Correlation Of Intra-Operative Changes In Intraocular Pressures In Non-Ocular Surgeries With Post-Operative Nausea & Vomiting: A Comparative Study

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Abstract

Introduction: Ocular surgeries and glaucoma can lead to nausea and vomiting due to raised intraocular pressure. Our present study is to evaluate the raised intraocular pressure during general anesthesia in non-ocular surgeries as a possible contributing factor for postoperative nausea and vomiting.

Design: Prospective randomized controlled study

Setting: Anesthesia department of a tertiary care university teaching hospital

Material and methods:60 patients of ASA grade-I undergoing surface surgeries were randomly divided equally into two groups. Group-I patients were intubated with vecuronium bromide (.1mg/kg) and group-II with succinylcholine (2mg/kg). Intraocular pressure (IOP) measurements were taken by Shiotz tonometer perioperatively at predefined intervals. In the post-operative period every episode of nausea, retching and vomiting was recorded for first 36 hours following the induction of anesthesia.

Results: Age, sex & duration of anaesthesia between two groups were statistically insignificant ($p>0.05$). There was a fall in IOP in Gr.I and a rise in IOP in Gr.II from preinduction to pre-intubation. There was a considerable rise of IOP at intubation in both groups, but in Gr. II the rise was seen above pre-induction level. The incidence of PONV was statistically significant in female population in both groups but insignificant difference was found in total episodes of PONV at any of the time intervals studied between two groups.

Discussion: IOP increases after induction with succinylcholine and further increases after intubation and extubation. IOP seldom crosses the baseline value after administration of vecuronium. The incidence of PONV and the number of the patients requiring antiemetic treatment recorded in both groups is statistically insignificant. The maximum episodes of PONV were within 6-12 hours and could be explained by wearing out of analgesia and sedation. Nausea and vomiting were negligible after 24 hours due to subsidence of precipitating factors.

Conclusion: Transient rises in IOP caused by succinylcholine do not affect the incidence and distribution of PONV

INTRODUCTION

Post-operative nausea and vomiting (PONV} are one of the most common complications following general anesthesia. Ocular surgeries and glaucoma lead to episodes of nausea and vomiting, possibly related with raised intraocular pressure (IOP) and extraocular muscle tension. Fluctuations in intraocular pressure are also noted in non-ocular surgeries as an effect of depolarizing neuromuscular blockers on extraocular muscles resulting in increased resting tension with increase in twitch response [9]. Many factors, both physiological and pharmacological, contribute to determine intraocular pressure during anesthesia including skill and experience of the anaesthetists.

We have planned in our present study to evaluate the raised intraocular pressure during general anesthesia in non-ocular

surgeries as a possible contributing factor for postoperative nausea and vomiting.

MATERIALS AND METHODS

In the present study, 60 patients of ASA grade-I undergoing surface surgeries like mastectomy, herniorrhaphy etc were randomly divided equally into two groups. Group-I comprised of patients intubated with vecuronium bromide (0.1mg/kg) and group-II comprised of patients intubated with succinylcholine (2mg/kg). Exclusion criteria were age more than 60 or less than 16 years, known ophthalmic disease, previous history of PONV and motion sickness or any co-existing systemic disease. All the patients received same anesthetic management i.e. 6 hours of fasting and premedication with tab.alprazolam 0.5mg day before and 2 hours before surgery. They were induced with fentanyl 2mcg/kg and propofol till loss of verbal contact. Facilitation of endotracheal intubation was done according to their groups and vecuronium was supplemented in both the groups to maintain surgical relaxation. Anesthesia was maintained with N_2O (66%) in O_2 and isoflurane (0.5-1.5%). Intraocular pressure (IOP) measurements were taken by Shiotz tonometer before induction, before intubation (post-relaxant), soon after intubation and then 2,5,10,15,20,30,45,60,90 and 120 minutes after intubation as per duration of surgery. IOP was also measured before and 2 minutes after extubation. This was repeated 30 minutes after extubation in post-operative recovery ward. Pulse and NIBP were measured simultaneously with the IOP. Inj. diclofenac sodium was used for post-operative analgesia.

In the post-operative period every episode of nausea, retching and vomiting was recorded for 36 hours. If the patient had vomiting twice in the first post-operative hour or had more than four episodes of vomiting in post-operative six hours period it was graded severe and rescue antiemetic was given (inj. Ondansetron 0.1mg/kg).

