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RESEARCH ARTICLE
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Incidence of Postoperative Nausea and Vomiting in Patient Undergoing Sleeve Surgery with BMI > 35 Maintained with Isoflurane

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ABSTRACT

Background and aim: Patients with a body mass index (BMI) of 35 or above undergoing sleeve surgery under isoflurane anesthesia will be analyzed for their risk of experiencing postoperative nausea and vomiting (PONV). Isoflurane is a popular anesthetic used during sleeve surgery, and postoperative nausea and vomiting (PONV) is a typical consequence. The purpose of this study is to collect data on the frequency with which patients who have had sleeve gastrectomy experienced postoperative nausea and vomiting.

Material and method: In a prospective descriptive analysis, 55 patients who matched the inclusion criteria were randomly assigned to one of two groups using a non-randomized allocation approach. Blood pressure, end-tidal CO2, oxygen saturation, and heart rate were all measured and tracked for each patient. A consistent method of evaluating the frequency and severity of nausea and vomiting was used. Eligibility criteria included having a body mass index (BMI) over 35, being between the ages of 19 and 45, and having chosen to have gastric sleeve surgery as an elective procedure. Women with a body mass index (BMI) lower than 35 or pregnant were not eligible. The researchers determined that a sample size of n = 55 was appropriate. Convenience sampling was used to pick the participants. The research made that the sample was representative and that the sampling strategy could be implemented as planned.

Results: Age, sex, body mass index, length of operation, antiemetic medicine, smoking, nausea and vomiting history, and premedication are all factors that are analyzed. The study concludes that the two groups, those who experience and those who do not, differ significantly in terms of mean operation length, antiemetic drug use, and history of nausea and vomiting following surgery.

There is no statistically significant difference in demographics such as age, gender, body mass index, smoking status, or premedication usage.

Conclusion: The objective of this study was to utilize logistic regression analysis to identify risk factors associated with postoperative nausea and vomiting (PONV). The findings revealed an inverse relationship between age and the incidence of PONV, while smoking was positively associated with PONV. The use of antiemetic medication, a higher body mass index (BMI), and longer surgical duration were also found to be correlated with an increased risk of PONV. However, there were no statistically significant correlations observed between preoperative treatment with Dexamethasone or ondansetron, gender, and the occurrence of PONV. Based on these results, the researchers concluded that these factors should be taken into consideration when assessing a patient's risk of experiencing postoperative nausea and vomiting during surgery.

Keywords: *BMI, isoflurane, nausea and vomiting, sleeve surgery*

INTRODUCTION

Anesthesia and surgery in general can cause some patients to have nausea and vomiting afterward, and sleeve gastrectomy is no exception. Several studies have described the incidence and risk factors for postoperative nausea and vomiting (PONV) following sleeve gastrectomy (1). PONV is characterized by the feeling of nausea, retching, and vomiting, and it can begin in the early postoperative period or last for several hours or days after surgery. Although the precise origin of PONV is unknown, it is thought to result from a combination of the patient's preexisting risk factors, the anesthetic administered, and the kind and extent of the surgical treatment. Female gender, previous episodes of motion sickness or PONV, current nonsmoking status, and the use of certain drugs are all risk factors for PONV (2,3). Antiemetic drugs such ondansetron, metoclopramide, or Dexamethasone may be used to treat PONV if it occurs. Hydration with intravenous fluids, avoidance of solid meals for a while, and a change in posture are all non-pharmacological methods that have shown promise (4,5). The laparoscopic technique of sleeve gastrectomy for the treatment of obesity is gaining in popularity. About 75% to 80% of the stomach is surgically removed, leaving a smaller stomach pouch and limiting food intake. Because of this, calorie consumption drops, which usually results in a marked decrease in weight (6). The anesthesiologist controls the patient's isoflurane concentration and checks their vital signs to keep them deeply sedated and their blood pressure and heart rate stable during the surgery. The potential for problems can be reduced by ensuring adequate posture, oxygenation, and breathing (7,8). This is crucial for reducing the risk of developing and managing obesity-related complications such type 2 diabetes, hypertension, and obstructive sleep apnea (9).

BMI (body mass index)

Researchers and health professionals have created this measurement to help determine a person's weight and the potential dangers of carrying extra fat. Underweight people have a body mass index (BMI) of less than 18.5; normal-weight people have a BMI of 18.5 to 24.9; overweight people have a BMI of 25 to 29.9; and obese people have a BMI of 30 or more. Comorbidities connected to obesity are more likely to occur in those with a body mass index (BMI) of 35 or higher (11, 12).

