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RESEARCH ARTICLE

REDUCING POST OPERATIVE NAUSEA AND VOMITING (PONV) IN NEUROSURGICAL PROCEDURES: OUR TERTIARY CARE EXPERIENCE

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Abstract

Aim: Patients undergoing elective neurosurgical procedures were observed to determine the therapeutic efficacy of two different dosages of palonosetron.

Materials and Methods: Patients undergoing elective neurosurgical procedures were randomly allocated to one of three groups: control (n = 30), 0.05 mg palonosetron (n = 30), or 0.075 mg palonosetron (n = 30). At the start of the dura mater closure, the medicines were administered intravenously. Anesthesia was maintained with 1 MAC sevoflurane in a 50/50 combination of air and oxygen. The patients were observed for 72 hours after extubation for postoperative nausea and vomiting.

Results: The 0.075 mg palonosetron group had considerably less nausea than the control group in the first 6 hours (P = 0.019). At 0–72 hours after surgery, the incidences of nausea, retching, and vomiting in the 0.075 mg palonosetron group were considerably lower than in the 0.05 mg palonosetron or saline groups (P 0.001).

Conclusion:PONV was decreased more efficiently in the 0.075 mg palonosetron group than in the 0.05 mg palonosetron and control groups in neurosurgicalpatients.

Introduction:-

After neurosurgery operations, postoperative nausea and vomiting (PONV) is a common and painful consequence (1). In several investigations (2–5), the reported incidence of PONV following elective craniotomy ranged from 44 percent to 70 percent. Vomiting can raise intracranial and/or cerebral intravascular pressure, putting hemostasis and cerebral perfusion at risk, as well as produce electrolyte imbalances such as hyponatremia (5,6).

The area postrema of the brain stem, which is where the chemoreceptor trigger zone is located, is rich in dopamine, opioid, and serotonin (or 5-hydroxytryptamine; 5-HT3) receptors (7–9). These receptors may play an important role in the transmission of impulses to the emetic centre (10).For the prevention and treatment of PONV, the new family of antiemetic drugs known as 5-HT3 receptor antagonists (ondansetron, granisetron, ramosetron, and dolasetron) outperforms traditional antiemetics (11). Palonosetron, a second-generation 5-HT3 receptor antagonist, has a

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substantially longer half-life (about 40 hours) than existing 5-HT3 receptor antagonists and has superior PONV outcomes (12). However, there are no studies on the effectiveness of various dosages of palonosetron in supratentorial tumour excision after elective craniotomy. The goal of this prospective, randomised, double-blind trial was to see how effective and safe different dosages of palonosetron were at preventing postoperative nausea and vomiting in patients who had supratentorial craniotomies.

Material and Methods:-

Study Place:
A tertiary care centre in North India

Study Period:
September 2018 to October 2020

Data Collection & Analysis:-
SPSS (version 15.0, SPSS Inc., Chicago, IL, USA) software

Selection Criteria:-
We acquired written informed consent from 90 patients aged 18 to 76 years old who were scheduled for elective neurosurgical procedure. In a double-blinded method, the patients were randomly allocated to one of three groups: 0.05 mg palonosetron (group P1), 0.075 mg palonosetron (group P2), or saline (group S).

A history of vomiting, such as motion sickness, preoperative antiemetic use, allergy to palonosetron, pregnancy, breast-feeding, morbid obesity, cardiac dysrhythmia, clinical symptoms (hypertension, bradycardia, nausea–vomiting, confusion, and papilledema), radiological images due to increased intracranial pressure, mental retardation, or psychiatric illness were all considered exclusion criteria.During the preoperative and postoperative periods, all patients in the three groups received corticosteroid treatment (dexamethasone: 4 mg/6 h). Patients were monitored with electrocardiography and a Datex–Engstrom AS/3 monitor for heart rate, noninvasive blood pressure, pulse oximetry, airway gas levels, and end-tidal CO2 concentration. During the research, all patients were administered saline at a rate of 5 mL/kg every hour. 2–2.5 mg/kg propofol (13) and 2 g/kg fentanyl were used to produce anaesthesia. 0.1 mg/kg vecuronium helped with endotracheal intubation. General anaesthesia was maintained with 1 MAC sevoflurane in a 50 percent air and oxygen combination and occasional bolus doses of 1 g/kg fentanyl after orotracheal intubation using an armoured tube resistant to kinking.Residual neuromuscular blockade was treated with intravenous atropine (0.015 mg/kg) and neostigmine (0.04 mg/kg) at the completion of the procedure. After satisfactory spontaneous breathing and movement, the patient was extubated.

