A Cross Sectional Study on Postoperative Nausea and Vomiting – Risk Prediction and Assessment in Patients Undergoing Elective Surgical Patients

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ABSTRACT

Introduction: Postoperative nausea and vomiting (PONV) is a common encountered problem in surgical patients. The risk factors for PONV are multi-factorial in origin. There are many tools in assessing PONV using various scales. With this background we conducted a cross sectional study to predict the risk and assessment of PONV using Apfel score and Visual Analogue Scale (VAS).

Material and methods: A study population of 60 patients planned to undergo major surgical procedures were enrolled after obtaining informed consent. The patients were followed up in the postoperative period to look for the intensity of nausea using visual analogue scale and the episodes of retching/vomiting. Baseline parameters including of demographic data along with perioperative details like type of anesthesia, opioid usage, prophylactic & rescue antiemetic usage were noted from anesthesia record/case sheet.

Results: All statistical analyses were done using SPSS for Window version 16.0. The overall incidence of PONV was found to be 33.3% in our study. Using Apfel score it was found that three major risk factors were present in majority of patients who experienced PONV (60% of patients). The clinically significant nausea VAS score >75mm was observed during the first 4 hours of postoperative period. And it was adequately treated with rescue antiemetic (80% of patients).

Conclusion: From our study we concluded that risk determination for PONV must be an integral part of perioperative care. The patients with 2 or more risk factors should be given prophylactic antiemetic before the planned surgical procedure to make them less burden both financially and medically.

Keywords: Postoperative nausea and vomiting, Apfel score, Visual Analogue Scale

INTRODUCTION

Nausea and vomiting in the postoperative period occurs in 20% to 30% of patients[1] and together are the second most common complaints reported (pain is the most common)[2-7] After the landmark 1992 review from Watcha and White[8], *postoperative nausea and vomiting* (PONV) became the more commonly used clinical term and in 1999, PONV became a medical subject heading in the National Library Of Medicine.

The recognition of risk factors plays a critical role in making diagnostic and therapeutic decision while encountering a patient presented with PONV. To know which of the risk factors is most likely causal or merely correlational can be critical for the development of valid risk assessment tools to be used for clinical decisions. It is more useful to consider PONV multi-factorial in its origin, that is, a consequence of emetogenic agents (Inhaled anesthetics, opioids) applied to susceptible patients (females, those with a history of motion sickness, nonsmokers). These have been shown not only to be associated with an increased incidence of PONV but also to be important predictors of PONV. A better prediction can be obtained by focusing on these well-established independent predictors that appear to cause PONV.[9] There are three ways to access the intensity of these symptoms namely, visual analogue scale, numeric rating scale and verbal rating scale. The most widely accepted measurement technique for intensity utilizes visual analogue scale (VAS). Visual Analog Scale is considered the criterion standard, because its reliability and sensitivity have been well established in pain studies.[10] With this background we conducted a study on measurement of postoperative nausea and vomiting using visual analogue scale along with assessment of risk factors for PONV.

MATERIAL AND METHODS

This study was conducted at our Institution after obtaining Institutional ethical committee approval from April to June 2016.The sixty elective surgical patients belonging to ASA PSI & II category were enrolled in our study after obtaining written informed consent.

Exclusion criteria

Patient refusal to consent
Patient on antipsychotic medications
Age<18 yrs and >65 yrs
H/o previous surgery within past 6 months

All the study participants were clearly explained about visual analogue scale for assessing postoperative nausea and vomiting during the preoperative visit by Anaesthesia faculty. The surgical procedure was done under appropriate anaesthesia. The demographic profile of the study patient such as name, age, sex, smoking history, diagnosis, planned surgical procedure etc were recorded. Both pre and intraoperative anaesthesia were noted from the anaesthesia chart. The details regarding premedication, type of anaesthesia used, duration of surgery etc were also recorded. The drug details such as opioids usage during postoperative period along with volatile anaesthetics used were recorded.

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All the study participants were followed at regular intervals in the postoperative ward. The visual analogue scale was applied to each patient at time interval of 0-4 hrs, 4-8 hrs, 8-12 hrs, and 12-24 hrs respectively after the surgical procedures. The intensity of nausea was assessed using VAS. The patient was enquired about the incidence of retching/vomiting episode at regular time intervals. The time to first rescue anti-emetic used, drug used and its frequency were also recorded from the postoperative chart.

