Original article

Assessment of nausea and vomiting in patients during the first post-operative 24 hours

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Abstract

Purpose: The objective of this study is the determination of the presence of nausea-vomiting at the patients in the first postoperative 24 hours, the effective factors in the development of the nausea–vomiting.**Methods:**This prospective study is performed with 104 patients at the General Surgery Clinic of the University Hospital. Data were obtained using patient information sheets, Beck Anxiety Inventory, Verbal Category Scale, and Verbal Descriptive Scale. Data were evaluated using chi-square, Fisher's exact test and student t tests. **Results:**Postoperative nausea- vomiting were more common in women, weak and obese, those who do not use alcohol, smokers, people with higher anxiety ($p>0.05$). In addition, nausea- vomiting wereoccurred frequently afterclosed surgical operation, spinal anesthesia, long duration surgery ($p>0.05$). Nausea-vomiting were significantly less in patients that were using proton pump inhibitors continuously ($p=0.009$). **Conclusion:** These results indicated that postoperative nausea-vomiting may be various reasons

Key Words: *nausea, vomiting, postoperative period, general surgical patient*

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Introduction

Regardless of newly discovered antiemetic medicines, short term effect opioids and anesthetics, vomiting develops in about 20-70% of patients in the postoperative period. This situation may cause delayed healing process in the postoperative period and may elongate the duration for the discharge of the patient like dehydration, electrolyte instabilities, aspiration pneumonia, infection, opening of surgical wounds. Yet, this is an encountered symptom that may be overlooked in clinical application due to the fact that it does not cause death and permanent damage [1-6]. postoperative period is not only due to the type of anesthesia and anesthetic drugs. In addition,

gender, presence of obesity, substance abuse, chronic and congenital diseases, surgical operation past history, type an duration of the surgical operation, duration of postoperative hunger, usage of analgesics, sedatives and antiemetic, oxygen treatment, presence of pain and anxiety at the patient may effective at the presence of postoperative nausea- vomiting (PONV) [1,7,8].

Team approach is important at the utmost level for determining the high risk patients for nausea-vomiting which is proven to be developing due to many different reasons and still have high incidence at the clinic and realizing the treatment and care applications. It is undeniable that the maintenance of non-pharmacological methods as well as the pharmacological ones with a team approach is very useful in increasing the quality of patient care. Nurses also have an effective role in the prevention of nausea-vomiting as an inseparable part of this team [9].

The purpose of this study is the determination of the presence of nausea-vomiting at the patients in the first postoperative 24 hours, the effective factors in the development of the nausea – vomiting.

Methods

Study Design

In this study, prospective, descriptive approach was used.

Participants

All patients (>18 years) who were admitted to the general surgical clinic of university hospital from January 25thto May 31st2011 were eligible for enrolment in this study. A hundred four patients were prospectively enrolled. Patients who had undergone emergency operation and patients with communication problem were excluded from this study.

Instruments

Data were collected by using patient information sheets, preoperative anxiety level of the patient by using Beck Anxiety Inventory (BAI), postoperative experienced pain level by Verbal Rating Scale (VRS), and the presence of nausea- vomiting by using Verbal Descriptive Scale.

Patient information sheet: At the patient information sheet, there were 26 items related to nausea- vomiting evaluating defining characteristics of the individual (age, weight, height, gender), alcohol consumption and smoking levels, chronic and congenital disease history, constantly used medicines, allergy status, previous history of surgical operation,features of the surgical operation, (type, place, duration), type of the applied anesthesia, anesthetic agents, preoperative and post hunger duration, antiemetic, analgesic, sedative, oxygen treatment applied to Total response scores range from 0 to 63, with higher scores indicating more severe anxiety patients, nausea- vomiting status

In the literature, it is stated that nausea-vomiting which should be monitored at the

first 24 hours in the Beck Anxiety Inventory (BAI):The BAI is a self-report scale designed to evaluate the severity of physical symptoms of anxiety.This scale is developed by Beck et al.[10]Turkish adaptation, validity and reliability studies of this scale were performed by Ulusoy et al.[11] BAI is a Likert type scale consisting of 21 items determining the frequency of the indications of anxiety experienced by the individuals and each item is given a point from 0 (not at all) to 3 (severely, I could barely stand it).

Verbal Rating Scale (VRS)is one of the methods used commonly for the assessment of the level of pain. This scale is verbally evaluated between 0 and 5. According to this, 0 value is assessed and categorized as "no pain" and 5 is "worst pain imaginable" or "possible" level.