Patients in group P1 (n = 30) were given 0.05 mg palonosetron diluted to 5 mL with 0.9 percent saline (1 mL palonosetron, 4 mL 0.9 percent saline), patients in group P2 (n = 30) were given 0.075 mg palonosetron diluted to 5 mL with with 0.9% saline (1.5 mL palonosetron, 3.5 mL 0.9% saline), and the patients in group S (n = 30) received 5 mL of 0.9% saline.The medicines were prepared and administered by anaesthetists who were not involved in the data collection. At the start of dural closure, the medicines were administered intravenously.

The patients were moved to the neurosurgical critical care unit after surgery, where trained nursing personnel documented each episode of nausea and vomiting for 72 hours. Although the nurses were aware of the study's purpose, they were unaware of the substance used.The patient's age, weight, and height were documented, as well as the length of operation, anaesthesia, and intraoperative narcotic use. At 0 minutes, 6, 24, 48, and 72 hours, episodes of nausea and vomiting, as well as requests (plus time of request) for rescue antiemetic medicine, were recorded. Nausea was defined as a desire to vomit that was elicited by the investigators during the evaluations. The term "vomiting" referred to the evacuation of stomach contents via the mouth. Retching was described as an attempt to vomit that did not result in stomach contents being produced. A single vomit or retch, or any number of consecutive vomits or retches, was considered an emetic episode.After more than two episodes of emesis within 30 minutes or persistent nausea lasting more than 10 minutes, patients were given metoclopramide (10 mg) intravenously as a rescue antiemetic. For postoperative pain control, all patients received 1 g of paracetamol intravenously every 8 hours.

The efficacy (and safety) of utilising different dosages of palonosetron to prevent postoperative nausea and vomiting in patients having supratentorial surgery was the primary outcome assessed in this study.

Results:-

There was no difference between the groups in terms of age, height, weight, sex, or ASA case categorization (P > 0.05). (Table 1).

Table 1:- Demographics and clinical data.

Variable	(n = 30) (mean ± SD) {control group}	(n = 30) (mean ± SD) {0.05 mg palonosetron}	(n = 30) (mean ± SD) {0.075 mg palonosetron}	P
Age (years)	49.8 ± 10.4	49.3 ± 14.1	47.8 ± 14.5	0.820
Weight (kg)	75.9 ± 11.6	72.7 ± 10.8	72.4 ± 13.3	0.450
Height (cm)	164.8 ± 88	166.3 ± 7.8	166.8 ± 7.8	0.620
Sex (M/F)	17/13	15/15	14/16	0.733
No.ofpatientswithASAphysicalstatus(I/II/III)	10/17/3	18/9/3	16/14/0	0.099
Duration of surgery (min)	172.3 ± 47.6	199 ± 64.8	182 ± 63.5	0.216
Total intraoperative fentanyl (µg)	246 ± 64	275 ± 87	248 ± 64	0.248

The mean operation time in the control group was 172.3 minutes, but the 0.05 mg and 0.075 mg palonosetron groups took 199 and 182 minutes, respectively. In terms of operation length, there was no statistically significant difference between the groups (P = 0.216). (Table 1).

The control group consumed 246 g of fentanyl intraoperatively, but the 0.05 mg and 0.075 mg palonosetron groups consumed 275 g and 248 g, respectively. In terms of mean intraoperative fentanyl use, there was no statistically significant difference between the groups (P = 0.248). (Table 1).

There was no difference between the groups in terms of mean blood pressure or heart rate (P > 0.05). (Tables 2 and 3).

Table 2:- Mean blood pressure (mmHg).