Severe obesity defined as a body mass index (BMI) of 35 or above, poses serious health concerns. Comorbidities associated with obesity, such as type 2 diabetes, heart disease, respiratory illness, joint pain, cancer, and psychological issues, are well-known to worsen with extreme obesity (13). Extreme obesity not only poses serious health problems, but also has far-reaching effects on healthcare expenditures and use. Therefore, preventing and treating obesity-related comorbidities, enhancing quality of life, and decreasing healthcare costs necessitates tackling severe obesity through lifestyle modifications, medical therapy, and bariatric surgery where appropriate.

Isoflurane is an inhalational anesthetic halogenated ether. By suppressing the CNS and producing unconsciousness, it makes it possible to perform painful surgical procedures without

the patient feeling a thing. The dangers and side effects of isoflurane include postoperative cognitive impairment, hypotension, arrhythmias, and decrease of respiration. Monitoring the patient's blood pressure, heart rate, oxygen saturation, and respiratory rate can help reduce the likelihood of adverse effects (14,15,16).

Risk factors

Severe obesity is a complex condition that is influenced by a variety of factors. These factors include genetic, behavioral, environmental, metabolic, medication-related, and psychological factors.

Aim of the study

To determine and record all post-operative nausea and vomiting incidence in patients undergoing sleeve surgery.

MATERIAL AND METHODS

Patients who had sleeve surgery at the Lebanese University Hospital (Maysan, Iraq) and satisfied the inclusion criteria of ASA I, II, or III classification and a BMI more than 35 were participated in this prospective descriptive research. Non-random assignment of patients to treatment groups was accomplished using the sequentially numbered opaque sealed envelopes (SNOSE) approach and 55 pieces of plain paper. Propofol (2 mg/kg) and atracurium (0.4-0.5 mg/kg) were used to produce general anesthesia. The use of isoflurane helped keep the patient unconscious. Prior to induction, the usual vitals were taken, including blood pressure, end-tidal CO_2, oxygen saturation, and heart rate. Patients were assessed for the presence of postoperative nausea and vomiting twice in the PACU: at admission and 6 hours later. A consistent scoring system was used to keep track of the frequency and intensity of episodes of nausea and vomiting.

Sample size

Because it can have a major effect on the patient's recovery and satisfaction, the incidence of postoperative nausea and vomiting is an important outcome measure in surgical treatments. An earlier study indicated that 33% of patients experienced postoperative nausea and vomiting, highlighting the need for efficient therapies to decrease this complication. Researchers utilized formula 1 to calculate how many people to include in their study of postoperative nausea and vomiting. This formula takes into account several factors, including the level of significance (α), the prevalence of complications (p), the margin of error (d), and the power of the study (1-β).

Data collection

In this prospective descriptive study, we aim to investigate the potential predictors for postoperative nausea and vomiting by collecting data from patient medical documents. The study had recorded several key variables including gender, age, BMI, history of nausea and vomiting, surgical time and premedication. These variables were analyzed to determine their relationship to the occurrence of post-operative nausea and vomiting. One of the benefits of using medical documents as a data source is that it can provide a cost-effective and efficient method of gathering information on patient history and outcomes.

Measurement

In this study, certain variables such as age, gender, and BMI have been collected by hospital staff as part of routine care and have been recorded in the medical documents of each participant.

Statistical analysis

All statistical analysis in this prospective descriptive study was performed in version 26 of IBM SPSS. Descriptional statistics (frequency, percentage, mean, and standard deviation) were used to summarize the data. Based on these research, we may learn the prevalence of postoperative nausea and vomiting (PONV), as well as other demographic and clinical characteristics of the study population.

RESULTS

In Table 1, we examine whether or not the two groups have statistically significant differences by comparing their variables. We examine the potential factors related with the result of interest (PONV) by comparing the variables. Potential risk factors for PONV can be determined with this data, allowing for the creation of preventative measures. The patient population's

features and their role in the result of interest can be better understood if we compare the variables between the two groups.

