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ORIGINAL ARTICLE

Propofol's Effectiveness in Preventing Nausea and Vomiting Following ENT Procedures Performed Under General Anesthesia

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ABSTRACT

Objective: Evaluation of Propofol's effectiveness in preventing post-surgery nausea and vomiting after ENT operations performed under general anesthesia
Study design: Observational study
Sampling method: lottery system
Study Place: Peshawar
Methods: 70 patients between age 18-65, having elective ENT surgery under conventional general anesthesia were included in this observational. After the surgical procedure, the patients were given either 10 mg/kg of dexamethasone, or 0.5 mg/kg of propofol intravenously. For 24 hours after surgery, the patients were monitored for any instances of nausea and vomiting.
Results: No significant variation in Mean ± S.D of age, gender, BMI, ASA categorization and type of surgery was observed in both dexamethasone and propofol group. A significant variation in surgery duration (p=0.031) and anesthesia time (0.001) was observed in both the groups. PONV was more common in the propofol group (70%) than in the dexamethasone group (40%), particularly in the first six hours after surgery.
Practical implication: this study will help to determine the whether propofol is a better choice for preventing post-operative nausea and vomiting.
Conclusion: Propofol was less efficient than dexamethasone in preventing PONV, necessitating less rescue antiemetic use.
Keywords: ENT, Propofol, nausea, vomiting, post-surgery complication, dexamethasone, effectiveness

INTRODUCTION

The presence of postoperative nausea and vomiting (PNOV) after ENT surgery is a frequent and uncomfortable complication, particularly in the absence of prevention [1]. Multiple routes, neurotransmitters, and risk factors all play a role in PONV's pathogenesis. Age 50, being female, having a history of PONV or motion sickness, non-smokers, being overweight, having surgery or an anesthetic, and/or parental concern are all risk factors for postoperative nausea and vomiting [2, 3]. The symptoms of PONV are so severe and distressing that a multimodal approach is necessary for therapy [4]. Recent research has shown that ineffective PONV prevention or treatment may lead to longer hospital stays, more unpleasant stays, and higher healthcare expenses[5]. Electrolyte imbalance (hyponatremic, hypochloremia, and hypocalcemia metabolic alkalosis), postoperative bleeding, dehydration, esophageal rupture, Mallory-Weis tears, airway obstruction, and aspiration are just some of the complications that can arise from persistent vomiting, particularly in patients undergoing ENT surgery[6]. By using antiemetics, certain groups may see a drop in PONV from over 52% to less than 30%. Several antiemetics have been attempted in clinical practice to reduce the prevalence of PONV [7]. These include corticosteroids, antihistamines, serotonin receptor antagonists, butyrophenones, and anesthetic agents [8-10]. However, most antiemetics have unwanted side effects include hypotension, drowsiness, dry mouth, dysphoria, extrapyramidal symptoms, and restlessness. Dexamethasone, a corticosteroid, has been proven in many trials to be an effective antiemetic for PONV prophylaxis in a wide variety of surgical procedures [11]. In sub hypnotic dosages, the new complete intravenous anesthetic propofol (an antagonist at the 5-HT3 receptor) has antiemetic effects, making it a promising candidate for use in combination therapy. Preventing PONV with low-dose intravenous propofol (0.5 mg/kg) is efficacious and has no major side effects. There are many anesthesiologists who have utilized propofol, although it is still being studied[12, 13]. For intravenous anaesthesia, propofol is now the drug of choice. Like other members of the alkylphenol family, it has been put to use as a hypnotic, sedative, anticonvulsant, and, more recently, antiemetic. Quick plasma clearance causes an immediate effect but a short half-life[20]. In light of this, we set out to evaluate how well dexamethasone and propofol fared in protecting patients against postoperative nausea and vomiting (PONV) after otolaryngological (ENT) procedures.