Verbal Descriptive Scale (VDS)was used to identify the presence and severity of postoperative nausea and vomitingin which 0 = no nausea, 1 = mild nausea, 2 = moderate nausea, 3 = frequent vomiting and 4 = severe vomiting.This scale is developed byRhodes et al.[12] for the assessment of nausea and vomiting and has been used in many studies in Turkey.

Data Collection

Patients were interviewed within the first 24 hours after the surgery.Each interview lasted about 20 minutes. Besides, the patients were monitored and examined for 24 hours. In the preoperative period, the patients were met in person and following their consent to participate, Beck Anxiety Inventory was filled on the morning of surgery. In the postoperative period, firstly, the presence of nausea- vomiting at thepostanesthesia recovery room was monitored. Meanwhile, the information on the patient information sheet was completed and the applied processes, level of pain, presence of nausea-vomiting were recorded. Later, the monitoring of the patient was proceeded at the service where he was transferred from the postanesthesia recovery room, the related blanks in the information form were completed; the applications to the patient, level of pain and presence of nausea-vomiting was recorded and the patient was monitored in this manner for the first postoperative 24 hours.

Data Analysis

Data were entered into the Statistical Package for Social Sciences (SPSS) 16.0 computer package software. Demographic features were evaluated by number, ratio, and average tests. Pearson Chi-square, Fisher's exact test and student t test were used to determine the significance of the association between outcome and those possible risk factors. Statistical significance was indicated by $p<0.05$.

Ethical Approach

This study was conducted with the approval of the clinical research review committee, and with written and verbal informed consent was obtained from all patients.

Result:

Table1.Features of Patients

	X ± SD	
Age	53.34 ± 1.54	
	n	**%**
Gender		
Woman	62	59.6
Man	42	40.4
Body Mass Index		
Weak (<18.5)	4	3.8
Normal (18.5-24.9)	34	32.7
Overweight (25.0-29.9)	30	28.8
Fat (30.0-39.9)	30	28.8
Obese (≥40)	6	5.8
Smokers	34	32.7
Alcohol users	5	4.8
Presence of chronic diseases (n=54)		
Asthma –bronchitis	13*	24.1**
Diabetes	13*	24.1**
Cardiac Insufficiency	11*	20.4**
Hypertension	32*	59.2**
Obesity	2*	3.7**
Reflux	1*	1.8**
Leukemia	1*	1.8**
Parkinson's Disease	1*	1.8**
Alzheimer's Disease	1*	1.8**
Vertigo	1*	1.8**
Continuous medicine users (n=50)		
Anticoagulants	11*	22.0**
Antihypertensive	34*	68.0**
Antidepressant	8*	16.0**
Levatyroxine sodium	6*	12.0**
Proton pump inhibitors	11*	22.0**
Bronchodilators	4*	8.0**
Antidiabetics	5*	10.0**
Neurological Medicines	2*	4.0**
Antidiuretics	3*	6.0**
Presence of allergy (n=14)		
Nickel, cobalt, plastic	2	14.2*
Dust, pollen	4	28.5*
Antibiotics	4	28.5*
Detergents	1	7.1*
Food	3	21.4*
Previous surgery history	74	71.2

More than one answer.* * Taken due to the number of percentages.*

The average age of the patients were 53.34 ± 1.54, 59.6% women, 32.7% have a body mass within normal limits. 32.7% were smokers, 4.8% used alcohol and 71.2% had a surgical experience previously. About of 13.5% of the patients had allergies, 30.8% had hypertension, 12.5% had diabetes, 12.5% had asthma-bronchitis complaints, and 48.1% were constantly using medicines (Table 1).

The majority of the patients (93.3%) had been subject to open surgical operation, general anesthesia was preferred for surgery (80.8%), and fentanyl (89.4%) and propofol (83.7%) were mostly used as anesthetics. Of the 104 patients 44 (42.3%) had undergone upper and 40 (38.4%) lower abdominal surgery.The duration of surgery was an average of 2.78 hours (Table 2).