RESULTS

Figure 1

Table 1: Comparison of age, weight and duration of anesthesia between Gr-I and Gr-II

	Age (years)	Weight (kg)	Duration of surgery (minutes)
Group-I	38.73±2.33	50.4±1.84	56.17±4.37
Group-I	41.6 ±1.98	56.83±2.06	52.33±3.17
t-test	0.9395	2.323	0.7330
p-value	>0.05	<0.05	>0.05

Using paired t-test did statistical comparison between two groups. As in table 1, age, sex & duration of anaesthesia between two groups were statistically insignificant (p>0.05). Though the weight between two groups was statistically significant but none of the patients having BMI >27.

Figure 2

Table 2: Comparison of changes in IOP at various time intervals between Gr-I and Gr-II

	Preinduction to Post-relaxant	Preinduction to intubation	Post-relaxant to intubation	Preinduction to post-extubation (2 min.)	Preinduction to post-extubation (30 min.)	Pre-extubation to post-extubation	Post-extubation (2-30min.)
Group-I	-1.85±0.17	0.48±0.09	1.37±0.15	0.92±0.22	-1.05±0.26	1.72±0.18	-2.7±0.85
Group-II	1.15±0.11	2.45±0.20	1.32±0.16	0.67±0.24	-2.15±0.26	1.72±0.19	-2.47±0.45
t-test	14.008	13.3516	0.2317	0.7712	0.1748	0.00	0.2389
p-value	<0.001	<0.001	>0.05	>0.05	>0.05	>0.05	>0.05

Table 2 showed that, there was a fall in IOP in Gr.I and a rise in IOP in Gr.II from preinduction to post-relaxant. There was a considerable rise at intubation in both groups but in group I, it had not crossed the preinduction value, but in Gr. II a considerable rise was seen further above induction level. The values were not significant at other times.

Figure 3

Table 3: Distribution of PONV in male and female population of Gr. I and II and their Statistical comparison

Sex	With PONV	Without PONV	Total
Male	1	3	4
Female	23	3	26
X^2=5.1923		p-value< 0.05	
Male	0	3	3
Female	21	6	27
X^2=4.2681		p-value< 0.05	

Figure 4

Table 4: Mean and average episodes of PONV between Gr-I and Gr-II

	0-3 hrs	3-6 hrs	6-12 hrs	12-24 hrs	24-36 hrs
Group-I	0.52± .1054	0.43± .1054	0.5± .1054	0.61± .1054	0.55± .1054
Group-II	0.5± .1054	0.5± .1054	0.5± .1054	0.51± .1054	0.5± .1054

The incidence of PONV was statistically significant in female population in both groups (table 3) but insignificant difference was found in total episodes of PONV at any of the time intervals studied between two groups (table 4).

DISCUSSION

In our study, age, sex, weight and duration of anaesthesia were similar in both the groups. The variations in above parameters are reported to be contributory in PONV[1, 2, 3]. The rise in IOP is reported to induce nausea and vomiting. At the time of induction there was a fall in IOP in Gr.I but a rise in Gr.II due to the physiological effect of succinylcholine. Succinylcholine, due to its effect on extra-ocular muscles, is associated with an increase in IOP within 1 minute after injection, peaks at 2 to 4 minutes and subsides by 6 minutes [4]. Vecuronium does not cause any change in IOP [7,8]. At intubation, changes in IOP were significant in both groups compared to induction values (1.37 and 1.32 mm Hg) but the changes between two groups were not significant as rise in IOP after intubation was not significantly different. With vecuronium intubation led to rise in IOP compared to preinduction level but it did not cross the preinduction level (- 0.48 mmHg).

At the time of extubation, 2min and 30 min after extubation mean changes in IOP showed significant differences but when compared between the two groups the differences were not statistically significant.

In our study, when we studied the time course of distribution of PONV from induction to 36 hours post-induction, the episodes were much less in the first three hours of induction. The maximum episodes of PONV in both the groups were in 6-12 hours period and could be explained by wearing out of analgesia and sedation [5].

Increased PONV episodes in subsequent period of 12-24 hours could be explained by the weaning of the effect of analgesics, mobility and oral intake. Vander Berg had shown that the incidence of PONV can be delayed but cannot be so efficiently controlled after first oral intake [3]. The incidence of PONV episodes subsided and almost reached the pre-induction level in 24-36 hours suggesting the subsidence of the all the factors related to PONV. The incidence of PONV in male population is statistically much lesser than the female population in both groups.

The use of antiemetic drugs was not different between the groups for patients experiencing PONV. The anti-serotonrergic effect of vecuronium [6] did not offer any protection on requirement of antiemetics. Transient rises in IOP caused by succinylcholine do not affect the incidence and distribution of PONV.

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