METHODOLOGY

Ethical approval from khyber teaching hospital ethical committe was taken for this observational study. From 01/01/22 to 30/06/22, patient scheduled to have an ENT surgery at Hospital, were included in the study. Eligible participants comprised adult male and female patients (aged 18-65) who had elective ENT surgery under general anesthesia and had an ASA of I or II. Smokers, those with a history of nausea and vomiting, those with hypotension, GERD, insulin-dependent diabetes, or a need for mechanical ventilation were not included in the present study. Seventy patients, ranging in age from 18 to 65 and having a physical status I or II according to the American Society of Anesthesiologists, were randomly split into groups. Patients were randomly divided into two groups, A (dexamethasone, n = 30) and B (propofol, n = 40) using a lottery system based on a list of their daily schedules. Patients Group A, B, and were induced with intravenous 2 g/kg fentanyl, 3-5 mg/kg thiopentone, and 2 mg/kg suxamethonium after monitoring baseline vital signs and obtaining appropriate preoxygenation for five minutes. Next, anesthesia was kept going by alternating doses of halothane (0.75%-1.5%) and vecuronium (0.04 mg/kg) in a 4 L/min flow of pure oxygen. After the surgery was finished, patients were given 0.04 mg/kg neostigmine and 0.02 mg/kg atropine to completely reverse the anesthesia. Patients in Group A were given an IV injection of 8 mg of dexamethasone right after they were extubated, Group B patients were given an IV injection of propofol at a sub hypnotic dosage (0.5 mg/kg). Once patients were able to react verbally in the ward, they were asked to use the NRS to rate the duration, frequency, and intensity of their nausea and vomiting, as well as their need for further antiemetics. Patients understood that a score of 0 meant no symptoms, 1 meant light symptoms, 6 meant moderate, and 7-10 meant severe symptoms, including a high likelihood of vomiting. The severity rating was then recorded after being determined by competent specialists. Whenever a patient

was actively vomiting or had an NRS score of 4 or above, an IV dose of rescue antiemetic was administered. Six hours, twelve hours, and twenty-four hours following dexamethasone and propofol treatment, the occurrence and severity of PONV and associated side effects were recorded. Rescue antiemetic use during the course of the whole period of 24 hours was also recorded. Analysis of variance and the student t test were used for statistical analysis using SPSS version 26, with a cutoff of p 0.05 indicating statistical significance.

RESULTS

Mean± S.D of age in Dexamethasone and Propofol administered patient were 40.8± 13.2 and 40.53±13, respectively (Table 1). No statistical variation (p=0.942) was observed in the age of the recruited patients was observed in both groups. Mean± S.D od BMI in Dexamethasone and Propofol administered patient were 22.6±3.54 and 22.8±3.3, respectively. No statistical variation (p=0.772) was observed in the age of the recruited patients was observed in both groups. In Dexamethasone group 50 % patients were female and 50% were male, while in Propofol group 53% were female and 47% were male. In Dexamethasone group 57% patients were categorized as ASA I and 43% were categorized as ASA II, while in Propofol group 63% were categorized as ASA I and 37% were categorized as ASA II. In Dexamethasone group, 10 patients each were scheduled to have Middle ear, nose and throat surgeries. While in Propofol group, 10 patients for middle ear, 9 for nose surgery, and 11 for throat surgery was scheduled.

Table 1: Demographics and baseline features of study subjects

Parameters	Dexamethasone (n=30)	Propofol (n=30)	P Value
Age (Mean ±S. D)	40.8± 13.2	40.53±13	0.942
BMI (Mean ±S. D)	22.6±3.54	22.8±3.3	0.772
Gender (Female/male n)	15/15	16/14	>0.9999
ASA (I/II n)	17/13	19/11	>0.9999
Type of surgery			
Middle Ear	10	10	0.9511
Nose	10	9	
Throat	10	11	

