Efficacy Of Propofol In Preventing Postoperative Nausea And Vomiting (PONV): Single Blind Randomized Control Study

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Abstract

Nausea and vomiting following anaesthesia is a distressing problem for patients as it increases recovery time, the intensity of nursing care and delays discharge. The aim of the randomized control single blind study is to evaluate the efficacy and safety of subhypnotic dose of propofol for prevention of postoperative nausea and vomiting (PONV) in gynecological surgeries. 40 females (ASAI) scheduled for either vaginal or abdominal hysterectomies under sub arachnoid block were randomly given either Propofol 20mg i.v / Group P (n=20) or Normal Saline 2ml i.v / Group C (n=20) at the end of surgery. A person who was blinded to the study evaluated them for PONV for 24 hrs.

The study found that the incidence of nausea was reduced in the propofol group (Group P) and was statistically significant (P<0.05) in the 4th -- 24th hour postoperative period. The incidence of vomiting was also significantly reduced (P<0.05) in the propofol group there was 65% incidence of vomiting in the control group when compared to 25% incidence of vomiting in the propofol group. No hemodynamic derangements were noted in the post operative period..

In conclusion, a subhypnotic dose of propofol is an effective antiemetic for gynaecological surgeries.

INTRODUCTION

The first extensive description of post operative nausea and vomiting (PONV) was made by John Snow in 1845 within 2 yrs of demonstration of ether anaesthesia by WTG Morton. Although much effort rightly has been placed on providing adequate pain relief after surgery, many physicians continue to view PONV as a minor complication that poses a little problem to the patient. In contrast many patients view PONV as more debilitating than the surgery itself. This complication is not only unpleasant and aesthetically displeasing to patients and their care givers but when severe, is associated with wound dehiscence, bleeding electrolyte imbalance, dehydration and rarely pulmonary aspiration of gastric contents. Yet this complication has been called as the “big little, problem”.

Major gynecological surgeries are associated with the highest incidence of PONV- as high as 60-83% of patients experiencing the emetic sequelae. Propofol is an disopropyl phenol derivative used for induction and maintenance of surgeries. Propofol has been known to exert antimetic properties even in sub-hypnotic doses and hence we decided to checkout this claim.

MATERIALS AND METHODS

A) STUDY DESIGN

After approval of the ethics committee, 40 female patients undergoing vaginal or total abdominal hysterectomy were randomly assigned into two groups

Group P – Given Inj. Propofol 20mg i.v at the end of surgery
Group C – Control group given Inj. Normal saline 2mli.v at the end of surgery.

All patients were evaluated in the preanaesthetic clinic for

a) History of allergy
b) Systemic disorders
c) History of vomiting disorders

B) SELECTION CRITERIA:

a) ASA I & II
b) No history of vomiting disorders – or drug allergy.

C) METHOD:

All patients were premedicated with Tab. Diazepam 5mg in the night and on the morning of surgery and with Inj. Pentazocine 30mg 1/m 45 minutes prior to surgery. Patients were transported to the theatre where an intravenous lifeline was started with 18G i.v cannula. Baseline pulse rate and blood pressure were measured. All patients were preloaded with 500ml ringers lactate solution.

With all aseptic precautions and patients in the lateral position, 4ml of 0.5% Bupivacaine (heavy) was injected intrathecally at the L3-4 or L2-3 space with a 23G spinal Quincke needle. All patients were monitored through the surgery period with pulse oximeter, NIBP and ECG monitors. Hypotension was defined as a fall of BP by 30% from the baseline. At the end of the surgery the patients received Inj. Propofol or normal saline randomly.

All patients were evaluated for hemodynamic derangements, nausea and vomiting for the 1st hour in the post operative room and thereafter in the post operative ward for 24 hrs by a person who was blinded to the study. Nausea was defined as a subjective, unpleasant sensation in the epigastrium and the throat with the urge to vomit.

Vomiting was defined as the forceful expulsion of gastric contents from the mouth.

Retching was defined as the labored contraction of diaphragm and abdominal muscles with no expulsion of gastric contents.

Inj. Metaclopramide 5mg i.v was given as a rescue antiemetic if more than 3 emetic episodes prevailed.

D) STATISTICS:

Demographic profile – unpaired students 't' test.
Nausea & vomiting – Chi-Square test.

RESULTS

Both groups were comparable with respect to age and weight. The demographic data is given in Table 1.

Figure 1

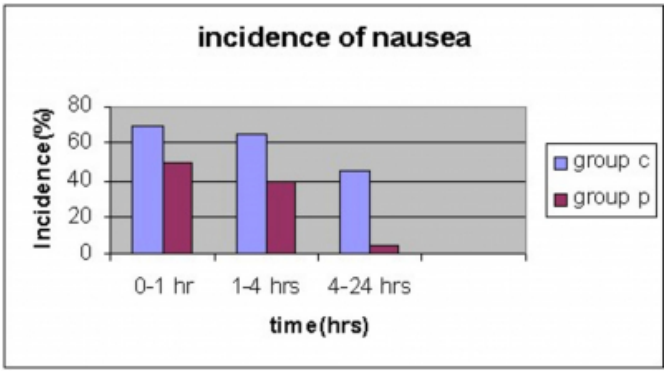
Table 1: Demographic profile

	GroupP	Group C	t test
Age	40.9±7.58	43.45±7.86	NS
Weight	45.45±6.41	45.8±5.9	NS

There was reduction in the incidence of nausea in the propofol group when compared to the control group and a higher percentage of patients were free of nausea after 4hrs post operatively (P<0.05). Graph 1