Variable	(n = 30) (mean ± SD) {control group}	(n = 30) (mean ± SD) {0.05 mg palonosetron}	(n = 30) (mean ± SD) {0.075 mg palonosetron}	P
MBP before induction	108.7 ± 17.3	101.1 ± 14.0	100.3 ± 13.8	0.067
MBP before intubation	85.0 ± 15.2	79.5 ± 12.2	82.7 ± 19.0	0.401
MBP after intubation	112.0 ± 20.9	104.1 ± 18.1	109.5 ± 19.3	0.283
MBP before medication	90.8 ± 12.5	92.3 ± 15.8	90.2 ± 10.7	0.815
MBP after medication	90.7 ± 14.6	90.7 ± 16.9	89.6 ± 12.4	0.947
MBP before	110.8 ± 16.8	109.7 ± 19.4	110.5 ± 15.4	0.938

extubation				
MBP 30 min after extubation	104.4 ± 23.5	98.9 ± 10.9	100.7 ± 16.6	0.335

Table 3:- Heart rate (beats/min).

Variable	**(n = 30) (mean ± SD) {control group}**	**(n = 30) (mean ± SD) {0.05 mg palonosetron}**	**(n = 30) (mean ± SD) {0.075 mg palonosetron}**	**P**
HR before induction	83.2 ± 15.2	77.9 ± 12.5	83.0 ± 20.1	0.364
HR before intubation	79.1 ± 15.3	72.7 ± 10.5	74.1 ± 15.6	0.186
HR after intubation	86.7 ± 14.8	83.3 ± 13.8	84.6 ± 17.5	0.689
HR before medication	76.7 ± 10.5	71.8 ± 10.0	73.9 ± 12.6	0.234
HR after medication	76.0 ± 14.4	72 .6 ± 12.3	75.1 ± 13.1	0.599
HR before extubation	95.0 ± 19.2	88.0 ± 14.5	91.1 ± 14.5	0.253
HR 30 min after extubation	87.4 ± 11.0	83.2 ± 12.4	84.3 ± 12.1	0.368

Although group P2 had statistically reduced nausea rates than group P1 and the control group at 0–6 hours (P 0.043), there was no intergroup difference at 6–24 or 24–72 hours (P > 0.05). (Table 4). At 0–6, 6–24, or 24–72 hours, there was no statistically significant difference between the groups in terms of vomiting or retching (P > 0.05). (Tables 4). However, the 0.075 mg palonosetron group had a considerably reduced rate of retching, nausea, and vomiting than the control group (P = 0.003). The difference between the 0.05 mg palonosetron and control groups was not statistically significant (P = 0.301). (Table 4).

Table 4:- Postoperative retching, nausea, and vomiting.

Variable	**(n = 30) (mean ± SD) {control group}**	**(n = 30) (mean ± SD) {0.05 mg palonosetron}**	**(n = 30) (mean ± SD) {0.075 mg palonosetron}**	**P**
0–6 h:	9 (30)	5 (16.7)	3 (10)	0.131
Retching	14 (46.7)	11 (36.7)	5 (16.7)*	0.043
Nausea	9 (30)	9 (30)	3 (10)	0.107
Vomiting				
6–24 h:	5 (16.7)	3 (10)		0.455
Retching	5 (16.7)	4 (12.3)4	2 (6.7) 2	0.484
Nausea	4 (13.3)	(12.3)	(6.7) 2 (6.7)	0.638
Vomiting				
24–72 h:	4 (13.3)	3 (10) 3	0 (0)	0.133
Retching	5 (16.7)	(10) 3 (10)	0 (0) 0 (0)	0.074
Nausea	2 (6.7)			0.227
Vomiting				
0–72 h: Retching, nausea, or vomiting	17 (56.7)	12 (40)	5 (16.7) *	0.006

*Significantly reduced relative to control group (P < 0.05).

