



ROLE OF INTRAOPERATIVE DEXAMETHASONE IN PREVENTION OF POST-OPERATIVE NAUSEA AND VOMITING

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ABSTRACT

Although rarely fatal, postoperative Nausea and vomiting is one of the most common and unnerving complications post-surgery. PONV is sometimes more dreaded than post-operative pain. Apart from discomfort, it is responsible for increased cost of care, prolonged PACU length of stay and delayed return to work. Considering the high incidence rate of PONV, it is imperative for anesthetist and related perioperative and post-operative team to reduce patient risk by proper prophylactic interventions. The Society for Ambulatory Anesthesia (SAMBA) revised the guidelines and re-published it in 2014 which included various prophylactic treatments after successful determination of patient risk. Dexamethasone, when given at the time of induction, was found to be very effective. Although the anti-emetic mechanism is unclear, low dose dexamethasone is not only efficient against PONV but also against post-surgical pain and fatigue. While multimodal interventions are considered for high risk patients, isolated use of dexamethasone is likely to act on medium risk patients.

INTRODUCTION

Intraoperative administration of intravenous dexamethasone has potential role in the prevention of Postoperative Nausea and Vomiting (PONV). Whether used singly or in conjunction with other prophylactic drugs, its role in preventing the unpleasant experience of nausea and vomiting is indisputable. Although improvement of various anesthetics and the identification of patient-, anesthesia-, and surgery-related risk factors for PONV have helped to develop many preventive strategies in recent years, the overall incidence of PONV in the adult population still remains at 20–30%. [1, 2] The PONV incidence rate in patients of high-risk groups could be as high as 70–80%.

Dexamethasone is a potent corticosteroid that has been reported to influence patient and clinician based outcome measures of recovery. [3, 4] It has been carefully assessed in the prevention of PONV in low and intermediate risk surgery and shown to have a substantial benefit. In a trial of over 4000 patients that assessed 64 different combinations of anesthetic measures, dexamethasone effectively reduced PONV. [5] Dexamethasone is one of several drugs recommended for patients at moderate and high risk of PONV in the consensus SAMBA guidelines. [6]

Post-Operative Nausea and Vomiting:

Postoperative nausea and vomiting (PONV) are the most common complications after surgery, affecting more than 30% of patients, [7, 8] and are reported by patients to be two of the five most undesirable outcomes [9]. It can contribute to anxiety, dehydration, metabolic abnormality, wound disruption, delayed recovery and other issues [10]. Morbidity associated with PONV includes wound dehiscence, dehydration, electrolyte disturbance, interference with nutrition and, more rarely, oesophageal rupture (Boerhaave syndrome) or aspiration pneumonitis.

Risk Factors Associated with PONV:

Evidence	Risk Factors
Positive overall	Female sex (B1) History of PONV or motion sickness (B1) Nonsmoking (B1) Younger age (B1) General vs regional anesthesia (A1) Use of volatile anesthetics and nitrous oxide (A1) Postoperative opioids (A1) Duration of anesthesia (B1) Type of surgery (cholecystectomy, laparoscopic, gynecological) (B1)
Conflicting	ASA physical status (B1) Menstrual cycle (B1) Level of anesthetist's experience (B1) Muscle relaxant antagonists (A2)
Disproven or of limited clinical relevance	BMI (B1) Anxiety (B1) Nasogastric tube (A1) Supplemental oxygen (A1) Perioperative fasting (A2) Migraine (B1)

Table 1: PONV Risk Factors in Adults[11]

BMI - body mass index.

Risk Factors	Points
Female Gender	1
Non-Smoker	1
History of PONV	1
Postoperative opioids	1
Sum	0-4

Table 2: Risk Factor Scores for PONV [11]

Basic PONV risk if no risk factors are present is 10%. Risk increases to 20%, 40%, 60% and 80% for each additional risk factor.

Risk Factors	Points
Female Gender	1
History of PONV	1
Age > 50	1
Use of opioids in PACU	1
Nausea in PACU	1
Sum	0-5

Table 3: Risk Factor Scores for PDNV [11]

Basic PDNV risk if no risk factors are present is 10%. Risk increases to 20%, 30%, 50%, 60%, and 80% for each additional risk factor.

Risk Factors	Points
Surgery >= 30 minutes	1
Age >= 3 years	1
Strabismus surgery	1
History of POV or PONV in relatives	1
Sum	0-4

Table 4: Risk Factor Scores for POV in Children [11]

Basic POV risk if no risk factors are present is 10%. Risk remains at 10% for 1 risk factor and increases to 30%, 50%, and 70% for each additional risk factor.

Dexamethasone and Its Mode of Action:

Corticosteroids may decrease PONV by inhibiting endogenous prostaglandin and opioid production[12]. Dexamethasone has been used as an antiemetic agent for patients receiving chemotherapy[13], and decreases PONV in patients undergoing laparoscopic cholecystectomy[14-16].

The exact mechanism of the antiemetic action of dexamethasone is not known. However, there have been some suggestions, such as central or peripheral inhibition of the production or secretion of serotonin,[17] central inhibition of the synthesis of prostaglandins[18] or changes in the permeability of the blood–brain barrier to serum proteins.[19]

Dosage and Time of Administration of Dexamethasone to Prevent PONV:

The recommended intravenous dose of dexamethasone for prevention of PONV in adults is 2.5e10 mg[20, 21]; its recommended dose for children is 0.15e1 mg.[22] Adult dosage studies have determined that a minimum of 2.5 mg of an intravenous injection of dexamethasone for PONV prevention is required after gynecological surgery (abdominal total hysterectomy, myomectomy, and radical hysterectomy),[20] and a minimum of 5 mg of an intravenous dose of dexamethasone after thyroidectomy.[21] Dexamethasone has also demonstrated preventive effects against nausea and vomiting induced by intravenous or epidural morphine for postoperative pain control.[23, 24] The respective minimum doses were 8 mg (to prevent nausea and vomiting triggered by intravenous injection of morphine)[23] and 5 mg (to prevent nausea and vomiting triggered by epidural injection of morphine).[24]

The mechanism of action of dexamethasone is poorly understood, but it seems to be most effective when it is administered before the start of surgery, as it can also reduce surgery induced inflammation.[25] Wang et al.[25] confirmed that dexamethasone is most effective when it is administered at the induction rather than at the termination of anaesthesia. However, the mechanism underlying the anti-emetic effects of dexamethasone is still unknown. It may be involved in central inhibition of prostaglandin synthesis, or it may cause a decrease in serotonin turnover in the central nervous system[14, 15, 26].

Adverse Effects of Dexamethasone:

Prolonged use of steroids such as dexamethasone can have dangerous side effects, including an increased risk of wound infection and anastomotic leak, which adversely affect recovery from gastrointestinal surgery. A single dose, however, does not seem to be associated with this increased risk. Though a systematic review of single dose methylprednisolone in patients undergoing cardiac, general, or trauma surgery showed no significant increase in these adverse events,[27] concerns among the surgical community might still be limiting its use during surgery of the large and small intestine.

CONCLUSION

PONV has detrimental consequence on the overall experience and health of the patient which can be avoided or relieved by appropriate intervention by various prophylactic antiemetic drugs. Administration of intravenous Dexamethasone before the induction of anesthesia can significantly diminish the incidence of

Postoperative nausea and vomiting. Even though the mechanism of action is ambiguous, it acts as an efficient antiemetic singly or in combination to other drugs for prophylaxis of PONV.

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