Table 2: Intraoperative characteristics of study participants

Parameters	Dexamethasone (n=30)	Propofol (n=30)
Surgery duration (mins) (Mean ±S. D)	67.56±9.76	72.93±0.58
Anesthesia duration (mins) (Mean ±S. D)	75.5±10.36	84.16±9.65
Blood loss (mL)	182.16±39.84	194.16±50.17
Volume of fluid replaced (mL)	731.83±150.7	766.5±133.34
Induction Agent		
Ketamine	17(51%)	13 (49%)
Thiopentone	13(49%)	17 (51%)
Intraoperative analgesia		
Fentanyl	4 (13.3%)	3 (10%)
Morphine	4 (13.3%)	7 (23.4%)
Pethidine	6 (20%)	5 (16.6%)
Tramadol and diclofenac	16 (53.4%)	15 (50%)

Interoperative parameters of recruited participants in both groups are presented in Table 2. Mean± S.D of surgery time in Dexamethasone and Propofol administered patient were 67.56±9.76 and 72.93±0.58, respectively. Statistically significant variation in the surgery time was observed in both groups with p value 0.031 (Figure 1A). Mean± S.D of anesthesia time in Dexamethasone and Propofol administered patient were 75.5±10.36 and 84.16±9.65, respectively. Statistically significant variation in the surgery time was observed in both groups with p value 0.001 (Figure 1B). Mean± S.D of interoperative blood loss (mL) in Dexamethasone and Propofol administered patient were 182.16±39.84 and 194.16±50.17, respectively. Statistically no significant variation in the surgery time was observed in both groups with p value 0.245 (Figure 1C). Mean± S.D of Fluid replaced (mL) in Dexamethasone and Propofol administered patient were 731.83±150.7 and 766.5±133.34, respectively. Statistically no significant variation in the surgery time was observed in both groups with p value 0.426 (Figure 1D). In Dexamethasone group 51% patients were administered with Ketamine induction agent and 49% with Thiopentone, while in Propofol group 49% patients were administered with Ketamine induction agent and 51% with Thiopentone. About 16 % in Dexamethasone group and 15% in Propofol group were administered with Tramadol and diclofenac analgesia during operation (Table 2).

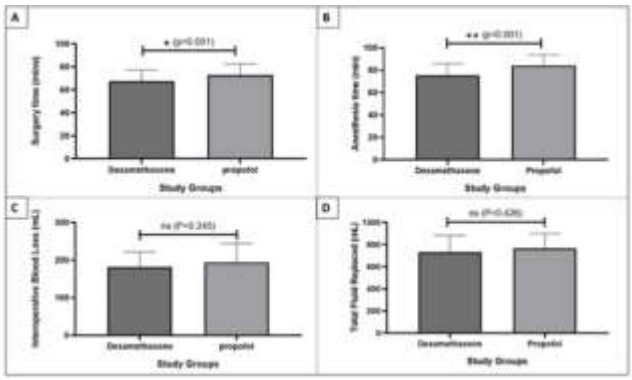

Figure 1: Comparison of interoperative parameters between the study groups. 1A. shows comparison of surgery time between the study groups, 1B. shows comparison of anesthesia time between the study groups, 1C. shows comparison of interoperative blood loss(mL) between the study groups. 1D. shows comparison of fluid replaced during surgery between the study groups. T-Test was conduction using SPSS version 26 to determine the level of significance. P ≤0.05 was considered significant. The X-axis has study groups, while Y-axis has interoperative variables.

Table 3: Incidence of PONV in study groups

PONV Parameters	Dexamethasone (n=30)	Propofol (n=30)
Nausea		
0-6h	3(20%)	5(17%)
6-12h	3(10%)	5(17%)
12-24h	0(0%)	2(6%)
Vomiting		
0-6h	2(6%)	4(13%)
6-12h	1(3%)	3(10%)
12-24h	0(0%)	2(6%)
Total PONV		
0-6h	5(17%)	9(30%)
6-12h	4(13%)	8(27%)
12-24h	0(0%)	4(13%)
Total PONV	12(40%)	21(70%)

