



STUDY OF OUTCOME EFFICACY OF PROPOFOL AS AN ANTI EMETIC IN TONSILLECTOMY PATIENTS

Anaesthesiology

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ABSTRACT

BACKGROUND: Tonsillectomy is one of the most frequently performed ambulatory surgical procedures in children and is associated with an incidence of post operative vomiting ranging between 40% and 73%. Most of the routine anti-emetics used like antihistamines, butyrophenones and dopamine receptor antagonists prevent post operative nausea and vomiting, but have undesirable adverse effects. **MATERIAL AND METHODS:** This is Prospective study done, Sixty patients aged between 3-15 years, belonging to ASA physical status I or II, scheduled for tonsillectomy under general anaesthesia were selected randomly for the study. All patients received 0.25 mg/kg propofol at the end of surgery. Heart rate, SpO₂, and respiratory rate were recorded before, one minute and three minutes after propofol injection. Every episode of PONV within a 24 hour period were recorded by trained nursing staff, who had no knowledge of the anti emetic being administered to the patient. **CONCLUSION:** Propofol in the dose of 0.25mg/kg given at the end of surgery decreased the incidence of vomiting by 60%. The role of age, gender and weight in the etiology of post operative nausea and vomiting was not significant. No significant haemodynamic changes were seen with 0.25mg/kg propofol.

KEYWORDS

Post operative nausea; vomiting; tonsillectomy; anti emetic; Propofol.

INTRODUCTION

Pain and emesis are considered as the most distressing symptoms following surgery and anaesthesia. Often described as the „Big little problem, post operative nausea and vomiting is considered as one of the commonest cause for delay in post operative recovery and prolonged hospital stay.¹ Apart from prolonged hospital stay, it can also lead to other post operative complications like bleeding, electrolyte imbalances, dehydration, increased risk of aspiration and can hamper the results of surgical procedures. Since the institution of general anaesthesia, nausea and vomiting have been frequently associated with their use. Sir John Snow first described post operative nausea and vomiting in 1848 after his experience with chloroform anaesthesia. Post operative nausea and vomiting is described as nausea, retching or vomiting occurring in the first 24-48 hours after surgery in inpatients.⁴ The incidence of post operative nausea and vomiting has decreased from 60% in the ether era to 30% at present. However the incidence remains as high as 70% in high risk individuals. Post operative nausea and vomiting is the most common complication of general anaesthesia in infants and children, with incidence ranging from 8.9% to 42% in susceptible children. Certain surgeries like adenotonsillectomy, squint surgeries and orchidopexy are most commonly associated with a high incidence of vomiting. According to a survey of 16 most commonly performed paediatric operations, the highest incidence of post operative nausea and vomiting was in tonsillectomy.⁷ It is the second most frequently performed paediatric surgery as per the American Association of Otolaryngology. Though routine anti emetic prophylaxis is not indicated in elective surgeries, its role is justifiable in patients who are at high risk for post operative nausea and vomiting, especially those who undergo surgeries like tonsillectomy. Several drugs and interventions have been used as anti emetic prophylaxis with variable success rates, such as droperidol², metoclopramide², ondansetron, ramosetron, dexamethasone, granisetron, dolasetron, tropisetron, prochlorperazine, promethazine, scopolamine transdermal patch, dimenhydrinate,⁹ benzodiazepines like midazolam and lorazepam, alpha-2 adrenergic agonists like clonidine, aprepitant which is a NK1 receptor antagonist, super hydration with ringer s lactate and acupuncture techniques. In the present study the efficacy of small dose of propofol (0.25mg/kg) as an anti emetic in patients undergoing tonsillectomy under general anaesthesia is evaluated.

OBJECTIVES

To study the anti-emetic efficacy of small dose of propofol in patients undergoing tonsillectomy under general anaesthesia.