Meanwhile the patient's hemodynamic variables along with pain & treatment were also recorded. Any specific event in the postoperative period was also noted in our record. The usage of NSAID/Opioid in the postoperative period for pain control was taken into consideration for our study workup. The details of anti-emetics used both during the preoperative period as prophylactic agent and postoperative period for treating PONV were clearly recorded with dosing frequency. All data were entered in excel sheet and computed for statistical analysis.

STATISTICAL ANALYSIS

Descriptive analysis of variables was done to summarize the data. Ordinal and continuous data not following a normal distribution are presented as median and interquartile range. Normally distributed data are presented as mean and standard deviation (SD). All the variables with p value of <0.05 are considered to be statistically significant. Data were analysed using SPSS for Windows version 16.0

RESULTS

In our study, the overall incidence of PONV was found to be 33.3%. Table-1 clearly explains the predictors of PONV. Fifteen out of twenty patients presented with clinically significant PONV are female (75%). Among them three patients (15%) had a history of PONV/motion sickness. There is no significant difference between the type of anaesthesia administered to paients with PONV. Sixteen patients (80%) received opioids during peri-operatively. The median length of PACU and hospital stay was not statistically significant with a p value of 0.261 and 0.301 respectively

Figure-1 explains the risk score determination of PONV (Apfel Score). Sixty percentage of patients who had PONV was found to have 3 risk factors in our study. Figure-2 depicts the number of patients presented with VAS score>75mm at various time intervals of 0-4 hours, 4-8 hours, 8-12 hours and 12-24 hours respectively. Among them 16 patients had VAS score >75mm at 0-4 hours and only 2 patients had VAS > 75mm at 12-24 hours, it means that the PONV was adequately treated with rescue antiemetic. Figure-3 explains the type of surgical procedures found in our study. In our study it revealed that 55% of patients who experienced PONV had undergone Gynaecological procedures. It clearly explains that the female sex is more prone to have PONV which was followed by laparascopy (20%) and ENT procedures (15%) in the descending order of PONV risk surgical procedures among our study population.

Most of the patients (75%) were actively treated with antiemetics at 0-4 hours. About 55% of patients had a varying and 20% had constant pattern of nausea. The median nausea VAS score >75 mm was found to be present in 80% of patients at 0-4 hours. The episodes of vomiting/dry retching were experienced by

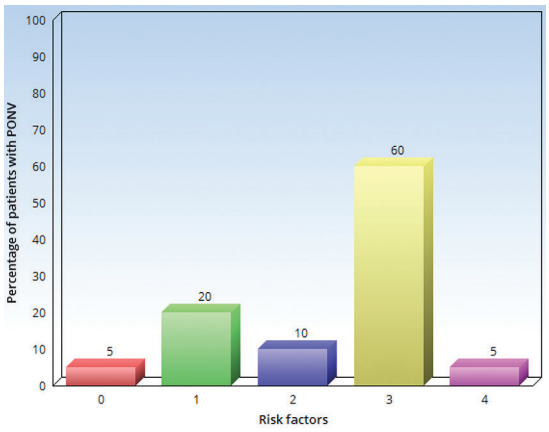

Figure-1: Apfel score

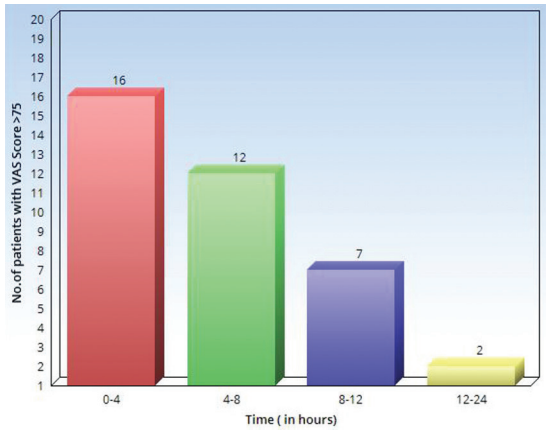

Figure-2: Visual analog scale

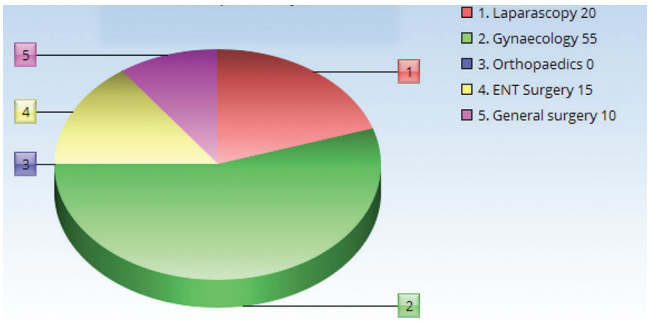

Figure-3: Surgical procedures & PONV

the patients at 0-4 hours. It clearly signifies that clinically significant nausea/vomiting were effectively treated with rescue antiemetics in our study population.