TABLE 1: descriptive data of the total population and sub grouped by PONV group

Variable		Without PONV	With PONV	Total	P-Value
Age		47.04± 5.68	44.28± 7.24	45.43±6.72	0.232
Sex	Female	9 (39.13)	17 (53.13)	26 (47.27)	0.363
	Male	14 (60.87)	15 (46.88)	29 (52.73)	
BMI (kg/m^2)		39.55±2.18	40.94±2.25	40.37±2.31	0.260
Summary of Surgery Duration(min)		57.60±15.80	76.09±15.43	68.36± 17.98	<0.001
Antiemetic Medication	No	11 (47.83)	6 (18.75)	17 (30.91)	0.021
	Yes	12 (52.17)	26 (81.25)	38 (69.09)	
Smoking	no	16 (69.57)	20 (62.50)	36 (65.45)	0.587
	Yes	7 (30.43)	12 (37.50)	19 (34.55)	
History of Nausea and Vomiting	No	23 (100.00)	13 (40.63)	36 (65.45)	<0.001
	Yes	0 (0.00)	19 (59.38)	19 (35.19)	
Premedication	Dexamethasone	4 (33.33)	9 (34.62)	13 (34.21)	0.938
	Ondansetron	8 (66.67)	17 (65.38)	25 (65.79)	

Using logistic regression analysis, researchers identified several factors that contributed to the development of PONV. There was no significant connection between age and the occurrence of PONV, as the OR for age was 0.93 (95% CI: 0.86-1.02, p=0.136). Similarly, there was no statistically significant connection between sex and the occurrence of PONV, as the OR for sex was 0.57 (95% CI: 0.19-1.68, p=0.307). The correlation between body mass index and the outcome variable has a p-value of 0.030, showing statistical significance. The odds ratio had a 95% confidence interval of 1.03–1.70. The odds ratio of 1.32 suggests that for each unit increase in BMI, there is a 1.32 times higher odds of the outcome variable occurring. BMI was identified as a significant variable in predicting the outcome.

However, numerous additional factors were discovered to be strongly linked to the occurrence of PONV. Summary Surgical time was related to a greater risk of PONV, with an OR of 1.08 (95% CI: 1.03-1.12, p=0.001). Antiemetic medicine was linked to a greater incidence of PONV, with an odds ratio (OR) of 3.97 (95% CI: 1.18-13.28, p=0.025). The odds ratio (OR) for having a PONV was 1.37 (95% CI: 0.44-4.29, p=0.587), which is not statistically significant. Pretreatment with Dexamethasone (OR=0.94, 95% CI: 0.22-4.01, p=0.938) or ondansetron (OR=1.00, 95% CI: 0.29-3.44, p=0.999) did not significantly reduce the risk of PONV.

The incidence of postoperative nausea and vomiting (PONV) was shown to be substantially related to several factors, according to the findings of a multivariable logistic regression analysis. Age was shown to be inversely linked with the occurrence of PONV after controlling for other variables, with an adjusted odds ratio (OR) of 0.74 (95% CI [CI]: 0.61-0.91, P = 0.005) for smokers. As a result, the likelihood of having PONV dropped by 26% for every year added to one's age. There was also a significant association between smoking and the incidence of PONV; the adjusted odds ratio (OR) was 23.04 (95% CI: 2.28-232.15, P = 0.008).

TABLE 2: The univariable and multivariable logistic regression between the PONV and potential risk factors

Variable		Odds Ratio	95% confidence interval	P-value	Odds Ratio	95% confidence interval	P-value
Age		0.93	0.86-1.02	0.136	0.74	0.61-0.91	0.005
Sex	Female	1	-	-	-	-	-
	Male	0.57	0.19-1.68	0.307	-	-	-
BMI		1.32	1.03-1.70	0.030	-	-	-
Antiemetic Medication	No	1	-	-	-	-	-
	Yes	3.97	1.18-13.28	0.025	-	-	-
Smoking	no	1	-	-	1	-	-
	Yes	1.37	0.44-4.29	0.587	23.04	2.28-232.15	0.008
Premedication	Dexamethasone	1	-	-	-	-	-
	Ondansetron	0.94	0.22-4.01	0.938	-	-	-

DISCUSSION

In our research focused on identifying the factors contributing to postoperative nausea and vomiting (PONV), we provided an overview of the demographic characteristics of the participating patients. The study consisted of 55 patients, with an average age of 45.43±6.72 years. Among the participants, there were 26 women (47.27%) and 29 men (52.73%) in total. The mean BMI 40.37±2.31(kg/m2). The mean summary of surgery duration was 68.36±17.98 minutes. In terms of antiemetic medication use, 17 (30.91%) patients did not receive it, while 38 (69.09%) did. About 65.45% of the patients reported not smoking. And 65.45% of the patients had no history of nausea and vomiting, while 35.19% did. Finally, 13 patients (34.21%) received Dexamethasone as premedication, and 25 patients (65.79%) received Ondansetron as premedication. Neither group showed a statistically significant difference from the other in terms of age or gender distribution.