Table 2. Features of SurgicalInterventions

	n	***%***
Type of Surgery		
Open	97	93.3
Closed	7	6.7
Place of Surgery		
Head-neck	19	18.3
Upper abdominal	44	42.3
Lower abdominal	40	38.5
Type of Anesthesia		
Epidural	3	2.9
Spinal	17	16.3
General	84	80.8
Anesthetics		
Neostigmine	23	22.1
Atropine	22	21.2
Midazolam	50	48.1
Fentanyl	93	89.4
Propofol	87	83.7
Volatile	24	23.1
Pentothal	2	1.9
	$X \pm SD$	
Duration of Surgery (hours)	2.78 ± 1.35	

Nausea and vomiting were observed at the 46.2% of the patients in the postoperative period.This situation wasmost commonly developed at the general surgery clinic (62.5%) and within the first eight hours (68.8%). Table 3 shows the comparison of patients' preoperative features and nausea-vomiting status. According to the table 4, PONV were more often observed in women (50%), weak (75%) and obese (66.7%) patients, smokers (47.1%), non-alcohol users (47.5%), no previous surgery experience (56.7%), those who did not receive preoperative antiemetic (46.3%), oxygen treatment (50%) and those to whom sedatives were applied (50%). Also, the age average, duration of preoperative hospital stay, duration of hunger and anxiety points were higher in these patients (PONV) ($p>0.05$). In the patients with constant medicine use history, nausea and vomiting developed in a lower ratio (33.3%) ($p=0.005$). When an evaluation was made according to the type of constantly used medicines, for the development of nausea and vomiting, only the patients who used proton pump inhibitors had a significant rate of lower nausea and vomiting ($p=0.009$) (Table 3).

Postoperative nausea-vomiting were more seen in patients who had undergonesurgical operations with closed technique (71.4%), spinal anesthesia (58.8%), and lower abdominal surgical operation (51.2%). Duration of surgery (average 2.83 hours) patients' with PONV were longer and were not used oxygen treatment during operation (56.2%) ($p>0.05$)(Table 4). Postoperative nausea-vomiting was more observed in patients who were given antiemetic drugs (48.7%), diclofenac sodium (58.8%) as analgesic drug and oxygen therapy (50%)during postoperative period ($p>0.05$). Also, the postoperative hunger duration was longer and the pain points were lower in these patients (PONV) ($p>0.05$) (Table 5).

Table 3. Comparison of PreoperativeFeaturesandNauseaVomitingStatus

	Nausea Vomiting Observed (n=48)		Nausea Vomiting Not Observed (n=56)		p
	n	%	n	%	
Gender					
Man	17	40.5	25	59.5	0.33
Woman	31	50.0	31	50.0	
Body Mass Index					
Weak	3	75	1	25	
Normal	16	47.1	18	52.9	0.57
Overweight	12	40	18	60	
Fat	13	43.3	17	56.7	
Obese	4	66.7	2	33.3	
Smoker					
Yes	16	47.1	18	52.9	0.89
No	32	45.7	38	54.3	
Alcohol User					
Yes	1	20.0	4	80.0	0.37
No	47	47.5	52	52.5	
Continuous medicine usage					
Yes	16	33.3	34	60.7	**0.005***
No	32	59.3	22	40.7	
Previous surgery history					
Yes	31	41.9	43	58.1	0.17
No	17	56.7	13	43.3	
Antiemetic treatment					
Yes	10	45.5	12	54.5	0.94
No	38	46.3	44	53.7	
Sedative treatment					
Yes	18	50	18	50	0.56
No	30	44.1	38	55.9	
	X+SD		***X+SD***		**p**
Age	55.97 ± 16.42		51.08 ± 14.35		0.10
Duration of hospital stay (day)	2.70 ± 2.53		2.66 ± 3.63		0.93
Duration of hunger (hours)	18.62 ± 18.97		17.89 ± 23.34		0.86
Anxiety scale points	9.89 ± 10.58		8.87 ± 10.16		0.61

Table 4. Comparison of Intraoperative Features and Nausea Vomiting Status

	Nausea Vomiting Observed (n=48)		Nausea Vomiting Not Observed (n=56)		p
	N	%	n	%	
Type of Surgery					
Closed	5	71.4	2	28.6	0.24
Open	43	44.3	54	55.7	
Place of Surgery					
Head-Neck	7	36.8	12	63.2	0.36
Upper abdomen	20	45.5	24	54.5	0.90
Lower abdomen	21	52.5	19	47.5	0.30
Type of Anesthesia					
Epidural	1	33.3	2	66.7	
Spinal	10	58.8	7	41.2	0.48
General	37	44.0	47	56.0	
Oxygen therapy					
Yes	39	44.3	49	55.7	0.37
No	9	56.2	7	43.8	
	X+SD		***X+SD***		**p**
Duration of surgery (hours)	2.83±1.32		2.75±1.39		0.75