DISCUSSION

Nausea (from the Greek *nautia* meaning "seasickness") is often described as a "sensation of unease and discomfort in the stomach with an urge to vomit". Nausea may manifest at different intensities, may last a variable period of time, and may be waxing and waning (cyclic change in intensity over time). There are three ways to assess the intensity of the symptoms.

Vomiting, as a clinical symptom, is the forceful expulsion of gastric contents through the mouth or nose. Retching is similar to vomiting with the exception that no gastric contents enter the pharynx. An *emetic episode* is often operationally defined as one or more instances of vomiting and/or retching is separated

Variable	No PONV (n=40)	PONV (n=20)	p Value
Age	38.35±13.43	39.40±12.80	0.7729
Gender			
Male/Female	06/34	05/15	
Body Mass Index (Kg/m2)	26.45±2.41	29.05±3.17	0.0008
ASA Physical Status			
I/II	28/12	13/07	
Non-smokers	38 (95%)	03 (15%)	
Previous PONV	01 (3%)	02 (10%)	
H/O Motion sickness	01 (3%)	01 (5%)	
Type of Anaesthesia			
General Anaesthesia Regional Anaesthesia Combined Anaesthesia	16 (40%) 22 (55%) 02 (5%)	10 (50%) 10 (50%)	
Opioids during anaesthesia, n (%)	26 (65%)	16 (80%)	
Rescue Antiemetics Used			
A) Metoclopramide B) Ondansetron C) Dexamethasone		06 (30%) 14 (70%) 01 (10%)	
Duration of anaesthesia (min)	130(85-195)	135(97-210)	0.877
Duration of surgery (min)	90(60-132)	98(70-165)	0.552
Length of PACU stay (hr)	91(64-130)	103(70-145)	0.261
Length of hospital stay (days)	3(2-6)	4(2-7)	0.301
Data as median (interquartile range) or number (%) or mean±SD PONV, Postoperative nausea and vomiting; ASA, American Society of Anaesthesiologists; PACU, Post-Anaesthesia Care Unit			

Table-1: Predictors of PONV (n=60)

by no more than 1 minute of respite. However, for the sake of simplicity and because vomiting is much more frequent than retching, many authors reports of vomiting will include both vomiting and retching. In such instances, use of the term 'emetic episode' is preferable. The measurement of vomiting and emetic episodes is simpler than that of nausea because the former involves a distinctive and recognizable muscular reflex. Severity is therefore best evaluated by number of episodes, and recording of the times of each individual episode allows secondary analysis with regard to the time course.

Understanding the various definitions and methodologies used in publications is critical for interpretation of results. For instance, even though the occurrences of nausea and vomiting are correlated, they also occur independently and should therefore be assessed and reported separately, so that result can be compared across publications. This is true for both inhaled and intravenous anesthesia in both inpatient and outpatient procedures. Failure to realize this essential point has resulted in difficulties in assessing results for a significant portion of the available literature. Similar difficulties have arisen from the use of various scales that are generally inadequate to properly assess PONV. For example, assessing PONV on a 4- point severity scale ranging from *"no symptoms, mild nausea, severe nausea or up to two vomits, or more than two vomits"* fails to reflect the underlying physiology and presentation of these symptoms and does not allow determination of the proposition of patients experiencing nausea, vomiting or both.[11]

The most widely accepted measurement technique for intensity uses a visual analogue scale (VAS). The VAS consists of a 100-mm horizontal line with the left end corresponding to *no nausea* and the right end corresponding to *worst imaginable nausea*. Patients are asked to choose a point on the line that represents the intensity of their current state. The VAS is considered the criterion standard, because its reliability and sensitivity have well established in pain studies. Another common approach is the use of a written or verbal 11 -points numeric rating scale (NRS), for which the patient is asked to note the severity of his or her nausea between 0 and 10, with 0 corresponding to *no symptoms* and 10 corresponding to *worst possible symptoms.* The NRS approach has the advantage of ease of use and maintains a sensitivity similar to the VAS gold standard.[12] The easiest approach to be categorical verbal rating scale (VRS) in which the patients describe their symptoms as none, mild, moderate or severe. Unfortunately, even though Boogaerts and collegues have demonstrated a good correlation between the VRS and VAS for nausea, pain studies have found that the VRS is not as sensitive as the VAS.[12]

Postoperative nausea and vomiting is multifactorial.Instead of assessing a wide range of associated risk factors, a patient's risk for PONV is best predicted by a simplified risk score using independent predictors (statistically corrected for confounders). In adult patients undergoing a general inhaled anesthesia, Apfel's simplified risk score includes female gender, nonsmoking status, history of PONV/motion sickness, and the use of postoperative intravenous opioids as the main independent predictors. When 0, 1, 2, 3 or 4 of these factors are present, the risk of PONV is about 10%, 20%, 40%, 60% or 80% respectively.