Review of Literature

Patients routinely undergoing surgery are exposed to various risks and complications, some due to their primary diagnosis and others owing to the type of surgery. If anaesthesia is needed, the complications add

up. However, life threatening complications have become very rare with the modern anaesthetic techniques. In recent years, much emphasis is being directed towards providing adequate pain relief post surgery. Post operative nausea and vomiting is still being viewed as a minor problem, even though they are the leading causes of morbidity especially in surgical patients. It is estimated that one episode of vomiting prolongs post anaesthesia care unit stay by about 25 minutes. Nausea and vomiting have been linked with the use of general anaesthetics for years. One of the first extensive descriptions of this phenomenon was by Sir John Snow in 1848, within 18 months of chloroform introduction in anaesthesia.² He reported that, "Narcotism by chloroform or ether occasionally leave some effects after the immediate influence of the vapour has subsided. These sequelae were sickness, headache, nausea and vomiting. Excessive distension or irritation of the duodenum provides a strong stimulus for vomiting. Impulses are transmitted as shown in figure (1) by both vagal and sympathetic afferents to the bilateral vomiting centre of the medulla, which lies near the tractus solitarius at the level of the dorsal motor nucleus of the vagus.

The emetic stimuli in gut are detected by mechanoreceptors which are present in the muscular wall of the gut which are in turn activated by contraction and distension of the gut during physical damage and manipulation in surgery and also by chemoreceptors present in the mucosa of the upper gut which are sensitive to noxious chemical stimuli.² The motor component of vomiting reflex is mediated by both autonomic and somatic nerves with coordination from the vomiting system in the brainstem. The vagal motor neurons supplying the gut and the heart originate in dorsal motor vagal nucleus and nucleus ambiguus. The dorsal and ventral respiratory groups regulating phrenic nerve output from the cervical spine, located in the brainstem, are parasympathetic neurons. The output of these nuclei is coordinated to produce the physiological pattern associated with vomiting.² Propofol is the most frequently used IV anaesthetic agent. Work in the early 1970s on substituted derivatives of phenol with hypnotic properties resulted in the development of 2,6-diisopropofol. The first clinical trial, by Kay and Rolly reported in 1977, confirmed the potential of propofol as an anesthetic agent to induce anaesthesia. It was first approved by FDA and introduced into clinical practice in 1989. Propofol is insoluble in water and was initially prepared with Cremophor EL but due to the anaphylactoid reactions associated with Cremophor EL, the drug was reformulated in an emulsion. Although it was initially approved for induction and as a hypnotic agent, its clinical use has expanded greatly over past 4 years to include indications for neurosurgical and paediatric anaesthesia, monitored anaesthesia care and intensive care sedation. Propofol is an agonist at GABA_A receptor. It binds to specific site on the alpha and beta subunits of the receptor

complex, but not to the GABA binding site. Activation of the GABA_A receptor results in increased chloride conductance and hyperpolarization, inhibiting the post synaptic neuron. Propofol is rapidly metabolized in the liver by conjugation to glucuronide and sulfate to produce water-soluble compounds, which are excreted by the kidneys. Less than 1% propofol is excreted unchanged in urine, and 2% is excreted in feces. Propofol has been used for sedation during surgical procedures and for patients receiving mechanical ventilation in the ICU. Propofol by continuous infusion provides the ability to titrate to a desired level of sedation and provide a rapid recovery after infusion is terminated, regardless of the duration of the infusion. Chhibber et al in a study in 1999 concluded that in children undergoing tonsillectomy with or without adenoidectomy, reversal of neuromuscular blockade with atropine and neostigmine is associated with a lesser incidence of postoperative emesis compared with glycopyrrolate and neostigmine. Jacqueline et al studied the efficacy of gastric aspiration in reducing post tonsillectomy vomiting and concluded that gastric aspiration does not decrease the incidence of vomiting following tonsillectomy, Borgeat et al in their study comparing propofol and thiopental/halothane for short-duration ENT surgical procedures in children found an increased incidence of nausea and vomiting in the thiopental group compared to propofol.

MATERIAL AND METHODS

This is Prospective study, A total number of 60 patients of ASA grade I and II aged between 3-15 years, scheduled to undergo elective surgery under general anaesthesia in Department of Anaesthesiology, Anugrah Narayan Magadh Medical College and Hospital, Gaya, Bihar. Study duration of 18 months.

COLLECTION OF DATA

60 patients between the age group of 3-15 years posted for tonsillectomy procedure were studied in a randomized prospective manner.

INCLUSION CRITERIA

Patients of either sex aged between 3-15 years of age posted for tonsillectomy under general anaesthesia. American Society of Anaesthesiologists grade I and II patients.

