evaluated have proven their efficacy in reducing the incidence of PONV.

Which is the best scoring system? The majority of these have been simplified as much as possible, and so it is not the system with the greatest statistical power that should be used, but the most practical in terms of clinical application, since it has been shown that, in the end, the discrimination capacity of the majority of systems is similar.⁴ Because of its predictive reliability and ease of application, experts agree that the best indicators are those proposed by Apfel⁵ and Koivuranta⁶ for adults, and by Eberhart⁷ for children.

Apfel⁵ developed a four-variable system with a discriminative power (area under the ROC curve) of 0.69, which, according to the greatest odds ratio, are: female (3.55 [95% CI 2.46-5.149]), perioperative use of opiates (2.10 [95% CI, 1.42-3.10]), non-smoker (2.05 [95% CI, 1.49-2.82]) and a background of PONV or motion sickness (1.91 [1.35-2.70]). The odds ratio represents the ratio between the number of times that a success occurs and the number of times it does not. In practice, the score obtained according to Table determines the probability of PONV risk.

Koivuranta⁶ formulated another system with five variables and a discriminative power of 0.71. The variables, according to their influence, are: female, background of PONV, duration of the surgical procedure, non-smoker, and a history of motion sickness. The risk based on the score obtained with this system does not result in very different percentages for each group as compared to those from the Apfel scoring system; in all, the Apfel system is the most widely used for evaluating PONV risk.

It is evident that certain risk factors associated with the patient and anaesthetic techniques influence the appearance of PONV. However, the contribution of the type of surgery to these scoring systems is still under debate.⁸ In fact, only three out of the eight that have been published include it as a risk factor. In a recent article, Ruiz⁹ concluded that the type of surgery, when ordered anatomically, is associated with a greater need for antiemetics during reanimation. The most heavily affected anatomical areas were: the brain, head and neck, and abdominal cavity. However, this study has been criticised with respect to its methodology.¹⁰

Table 1 – Stratification of PONV risks

Risk factors		Score, points
Female		1
Perioperative use of opiates		1
Non-smoker		1
History of PONV or motion sickness		1
		Total: 0 to 4
Risk		Possibility of PONV
Low	(0-1 points)	10%-20%
Moderate	(2 points)	40%
High	(3-4 points)	60%-80%

Perioperative management

The multifactor nature of PONV requires a multifocal treatment. Therefore, in addition to the prophylactic use of antiemetics we can adopt different kinds of non-pharmacological measures that can minimise risk.

The patient-related factors are obviously not modifiable, nor can we do much regarding those that depend on the surgery. In contrast, measures could be taken for changing the perioperative anaesthetic protocol, which if not eliminating PONV risk, could reduce it. Evidence exists to some degree regarding the following actions^{2,8}:

- Preoperative use of anxiolytics (III B).
- Adequate hydration (III A), preferably with colloids instead of crystalloids (III A).
- Local anaesthesia has advantages over general anaesthesia (IV A).
- In the case of general anaesthesia, total intravenous anaesthesia with propofol is recommended (I A).
- Avoid potentially emetic anaesthetics such as: nitrous oxide (II A), inhaled agents (I A), etomidate and ketamine (V).
- Reduce the dosage of intraoperative (II A) and postoperative opiates (IV A).
- Reduce the dosage of neostigmine (<2.5 mg) (V).

Regarding the pharmacological treatment, the most frequently used antiemetics are: ondansetron (4 mg), dexamethasone (4 mg), and droperidol (1.25 mg), each of which has a similar antiemetic efficacy, and each one independently reduces the risk of PONV by approximately 25%.⁸

The low cost and high safety presented by both droperidol and dexamethasone make their combined use a valuable cost-effective strategy, and so it is not surprising that the addition of ondansetron only yields a small increase in benefit when administered to patients with a high risk of PONV.¹¹

Of all the 5-HT₃ antagonists, ondansetron is the most widely used. These three drugs have been shown to have the same antiemetic effect. The prophylactic dosage recommended for ondansetron is 4 mg, and it is shown to be most effective when administered at the end of surgery.¹² The recommended dose for dexamethasone in prophylactic treatment is 4 mg, administered after inducing anaesthesia, with no observed secondary side effects for this dosage.¹³ Droperidol is administered at 0.625 to 1.25mg at the end of surgery. Its use has been questioned for some years due to its relationship with electrocardiographic abnormalities and even sudden death. However, in the doses used as antiemetic treatment, it has not been related to any heart problems. It has even been recently put forth as the antiemetic of choice.¹⁴⁻¹⁶

To conclude, we wish to mention the still very widespread use of another drug in the prophylaxis and treatment of PONV: metoclopramide. The available evidence shows that, at the normal dosage (10 mg), it has no more effect than a placebo.¹⁷

What is the most efficient strategy for a multifocal approach to PONV? We have several guidelines and protocols at our disposal that have resulted in various levels of success upon implementation. Perhaps the three most well-known are those by the American Society of Anaesthesiologists (ASA),¹⁸ the American Society of Perianaesthesia Nurses (ASPAN),¹⁹ and the Society of Ambulatory Anaesthesia (SAMBA).¹⁵ We believe this last one to be the most complete. The recommendations from the SAMBA are made up of the following steps:

1. Identify the patients with a risk of PONV. We have already discussed the various aspects of the most widely used scoring systems; the most important guideline is to always use the same. The Apfel scoring system is currently the most used.⁵
2. Reduce risk factors. The most practical steps to take are related to the anaesthesia because of the wide variety of techniques available (in most of the cases they are elective). Those methods that have the greatest proven efficacy are: local anaesthesia, or if unavailable, general anaesthesia with propofol perfusion; avoiding nitrous oxide and inhaled anaesthetics; reducing the use of intraoperative opiates; and using NSAIDs for supporting analgesia.
3. Administer pharmacological prophylaxis in patients with moderate to high risk. The use of multiple antiemetics of different pharmacological characteristics has been shown to have an accumulative benefit. Indeed, the addition of a second or third antiemetic substantially reduces PONV: by 37% with only one, 28% with two, and 22% with three. The combination of droperidol and dexamethasone halves the incidence of PONV, compared to a 15% reduction with only one drug.⁸
4. Treat the PONV. It is recommended to use an antiemetic different from that used in prophylaxis. Ondansetron is recommended in those patients that have not received prophylaxis, in smaller doses than those used in prophylactic application (1 mg²⁰). As an alternative, droperidol (0.625 mg) or dexamethasone (2-4 mg) can be used.²¹

To conclude, we graphically present the strategy established here in an algorithm (Figure).

Conclusion

We conclude that the management of PONV can be efficient if risks are properly stratified and acted upon accordingly. It is important not to forget that once PONV start, therapeutic resources are limited, so we must resort to the wide range of prophylactic options available, mainly those related to anaesthesia, in addition to the relevant antiemetic treatment. A simple strategy could consist of using these methods along with droperidol, dexamethasone, or both when the risk is high enough. Ondansetron should only be used as a rescue treatment.

Conflict of interest

The authors affirm that they have no conflicts of interest.

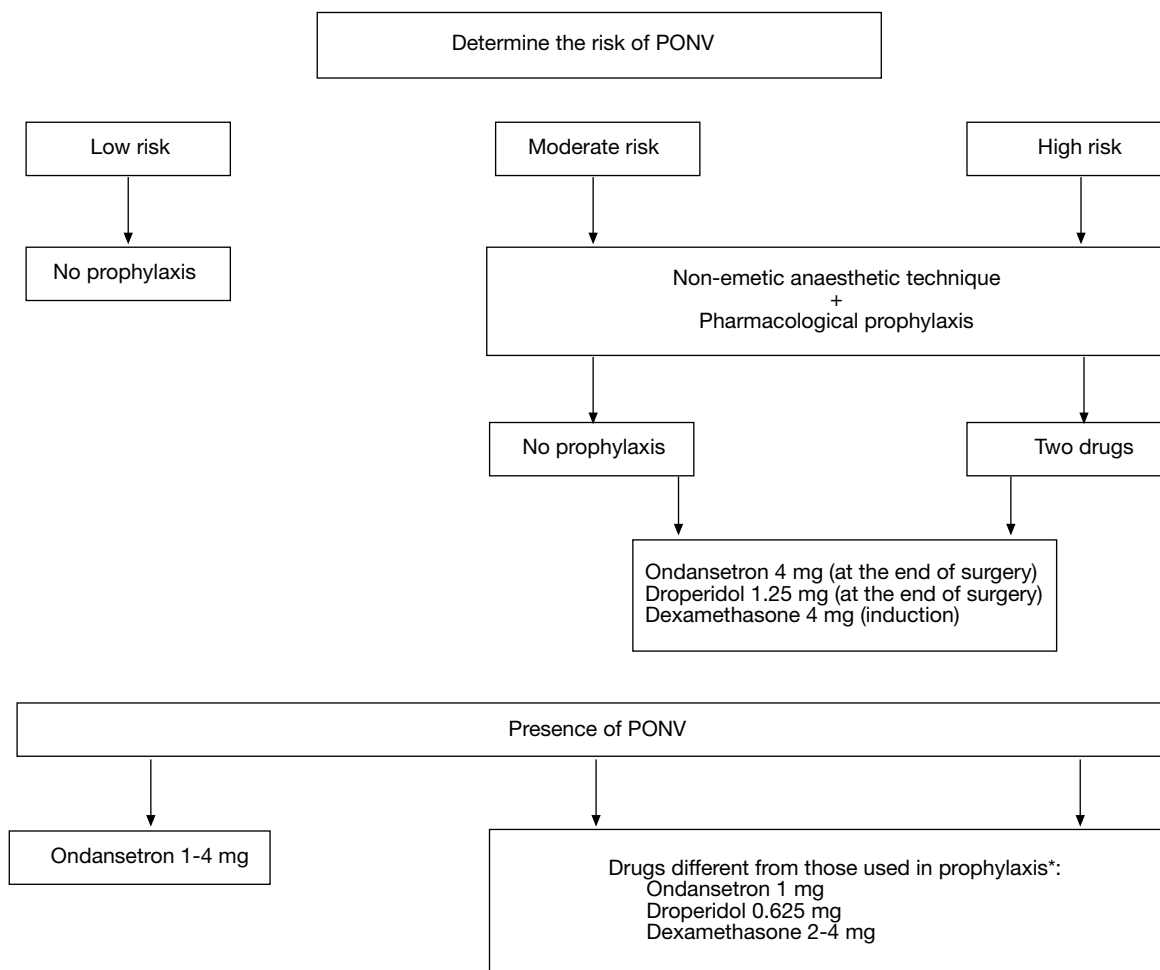


Figure – Algorithm for the prophylaxis and treatment of PONV. *After 6 h, the antiemetics used in prophylaxis can be repeated, except for dexamethasone.

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