Table 5. Comparison of Postoperative Features and Nausea Vomiting Status

	Nausea Vomiting Observed (n=48)		Nausea Vomiting Not Observed (n=56)		p
	N	%	n	%	
Antiemetic treatment					
Yes	38	48.7	40	51.3	0.36
No	10	38.5	16	61.5	
Analgesic treatment					
Pethidine HCL	38	45.8	45	54.2	0.88
Tramadol hydrochloride	6	33.3	12	66.7	0.23
Diclofenac sodium	10	58.8	7	41.2	0.25
	X+SD		***X+SD***		**p**
Duration of hunger (hours)	16.58 ± 18.99		16.28 ± 15.79		0.93
Verbal rating scale points					
Postanesthesia recovery room	2.08 ± 1.41		2.14 ± 1.44		0.83
Surgery Clinic	2.02 ± 1.26		2.16 ± 1.46		0.60

DISCUSSION

Nausea-vomiting is one of the most frequently encountered complications following the local or general anesthesia. In spite of all the developments, PONV incidence is presently reported as 20-70% [1-6, 8]. In the current study, nausea and vomiting were detected at the 46.2% of the postoperative patients and mostly during the first 8 hours (68.8%). Also, while 18.8% of the patients developed nausea and vomiting in thepostanesthesiarecovery room, this rate was increased to 62.5 % in the general surgery clinic. In this study, differently Frank et al.[7] have stated that nausea and vomiting in the postanesthesiarecovery room (42%) is more observed than the clinic (29%). The result in this study is thought to be because of the frequent antiemetic drugs application in the postanesthesiarecovery room of the hospital in which the study was conducted. But this is consistent with data form the previous reports, nausea and vomiting is still observed in a high rate [3,4,13].

Preoperative Features of the Patients and Nausea Vomiting

In the current study, the rate of development of PONV in women was more than men ($p>0.05$). In many studies related to the subject, being female in gender is the most powerful risk factor related to PONV. In these studies, the presence of PONV is stated to be more than men by 1.5-3 times depending upon the role of serum gonadotropins or other hormones [4, 7, 13-15].

At present, the relation between the body mass index of the patients and postoperative nausea- vomiting has been disproved [13].In this study, similarly there have been no findings that were detected indicating obesity increases nausea-vomiting.

Smoking is one of the most important risk factors which increase complication development during operation. However, it has been found recently that cigarettes have antiemetic effects [16]. A number of researches have stated that smoking has a protective effect on postoperative nausea-vomiting being experienced and that non-smokers experience this complication significantly more often, supporting this characteristic [3,13,15,16-18]. Yet, a recent study has found that smoking status does not significantly affect development of nausea-vomiting [14,19]. In this present study, the rate of nausea- vomiting status of smokers have been detected to be higher, differentiating from the previous studies ($p>0.05$).

It has been stated that use of alcohol also has a protective effect against postoperative nausea and vomiting [20,21]. In this study, it has been observed that 20% of the alcohol users and 47.5% of the non-users experienced nausea-vomiting ($p>0.05$). This finding is similar to the findings of the studies of Ssebuufu et al. [13].

In the study, the patients who have a history of constant drug use at the preoperative period, especially those who use proton

pump inhibitors, the rate of nausea-vomiting had decreased significantly ($p<0.05$). Due to the effect of proton pump inhibitors increasing the volume and acidity of the stomach fluids and antiemetic effect, it is considered that they will reduce the pulmonary damage caused by vomiting or regurgitation and is advised to be used at the preoperative period. Yet, in the study, it has not been proven that the prophylactic use of esomeprazole reduces nausea-vomiting at the period following the operation [23].

Age has a non-linear effect on postoperative nausea-vomiting. While nausea-vomiting is at the utmost level in young adults, the incidence decreases gradually in older people [24]. In the recent study, age is accepted to be a strong risk factor in the sense of postoperative nausea-vomiting [24]. In this study, no statistically significant difference has been determined between the presence of postoperative nausea-vomiting and the ages of the patients. In the studies of Frank et al.[7], Toner et al.[19] and Doubravska et al.[18],there is no significant difference detected between age and postoperative nausea-vomiting. In the studies of Ssebufuu et al.[13], a significant decrease in the incidence of PONV has been detected only in patients between 20 and 30 years old, but there were no differences in other advanced age groups.

It has been determined that antiemetic drugs, oxygen and sedative treatments in the preoperative period have no effect in the prevention of PONV. The usage of antiemetic as prophylactic is also disputable. In the conducted studies, it has been notified that the usage of antiemetic treatment for the aim of prophylaxis is not effective when used at the patients that are not in risk of postoperative nausea-vomiting, [6,19] and the sedation obtained by opioids increase the possibility of nausea-vomiting [8].