Discussion:-

0.075 mg of palonosetron was shown to lessen the incidence of nausea in the first 6 hours after surgery in this study. At 24 hours after surgery, Kathirvel et al. (14) discovered that 44 percent of elective craniotomy cases had nausea–vomiting, compared to 24 percent in patients treated with 4 mg of ondansetron. The requirement for an antiemetic has been reported to have decreased from 15% to 5%. In a retrospective analysis of 199 adult individuals with a history of elective craniotomy, Fabling et al. (3) found that the incidence of nausea at 48 hours was 50% and the

incidence of vomiting was 39%. Antiemetic medication was necessary in 61 percent of the cases after surgery (it was administered intraoperatively in 7% of the instances).However, it has been noted that infratentorial craniotomy, female sex, and early age are all substantial risk factors for this condition. In their earlier supratentorial craniotomy procedures, Madenoglu et al. (15) used isoflurane and nitrous oxide in oxygen, and they reported a 46.7 percent and 56. percent incidence of nausea and vomiting, respectively, while noting a drop in these values to 30 percent and 26.7 percent, respectively, due to the delivery of 2 mg of tropisetron.

Sevoflurane and an oxygen–air combination were used to maintain anaesthesia in this investigation.Because there was no statistically significant difference between the groups in terms of mean intraoperative fentanyl intake, known emetic potentials of opioids presumably had no effect on the rate of nausea and vomiting across the three groups.

Only nausea in the 0.075 mg palonosetron group showed a statistically significant decrease at 0–6 h in the current trial. At 0–72 hours after surgery, the occurrences of retching, nausea, and vomiting were 56 percent in the control group, 40 percent in the 0.05 mg palonosetron group, and 16.7 percent in the 0.075 mg palonosetron group. These rates were lower in the 0.075 mg palonosetron group than in the other groups, suggesting that palonosetron at 0.075 mg is more effective at lowering PONV than at 0.05 mg.In 381 patients who underwent major gynaecological surgery, White et al. (16) examined the efficacy of 0.1–30 g/kg palonosetron with a placebo on PONV, and showed that palonosetron at dosages of 1 g/kg successfully reduced the occurrence of nausea 0–24 h postoperatively.

544 individuals with a history of gynaecological or breast surgery were studied by Kovac et al. (17). They gave 0.025, 0.050, and 0.075 mg palonosetron for PONV prevention, and the 0.075 mg palonosetron was shown to be considerably more effective than a placebo in reducing nausea and vomiting in both the early (0–24 h) and late (24–72 h) postoperative periods.

Candiotti et al. (18) looked at the prophylactic effect of palonosetron at doses of 0.025, 0.050, and 0.075 mg in 574 patients who had laparoscopic day surgery, and found that the total incidence of retching, nausea, and vomiting was lower in the 0.075 mg palonosetron group than in the placebo group at 0–72 hours.

0.075 mg of palonosetron reduced nausea episodes at 0–6 h and lowered the incidence of nausea and vomiting at other times in our investigation, which was comparable to the above-mentioned studies. Following the administration of the medication, no significant changes in hemodynamics were seen. Palonosetron had no postoperative adverse effects (such as constipation or bradycardia) in any of the patients.Based on the findings of this study, we may propose palonosetron as a safe drug for hemodynamic and postoperative side effects at the levels listed. Females made up 51.1 percent of the patients in this research, while males made up 48.9%. In terms of sex or age, there was no statistically significant difference between the groups. Similarly, painkiller intake and surgery length were nearly identical in the two groups in our study.

Because the expense of treating PONV is rising, cost-effectiveness is still a major consideration when selecting therapeutic drugs. Palonosetron, on the other hand, is significantly more expensive than other 5-HT3 receptor antagonists. In the case of palonosetron, it's impossible to say how much the additional expense is worth.

Conclusion:-

We believe that intraoperative palonosetron at 0.075 mg is more effective than at 0.05 mg; thus, palonosetron at 0.075 mg would be more suited for the prevention of PONV in supratentorial craniotomy instances.