Boogaerts JG et al. assessed the postoperative nausea using visual analogue scale.[13] They found that VAS method was useful for assessing quantitative nausea intensity and for testing the efficacy of rescue medication. It was found that a cut-off value of 4 on the VAS may be considered as a critical threshold triggering anesthesiologists or nurses to administer rescue medication. In our study we also used the same cut off point to administer rescue anti-emetic. Sixteen out of twenty patients had significant VAS score >75mm i.e. intensity of nausea seemed to

very high. Later on, after administration of rescue anti-emetic the intensity of nausea was reduced very well which was clear with decline in VAS score.

In our study we found that 20 out of 60 patients had experienced postoperative nausea and vomiting during the first 24 hours of postoperative period. The overall incidence of PONV was found to be 33.3%. It was quiet comparable with previous study done by Dolin et.al. While analyzing the risk factors for PONV based on Apfel score, 60% of patients had three risk factors. It was followed by one risk factor in 20% of patients who experienced PONV. It was also quiet similar to Apfel et al and Sinclair DR et al on risk assessment of PONV.[14,15]

Apfel CC, Kranke P et.al did a study on PONV prediction by comparing surgical site and patient's history with simplified risk score.[16] In our study we found that majority of patients who experienced PONV had undergone gynaecological procedures. It was followed by laparoscopic and ENT surgical surgeries. This result was quiet comparable with study done by Ebehart LH et.al on a survey of anaesthesia on PONV.[17] There was no significant difference the type of anaesthesia administered (either regional or general) to the patients with PONV.

In 23 out of 60 patients, Inj. Palanosetron was used as the prophylactic anti-emetic before the surgical procedure. Among them the need for usage rescue antiemetic seemed to be very minimal while comparing with other prophylactic antiemetic like Inj. Ondansetron.[18-20] Among the rescue anti-emetic used in our patients with PONV, Inj. Ondansetron was on the top list (70%) which was followed by Inj. Metoclopramide (30%) and Inj. Dexamethasone (10%).This was quiet comparable with the studies done by Park et.al, Ekinei et.al, Bajwa SS et.al, Kovac AL et al and Nazar et al.[21-25]

Based on the study reports done by Chandrakantan et.al and Habib et.al, it was found that the multimodal management strategy for PONV was associated with a higher complete response and greater patient statisfaction when compared with single antiemetic prophylaxis under inhaled anaesthesia or Total intravenous anaesthesia.[26-28] Being a observational study, we did not find any multimodal approach to treat PONV rather than using more than two emetics among the study population.

Our study has certain limitations. 1. Smaller sample size 2. Limited time period for study. The sample size limited the value of our PONV risk assessment results and prophylaxis guidelines compliance. The time period of assessment was limited to 24 hours; therefore we may have missed patients presenting with late PONV

CONCLUSION

From our study we concluded that risk determination for PONV must be an integral part of perioperative care. The patients with 2 or more risk factors should be given prophylactic antiemetic before the planned surgical procedure to make them less burden both financially and medically. The quality of surgical patient care will be improved with standardization of certain guidelines of PONV prevention and treatment.