Another factor that increases PONV frequency is the level of anxiety in the preoperative period [24]. Due to the increase of stress hormones of the patients who experience anxiety gastric motility and gastric fluid amount increase, gastric discharge is delayed and this status might accompany nausea-vomiting [8].In this study, the anxiety point of the patients who developed nausea-vomiting was found to be higher ($p>0.05$). Also in the study, nausea-vomiting were observed in the patients who did not have a previous surgical experience and those who stayed in the hospital longer at the preoperative period. This result will increase the anxiety of the patients and thus will be effective on nausea-vomiting.

Intra-operative Features and Nausea Vomiting

In this study, nausea-vomiting more developed in the patients who had undergone laparoscopic surgery(71.4%)($p>0.05$). During surgical operation performed with laparoscopic method, the gas that is being injected to the body makes a pressure in thevagus nerves which provides the connection to the nausea-vomiting center of the brain causes nausea and vomiting [25]. In a previous study,in the incidence of nausea-vomiting after cholecystectomy operation performed with open and laparoscopic methodsno significant differences were detected.

According to the results of this study, laparoscopy is not a major risk for nausea-vomiting [26].In another study, the surgical operation performed with laparoscopic method significantly increases nausea-vomiting [18].

There is a common consensus thatthe type of surgery is also an important risk factor in PONV. In studies, the ratio of nausea-vomiting in patients who had undergone gynecological,head neck surgery,and abdominalsurgery were the highest level [4,13,15,16,24,25]. Nevertheless, Apfel et al. [27] and Pierre et al. [14] have stated that the type of surgery does not have a major role in the incidence of nausea-vomiting. In the current study, nausea-vomiting were the highest rate in the patients withlower abdominal surgery (52.5%) ($p>0.05$).

In the study, nausea-vomiting were the most observed in the patients undergone surgery under spinal (58.8%) and general (44%) anesthesia ($p>0.05$). In previous studies, general anesthesia is seems as an important factor on the frequency and strength of PONV and local anesthesia has been overlooked [4,7]. Nevertheless at present, with the level of interest in local anesthesia increasing, the effect of this anesthesia on nausea-vomiting is being examined. The incidence of nausea-vomiting (20%) following the spinal anesthesia in previous study was lower than the current study[28].

It has been determined that postoperative nausea-vomiting develops at the patients of which the surgery takes a longer time (average 2.83 hours) ($p>0.05$). The duration of the operation effects postoperative nausea-vomiting incidence significantly. This has been stated as being due to more amounts of analgesics being used in operations that are longer in duration [1,7,9,24,25].

In the intraoperative period, oxygen therapy provided at high concentration (80%) is weakened effect of the nausea-vomiting related to the nitrous oxide. Oxygen therapy at high concentration is antiemetic effect [1,9,24]. In current study, similar to this information, nausea-vomiting less developed in patients who had applied oxygen ($p>0.05$).

Postoperative Features and Nausea Vomiting

As postoperative pain may delay gastric discharge, it may increase the incidence of nausea-vomiting. The most frequently used method for controlling postoperative pain is the usage of opioids. However, usage of opioid analgesics is one of the most common cause of nausea-vomitingduring the postoperative period [9,19,24-26]. In this study, the postoperative pain level of the patients did not have any effects on the nausea-vomiting ($p>0.05$). Diclofenac sodium (58.8%) which is used to provide an analgesic were increased the incidence of nausea-vomiting. Ssebuufu et al. [13], there was no a relation between pain and incidence of nausea-vomiting. In the study conducted by Imarengiaye et al. [29]nausea-vomiting had decreased at the group on which pethidinehydrochloride is used for analgesic. Thaweekul et al. [30] also stated that diclofenac sodium reduced pain of the

patients significantly but did not have any effect on nausea-vomiting.

In this study, nausea-vomiting more developed in the patients who start postoperative oral intake later than the others ($p>0.05$). It is well known that the time of starting postoperative oral intake effects postoperative nausea-vomiting [8]. Similarly, Ssebuufu et al. [13] also determined that the incident of nausea-vomiting increases as the starting of oral intake gets later.

CONCLUSION

This study has shown that being a woman in gender, being weak and obese, non-alcohol consumer, smoking, lack of application of preoperative antiemetic and oxygen treatment, anxiety, closed surgical operation, spinal anesthesia, lower abdomen surgery, long period of surgical operation, lack of application of oxygen and sedatives during operation, late start to postoperative first oral intake increases postoperative nausea-vomiting ($p>0.05$).

Conflict of Interest

No potential conflict of interest relevant to this article was reported.

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