EXCLUSION CRITERIA

Patient refusal, ASA grades III, IV, V

Patients who have received anti emetics within 24 hours before surgery If patient is allergic to any of drugs used in the study. A pre-operative visit was conducted before surgery. Detailed history of patient's complaints were noted and a complete general and systemic examination was conducted. A specially designed performa was used to collect the data which included patient's particulars, the anaesthetic details, intra-operative monitoring and observation for side effects if any.

On the day of surgery, the Boyle's anaesthetic machine was checked, appropriate sized endotracheal tubes along with two working laryngoscopes and emergency drugs were kept ready prior to the procedure. Patient's basal parameters- Heart Rate (HR), Systolic Blood Pressure (SBP), Diastolic Blood Pressure (DBP), Mean Arterial Pressure (MAP), and Electrocardiography were monitored using, pulse oximetry, Non Invasive Blood Pressure (NIBP), and ECG monitor in the operating room.

RESULTS

Data was collected and statistical analysis was performed as explained in the methodology of the study.

Distribution of subjects according to age and sex

Age group(yrs)	Number of subjects			
	Male		Female	
	N	%	N	%
3-7	17	53.12	3	10.71
7-11	10	31.25	12	42.86
11-15	5	15.63	13	46.43
TOTAL	32	53.33	28	46.67

male subjects were higher in number(32) compared to females(28). Among male subjects majority were of the age group 3-7 years followed by 7-11 and 11-15 years respectively. Where as in female subjects, the majority belonged to 11-15 years followed by 7-11 years and 3-7 years respectively.

Distribution of subjects according to weight

Weight	Male subjects		Female subjects	
	N	%	N	%
10-20	16	50	6	21.43
21-30	13	40.67	15	53.57
31-40	3	9.37	6	21.43
41-50	0	0	1	3.57
MEAN	20.96		26.41	
SD	6.67		6.722	

The mean weight of the male subjects was 20.96 ± 6.67 kgs with majority (50%) in the range of 10-20 kgs and none in the range of 41-50 kgs. Among females the mean weight was 26.41 ± 6.72 kgs with majority (53.57%) in the range of 21-30 kgs and the least (3.57%) in the range of 41-50 kgs. This difference is mainly due to the difference in number of subjects in either sex groups. In the age group of 11-15 years, majority (72.22%) had no symptoms of vomiting, with equal number of subjects (11.11%) experiencing nausea and retching and rest (5.56%) vomiting. However, statistically applied chi square test shows a non significant difference between different age groups of subjects and vomiting with no association between grades of vomiting and age of subjects. The mean respiratory rate at 0, 1 and 3 minutes for males were 16.47 ± 1.50 , 16.53 ± 1.68 , 16.47 ± 1.82 and 15.64 ± 1.82 , 15.54 ± 1.59 and 15.46 ± 1.74 for females respectively. However the difference in respiratory rate at.

different time intervals for either gender was found to be non significant as indicated by statistically applied paired 't' test, the mean heart rate at 0, 1 and 3 minutes for males were 100.59 ± 7.87 , 101.53 ± 8.27 , 102.53 ± 8.47 and 100.32 ± 13.33 , 103.15 ± 13.47 , 105.21 ± 14.71 for females respectively. However the difference in heart rate at different time intervals for either gender was found to be non significant as indicated by statistically applied paired 't' test. majority of patients (60%) did not have any symptoms of vomiting. 9 patients (15%) had nausea, 7 patients (11.67%) had retching and 8 patients (13.33%) had vomiting. among subjects weighing 10-20 kgs, majority (69.56%) had no symptoms of vomiting, where as equal number of subjects (13.04%) had symptoms of nausea and retching and remaining (4.34%) had vomiting. In subjects weighing 21-30 kgs, majority (55.55%) had no symptoms of vomiting, and an equal number of subjects (18.51%) had nausea and vomiting. In the weight ranging from 31- 40 kgs, majority (44.44%) had no symptoms of vomiting, followed by vomiting (33.33%) and retching (11.11%). However subject in the weight range of 41- 50 kgs, did not have any symptoms of vomiting. However, statistically applied chi square test shows non significant difference between weight of subjects and vomiting.