However, significant differences were observed between the groups concerning the average duration of surgery, administration of antiemetic medication, and the presence of a history of nausea and vomiting. Interestingly, neither the group receiving premedication with Dexamethasone nor the group receiving Ondansetron showed any noticeable improvement. These findings strongly suggest a potential link between PONV and factors such as the duration of surgery, the use of antiemetic drugs, and a previous history of nausea and vomiting.

The results provide insights into the distribution of ages and sexes among individuals affected and unaffected by PONV. The mean age was 47.04±5.68 years for the PONV-free group and 44.28±7.24 years for the PONV-affected group. The study revealed no statistically significant difference in mean age between the two groups ($p = 0.2232$). These findings suggest that age and sex may not be significant risk factors for PONV. However, it is important to consider these factors as they have been associated with increased susceptibility to the virus in certain studies.

Body Mass Index (BMI): Our result showed that the mean Body Mass Index (BMI) was 39.55±2.18 in the group without Postoperative Nausea and Vomiting (PONV), 40.94±2.25 in the group with PONV, and 40.37±2.31 in the total population. No significant difference in body mass index (BMI) was observed between the two groups ($p = 0.260$). The relationship between BMI and the risk of PONV has been extensively investigated, yielding conflicting findings.

Surgery duration: Surgery times were much shorter for patients who did not experience PONV than those who did. The mean surgery duration was shorter in the group without PONV (57.60 ± 15.80 minutes) compared to the group with PONV (76.09 ± 15.43 minutes). The study's results suggest that minimizing surgery duration could potentially reduce the risk of PONV in patients undergoing surgery. However, further research is needed to determine the maximum surgery duration to minimize the incidence of PONV while ensuring optimal surgical outcomes (17).

Antiemetic medication: The results of this study suggest that patients who experience PONV are more likely to require antiemetic medication than those who do not experience PONV. Specifically, in the total population, 69.09% of patients received antiemetic medication, and the use of antiemetic medication was significantly higher in the group with PONV (81.25%) compared to the group without PONV (47.83%); however, other considerations, such as the kind of operation or anesthetic, patient demographics, and preoperative risk factors, may also impact the decision to provide antiemetic medicine. The variables that increase the likelihood that surgical patients may need antiemetic medicine are poorly understood.

The findings of this study align with previous research, indicating that patients who experience PONV are more likely to receive antiemetic medications. The treatment and prevention of PONV often involve using these medications, which can impose significant financial and logistical burdens on individuals and healthcare systems. Numerous studies have demonstrated the effectiveness of prophylactic antiemetic use in reducing the occurrence of PONV. For example, a meta-analysis of 51 randomized controlled trials revealed that the prophylactic use of serotonin antagonists resulted in a significant decrease in the incidence of PONV compared to placebo (18, 19). Additionally, another study confirmed that combining a serotonin antagonist with Dexamethasone, a corticosteroid, was more effective in preventing PONV than using either medication alone (20, 21).

CONCLUSION

This research shows that almost half of all surgical patients get some degree of PONV. Patients' mean age was 45.436.72 years, and 52.73% were male and 47.27% female. The mean body mass index was 40.372.31 (kg/m2). 68.3617.98 minutes was the average time needed for the operation. Sixty-nine point nine percent of patients were given antiemetic medicine, whereas thirty-one point nine one percent were not. In addition, 34.55 percent of patients were smokers, whereas 65.45 percent were never exposed to tobacco. Finally, 35.19% of patients reported a history of nausea and vomiting, as did 34.21% pretreated with Dexamethasone and 65.79 % pretreated with Ondansetron. The study concludes that variables including prolonged surgical procedures, the absence of antiemetic medicine, and a preexisting history of nausea and vomiting may all contribute to the development of PONV. Using these findings, we can create interventions to lower the rate of PONV in surgical patients.

Ethical approval

The study's ethical approval (IR.TUMS.SPH.REC.1401.305) was approved by the Tehran University of Medical Sciences' ethical committee. For all the information that was acquired, group data were published (instead of individual data). The required data lacks any identity information, such as a name, ID number, country code, or other identifier.

Conflict of interest

According to the authors, there are no conflicts of interest.

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