References:-

1. Jain V, Mitra JK, Rath GP, Prabhakar H, Bithal PK, Dash HH. A randomized, double-blinded comparison of ondansetron, granisetron, and placebo for prevention of postoperative nausea and vomiting after supratentorialcraniotomy. J NeurosurgAnesthesiol 2009; 21: 226– 30.2.
2. Audibert G, Vial V. Postoperative nausea and vomiting afterneurosurgery (infratentorial and supratentorial surgery). AnnFrAnesthReanim 2004; 23: 422–7.3.
3. Fabling JM, Gan TJ, Guy J, Borel CO, el-Moalem HE, WarnerDS. Postoperative nausea and vomiting. A retrospectiveanalysis in patients undergoing elective craniotomy. JNeurosurgAnesthesiol 1997; 9: 308–12.4.
4. Pugh SC, Jones NC, Barsoum LZ. A comparison of prophylacticondansetron and metoclopramide administration in patientsundergoing major neurosurgical procedures. Anaesthesia1996; 51: 1162–4.5.

5. Fabling JM, Gan TJ, El-Moalem HE, Warner DS, BorelCO.A randomized, double-blinded comparison of ondansetron,droperidol, and placebo for prevention of postoperative nauseaand vomiting after supratentorial craniotomy. Anesth Analg2000; 9: 358–61.6.
6. Vrsajkov V, Kolak R, Uram-Benka A, Uvelin A, KiselickiJ.Anesthesia, complications, and clinical outcome for rupturedintracranial aneurysms: a retrospective comparison betweenendovascular coiling and neurosurgical clipping. Turk J MedSci 2012; 42: 477–83.7.
7. Stefanini E, Clement-Cormier Y. Detection of receptors in thearea postrema. Eur J Pharmacol 1981; 74: 257–60.8.
8. Atweh SF, Kuhar MJ. Autoradiographic localization of opiatereceptors in rat brain. II. The brain stem. Brain Res 1977; 129:1–12.9.
9. Waeber C, Dixon K, Hoyer D, Palacios JM. Localisation byautoradiography of neuronal 5-HT3 receptors in the mouseCNS. Eur J Pharmacol 1988; 151: 351–2.10.
10. Watcha MF, White PF. Postoperative nausea and vomiting. Itsetiology, treatment, and prevention. Anesthesiology 1992; 77:162–84.
11. Loewen PS, Marra CA, Zed PJ. 5-HT3 receptor antagonists vstraditional agents for the prophylaxis of postoperative nauseaand vomiting. Can J Anaesth 2000; 47: 1008–18.12.
12. Muchatuta NA, Paech MJ. Management of postoperativenausea and vomiting: focus on palonosetron. Ther Clin RiskManag 2009; 5: 21–34.13.
13. Sızlan A, Göktaş U, Özhan C, Özhan MÖ, Orhan ME, KurtE. Comparison of remifentanil, alfentanil, and fentanilcoadministeredwith propofol to facilitate laryngeal maskinsertion. Turk J Med Sci 2010; 40: 63–70.14.
14. Kathirvel S, Dash HH, Bhatia A, Subramaniam B,Prakash A, Shenoy S. Effect of prophylactic ondansetronon postoperative nausea and vomiting after electivecraniotomy. J NeurosurgAnesthesiol 2001; 13: 207–12.15.
15. Madenoglu H, Yildiz K, Dogru K, Kurtsoy A, Güler G, BoyaciA. Randomized, double-blinded comparison of tropisetronandplacebo for prevention of postoperative nausea and vomitingafter supratentorial craniotomy. J NeurosurgAnesthesiol 2003;15: 82–6.16.
16. White PF, Scuderi PE. Prevention of postoperative nausea andvomiting (PONV): A dose-ranging study involving palonosetron,a potent 5-HT3 receptor antagonist. Anesthesiology 2005; 103:A703.17.
17. Kovac AL, Eberhart L, Kotarski J, Clerici G, ApfelC,Palonosetron 04-07 Study Group. A randomized, double-blindstudy to evaluate the efficacy and safety of three different dosesof palonosetron versus placebo in preventing postoperativenausea and vomiting over a 72-hour period. Anesth Analg2008; 107: 439–44.18.
18. Candiotti KA, Kovac AL, Melson TI, Clerici G, Joo Gan T,Palonosetron 04-06 Study Group. A randomized, double-blindstudy to evaluate the efficacy and safety of three different dosesof palonosetron versus placebo for preventing postoperativenausea and vomiting. AnesthAnalg 2008; 107: 445–51.