Table 3 shows the percentage of the patients who experiences postoperative nausea and vomiting during, 0-6h, 6-12h, and 12-24h intervals. In Dexamethasone group, 20% of the patients experienced nausea after first six hours of surgery, while 10% patients experienced nausea in 6-12h interval post-surgery, followed by none of the patient experienced nausea in 12-24h post-surgery. In Propofol group, 23% of the patients experienced nausea after first six hours of surgery, while 37% patients experienced nausea in 6-12h interval post-surgery, followed by 23% of the patient experienced nausea in 12-24h post-surgery. In Dexamethasone group, 6% of the patients had vomiting after first six hours of surgery, while 3% patients experienced nausea in 6-12h interval post-surgery, followed by none of the patient experienced nausea in 12-24h post-surgery. In Propofol group, 13% of the patients experienced nausea after first six hours of surgery, while 10% patients experienced nausea in 6-12h interval post-surgery, followed by 6% of the patient experienced nausea in 12-24h post-surgery.

DISCUSSION

However, it is likely that several factors contribute to postoperative nausea and vomiting following middle ear surgery. It is believed

that the prevalence of PONV is influenced by a variety of variables, such as age, sex, obesity, a history of motion sickness and/or prior PONV, the menstrual cycle, the operational method, the anesthetic technique, and postoperative discomfort. Nitrous oxide, used during surgery, may raise pressure in the middle ear, another concern. Propofol's antiemetic effects are not mediated by the lipid emulsion (Intralipid) used in the drug's formulation. Propofol is not thought to have vagolytic qualities, although its specific mechanism of action as an antiemetic remains a mystery[21].

Prophylactic use of regular antiemetic before surgery remains controversial, most likely owing to complex etiology and also due to varying risk of emetic sequelae in various patient populations. The use of pharmacological prophylaxis is warranted due to the high rate of vomiting after ENT procedures [14]. Significant rates of postoperative nausea and vomiting (PONV) have been reported after otolaryngologic (ENT) surgery, particularly in individuals who did not receive preemptive antiemetic medication. During surgery, enterochromaffin cells secrete serotonin, which binds to 5-HT 3 visceral receptors and stimulates vagal afferents in the GI tract, sending impulses to the Chemoreceptor Trigger Zone (CTZ) on the dorsal surface of the medulla oblongata near the caudal end of the fourth ventricle. Stimulation of the CTZ by the incoming input will cause a post-traumatic neurotic response [15]. The frequency of PONV was significantly greater in the propofol group (70%) than in the dexamethasone group (40%), especially between 0-6h post-surgery duration.

Given that there was almost equal distribution of patients across the three groups in terms of demographics and kind of surgery in this research, it is possible that antiemetic medicine directly influences the incidence of PONV. When compared to propofol, Dexamethasone was most successful in lowering the incidence of PONV in the majority of individuals. Our findings are consistent with earlier research. In the propofol group, the total incidence of PONV was 70%, with an incidence that was somewhat greater in the first few hours after surgery (30%). Similar to our findings, Zestos et al. observed that propofol was ineffective in managing postoperative vomiting in children after tonsillectomy [16]. Present study results are also consistent with Abere et al., study, they found propofol to be less effective in controlling post-operative PONV [17]. In contrast to our findings, Ewalenko et al. and Fujii et al.'s studies found that a modest dosage of propofol was successful in lowering the incidence of PONV after thyroidectomy to 10 to 13% [18, 19]. Nevertheless, earlier used a modest dosage of propofol that was continuously infused. It's possible that our dosage of propofol, 0.5 mg/kg, isn't the best one for ENT procedures.

CONCLUSION

In conclusion, dexamethasone offered stronger protection against PONV than propofol at all time points. However, this research does have certain shortcomings. For instance, the majority of the time intervals' values were not statistically significant, which may be due to the small sample sizes in both groups. Furthermore, neither the results of medication therapy nor those without treatment were evaluated using placebos. Therefore, we advise doing trials with a placebo group and bigger sample sizes in the future. We also advise doing a randomized controlled experiment to further support these conclusions.

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