Distribution of subjects according to weight and different grades of vomiting.

Weight of subjects	Grades of vomiting								Calculated Chi Square
	0		1		2		3		
	N	%	N	%	N	%	N	%	
10-20	16	69.56	3	13.04	3	13.04	1	4.34	6.226 ^{NS}
21-30	15	55.55	5	18.51	2	7.40	5	18.51	
31-40	4	44.44	1	11.11	1	11.11	3	33.33	
41-50	1	100.00	0	0	0	0	0	0	

: Non Significant at 5 % level Contingency Coefficient =0.322

DISCUSSION

The overall incidence of post operative nausea and vomiting after tonsillectomy and adenoidectomy ranged from 40-70% and this limits the hospital discharge leading to unanticipated overnight admission. However the incidence of post operative nausea and vomiting is between 62% and 73% when no prophylactic antiemetic is given. Numerous antiemetics have been studied in the management of post operative nausea and vomiting after paediatric tonsillectomy. The traditional antiemetics used in the treatment of post operative nausea and vomiting are benzamides (eg: metoclopramide), butyrophenones (eg: droperidol), phenothiazines (eg: perphenazine) and antihistamines (eg: dimenhydrinate). Serotonin receptor antagonists like ondansetron, granisetron and ramosetron are more effective than the traditional antiemetics. The non traditional anti emetics like propofol, dexamethasone, midazolam have been extensively studied and there are various conflicting reports regarding their efficacy, the adequate anti emetic dose to be administered and also regarding the appropriate

timing of the drug. The dissection and snare method (cold method) is the common surgical method followed for paediatric tonsillectomies in our hospital. The mean age group in our study is 8.64 ± 3.2 yrs, with the highest incidence of vomiting (18.18%) in the age group of 7-11 years. The incidence of postoperative vomiting is low at birth and increases to a peak in late childhood (between 6–16 years) before decreasing in adulthood. In concordance with our findings, Lerman reported emesis rates of 5% in infants, 20% in children and 34% to 51% in teenagers. Children of this age group have a greater awareness of what is going on than younger children but a poorer understanding than adults and this leads to greater levels of anxiety, fear, and pain and may explain the increased risk of vomiting. Unfortunately, this is the commonest age group in which tonsillectomy is performed. Also in the present study there was no significant association between vomiting and age of the patient. Elgueta et al in 2012 conducted a study to evaluate the anti emetic effect of super-hydration with lactated ringer's solution in children undergoing tonsillectomy. Two groups, one receiving 10 ml/kg/hr and the other 30 ml/kg/hr were compared. The study concluded that intraoperative hydration with 30 ml/kg/hr lactated ringer's solution significantly reduced the incidence of post operative vomiting during the first 24 hours post operatively.

All the study subjects were premedicated with fentanyl 2 mcg/kg and glycopyrrolate 0.005 mg/kg. It is known that all opioids, regardless of their route of administration, produced nausea and vomiting. This effect is mainly due to stimulation of receptors in area postrema. They also contribute to nausea and emesis via delayed gastric emptying, sensitization of vestibular induced emesis and release of vasopressin. Anxiety is also another patient related risk factor for PONV. Bolton et al in 1997 conducted a systemic review and meta analysis on the prophylaxis of post operative vomiting in children undergoing tonsillectomy. Of the several observations made, he concluded that there was insufficient evidence to suggest that dimenhydrinate, droperidol, gastric aspiration or acupuncture were clinically useful anti emetics. Satkar et al studied the anti emetic effects of propofol in 60 patients who were administered 0.5mg/kg propofol after reversal of the neuromuscular blockade at the end of surgery. The incidence of vomiting and retching put together was 5%. They concluded that 0.5mg/kg propofol was an effective anti emetic.

CONCLUSION

Tonsillectomy being one of the most frequently performed paediatric surgical procedure has a very high incidence of post operative nausea and vomiting. Various drugs have been used in the anti emetic prophylaxis to prevent post operative nausea and vomiting. Propofol in the dose of 0.25mg/kg given at the end of surgery decreased the incidence of vomiting by 60%. The role of age, gender and weight in the etiology of post operative nausea and vomiting is not significant

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