REFERENCES

1. Dolin SJ, Cashman JN, Bland JM. Effectiveness of acute postoperative pain management: I. Evidence from published data. Br J Anaesth. 2002;89:409-423.
2. Palazzo M, Evans R. Logistic regression analysis of fixed patient risk factors for postoperative sickness: A model for risk assessment. Br J Anaesth. 1993;70:135-140.
3. Caben MM, Duncan PG, DeBoer DP, Tweed WA. The postoperative interview: Assessing risk factors for nausea and vomiting. Anesth Analg. 1994;78:7-16.
4. Koivuranta M, Laara E, Snare L, Alahuta S. A survey of postoperative nausea and vomiting. Anaesthesia. 1997; 52:443-449.
5. Apfel CC, Laara E, Koivuranta M, et.al. A simplified risk score for predicting postoperative nausea and vomiting: Conclusions from cross-validations between two centers. Anesthesiology. 1999; 91:693-700.
6. Eberhart LHJ, Hogel J, Seeling W, et.al. Evaluation of three risk factors to predict postoperative nausea and vomiting. Acta Anaesthesiol Scand. 2000;44:480-488.
7. Stadler M, Bardiau F, Seidel L, et.al. Difference in risk factors for postoperative nausea and vomiting. Anaesthesiology. 2003;98:46-52.
8. Watcha MF, White PF. Postoperative nausea and vomiting: Its etiology, treatment and prevention. Anesthesiology. 1992;77:162-184.
9. Apfel CC, Kranke P, Eberhart LH. Comparison of surgical site and patient's history with a simplified risk score for the prediction of postoperative nausea and vomiting. Anaesthesia. 2004;59:1078-1082.
10. Huskisson EC. Measurement of pain. Lancet. 1974; 2:1127-1131.
11. Apfel CC, Roewer N, Korttila K. How to study postoperative nausea and vomiting: Acta Anaesthesiol Scand. 2002;46:921-928.
12. Breivik EK, Bjornsson GA, Skovlund E. A comparison of pain rating scales by sampling from clinical trial data. Clin J Pain. 2000;16:22-28.
13. Boogaerts JG, Vanacker E, Seidel, et.al. Assessment of postoperative nausea using visual analogue scale. Acta Anaesthesiol Scand. 2000;44:470-474.
14. Apfel CC, Roewer N. Risk assessment of postoperative nausea and vomiting. Int Anesthesiol Clin. 2003;41:13-32.
15. Sinclair DR, Chung F, Mezei G. Can postoperative nausea and vomiting be predicted? Anesthesiology. 1999;91:109-118.
16. Apfel CC, Kranke P, Eberhart LH. Comparison of surgical site and patient's history with a simplified risk score for the prediction of postoperative nausea and vomiting. Anaesthesia. 2004;59:1078-1082.
17. Eberhart LH, Morin AM, Felbinger TW et.al. [Results of a survey of anesthetists on postoperative nausea and vomiting]. Anaesthesiol Intensivemed Notfallmed Schmerzther. 1998;33:541-551.
18. Swaika S, Pal A, Chatterjee S, Saha D, Dawar N. Ondansetron, ramosetron, or palonosetron. Which is a better choice of antiemetic to prevent postoperative nausea and vomiting in patients undergoing laparoscopic cholecystectomy? Anesth Essays Res. 2011;5:182-6.
19. Adriani J, Summers FW, Antony SO. Is the prophylactic use of antiemetics in surgical patients justified? JAMA. 1961;175:666-71.
20. Moon YE. Postoperative nausea and vomiting. Korean J Anesthesiol. 2014;67:164-70.
21. Park SK, Cho EJ. A randomized, double-blind trial of palonosetron compared with ondansetron in preventing postoperative nausea and vomiting after gynaecological laparoscopic surgery. J Int Med Res. 2011;39:399-407.

22. Ekinci O, Malat I, Isitmangil G, Aydin N. A randomized comparison of droperidol, metoclopramide, tropisetron, and ondansetron for the prevention of postoperative nausea and vomiting. GynecolObstet Invest. 2011;71:59-65.
23. Bajwa SS, Bajwa SK, Kaur J, Sharma V, Singh A, Singh A, et al. Palonosetron: A novel approach to control postoperative nausea and vomiting in day care surgery. Saudi J Anaesth. 2011;5:19-24.
24. Kovac AL, Eberhart L, Kotarski J, Clerici G, Apfel C; Palonosetron – Study Group. A randomized, double-blind study to evaluate the efficacy and safety of three different doses of palonosetron versus placebo in preventing postoperative nausea and vomiting over a 72-hour period. AnesthAnalg. 2008;107:439-44.
25. Nazar CE, Lacassie HJ, López RA, Muñoz HR. Dexamethasone for postoperative nausea and vomiting prophylaxis: Effect on glycaemia in obese patients with impaired glucose tolerance. Eur J Anaesthesiol. 2009;26:318-21.
26. Tramèr MR. A rational approach to the control of postoperative nausea and vomiting: Evidence from systematic reviews. Part I. Efficacy and harm of antiemetic interventions, and methodological issues. Acta Anaesthesiol Scand. 2001;45:4-13.
27. Chandrakantan A, Glass PS. Multimodal therapies for postoperative nausea and vomiting, and pain. Br J Anaesth. 2011;107 Suppl 1:i27-40.
28. Habib AS, White WD, Eubanks S, Pappas TN, Gan TJ. A randomized comparison of a multimodal management strategy versus combination antiemetics for the prevention of postoperative nausea and vomiting. Anesth Analg. 2004;99:77-81.

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