Figure 2

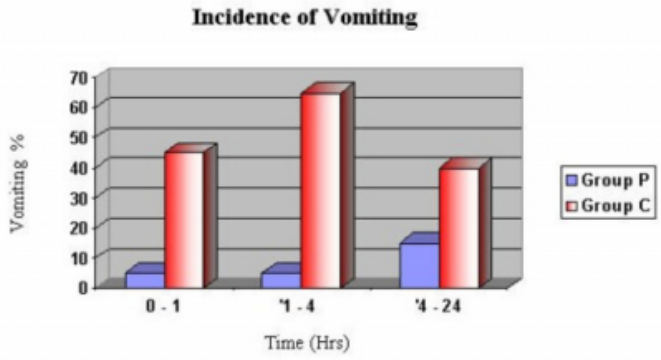
Graph 1



The overall incidence of vomiting in the first 24hrs postoperatively was significantly less in the propofol group (25%) as compared to the control group (65%) [P<0.05]. Graph 2. The relative number of emetic episodes and the need for rescue antiemetic therapy was also reduced. Rescue antiemetics were given to 55% of the patients in the control group while none in the propofol group required the same.

Figure 3

Graph 2



DISCUSSION

Vomiting is a complex integrated reflex act with three major components

a) emetic detectors
b) integrative centers
c) motor outputs.

Emetic detectors include the chemo and mechanoceptors of the GIT, the chemorecptor trigger zone, and the vestibular apparatus. The integrative centres lie in the Botzinger complex, situated in the dorsolateral reticular formation of the brainstem. The vomiting center is predominant in serotoninergic (5-HT3), dopaminergic (D2) and muscarinic (M3) receptors. The Nucleus Tracus Solatarins (NTS) is the main receptor site which integrates information to the dorsal vagal nucleus for parasympathetic responses; nucleus ambigus for glottic closure and to the reticular formation and spinal cord for contraction of diaphragm and abdominal muscles.

The act of vomiting has 3 phases.

a) Preejection phase characterized by prodromal symptoms like sweating, salivation, swallowing, relaxation of proximal stomach with retrograde contraction of stomach
b) ejection phase characterized by retching and vomiting of gastric contents through by mouth
c) post ejection phase characterized by fluid and electrolyte imbalance,lethargy and muscular weakness

The etiology of PONV is multifactorial. It is more common in the pediatric age group especially between 11-14 yrs.It is prevalent more in adult females and obese individuals. Abdominal surgeries , adenotonsillectomies ,middle ear surgeries ,eye surgeries and gynecological surgeries have increased PONV. Stimulation of the uterus, broad ligament, vagina and cervix causes vomiting through afferents to the spinal cord along the hypogastric and pelvic plexuses. PONV is common in surgeries where the vagina is packed or the cervix is dilated. PONV usually lasts for less than 24 hrs and is usually more intense during the first 2 hours. In general vomiting and retching subside before nausea. Surgical pain increases the circulating catecholamines which causes PONV by stimulating area postrema.

Management of PONV ranges from pharmacological therapy using an array of antiemetics to non pharmacological methods of acupuncture at P6 or Neiguen point and hypnosis.Even though a battery of powerful antiemetics are available, the use of propofol,an intravenous anaesthetic agent, for preventing nausea and vomiting is a newer concept.Infact it is ironical that of all the intravenous agents available propofol alone is associated with little nausea and vomiting.

The mechanism of propofol induced anti emesis is quite unclear. The antiemetic properties have been explained by its possible action on the vomiting centre and the CTZ. Propofol has a profile of central nervous system depression that differs from other anesthetic drugs. In contrast to thiopental, propofol uniformly depresses the CNS including the subcortical centres where most of the antiemetics act. Hence modulation of the subcortical structures could be a possible mechanism of propofol antiemesis. It is remarkable that propofol was used as an antiemetic in patients receiving cisplatin therapy. Studies have shown that in subhypnotic doses of 10 mg iv bolus, propofol eliminates postoperative nausea. The median plasma concentration of propofol associated with an antiemetic property was 343 ng/ml. The concentration can be achieved by propofol infusion of 10-20 mcg/kg /min. Propofol given at the end of surgery as a bolus has been widely proclaimed as the sandwich technique and this has been shown to reduce the PONV incidence .

The clincal implication of the study is manifold. Firstly the efficacy of subhypnotic dose of propofol in reducing the PONV incidence was proved. Secondly the antiemetic properties of propofol can be made use of in day care surgeries and in monitored amaesthesia care where PONV can be distressing. It can also be used for surgeries which have increased PONV (gynecological, adenotonsillectomies, laparoscopies etc) for induction and maintenance of anesthesia since propofol reduces PONV more than other inhalation and intravenous agents.

CONCLUSION

In conclusion this study has shown that propofol in subhypnotic doses possesses antiemetic properties. It is effective in reducing nausea in the 4-24 hr period postoperatively and significantly reduces the incidence of vomiting with minimal side effects. The number of emetic episodes and the rescue antiemetic therapy is grossly reduced even though the mechanism of its antiemetic action remains to be deciphered.

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