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THE EFFICACY OF ROUTINE USE OF PREVENTION PROTOCOL FOR POSTOPERATIVE NAUSEA AND VOMITING IN PATIENTS UNDERGOING SURGERY FOR BREAST CANCER

LJILJA ŠTEFANČIĆ[1], STELA MARIĆ[1], SREĆKO LJUBIČIĆ[2] and ZVONIMIR ZORE[3]

[1]Department of Anesthesiology and ICU, [2]Department of Surgical Oncology, University Hospital for Tumors, »Sestre milosrdnice« University Hospital, Zagreb, Croatia
[2]Department of Anesthesiology and ICU, Dubrovnik General Hospital, Dubrovnik, Croatia

SUMMARY

The incidence of postoperative nausea and vomiting (PONV) exceeds 30% in patients undergoing surgery that involves general anesthesia. For its high incidence, PONV, together with postoperative pain, are amongst the most common complications following surgery under general anesthesia, resulting in increased costs of treatment, prolonged recovery and hospital stay following surgery. The occurrence of PONV is an unpleasant experience for patients, which can be additionally complicated by aspiration of gastric contents and the development of aspiration pneumonia, increased wound dehiscence which may significantly delay and render postoperative course and recovery more difficult.

In accordance with the recommended guidelines for the prevention and management of PONV, our Hospital has developed a local protocol aimed at reducing PONV and all adverse effects that can be caused by PONV. The protocol also includes therapeutic procedures in case of PONV.

The aim of this study was to assess the expected incidence of PONV using the Apfel scoring system, and the efficacy of the protocol against PONV by recording the frequency of PONV during the first 24 hours following surgery for breast cancer.

A prospective study was performed in 164 patients operated for breast cancer. Each patient was assessed for the expected incidence of PONV provided by the Apfel score and then underwent prophylaxis and therapy in accordance with the protocol. The incidence of nausea and vomiting was recorded during 24 hours postoperatively.

KEYWORDS: *postoperative nausea and vomiting (PONV), protocol, Apfel score*

UČINKOVITOST RUTINSKE PRIMJENE PROTOKOLA ZA PREVENCIJU POSLIJEOPERACIJSKE MUČNINE I POVRAĆANJA U BOLESNICA PODVRGNUTIM OPERACIJAMA RADI TUMORA DOJKE

SAŽETAK

Pojavnost poslijeoperacijske mučnine i povraćanja (PONV) je veća i od 30% u bolesnika podvrgnutih općoj anesteziji tijekom operacijskog zahvata. Radi visoke učestalosti PONV je, uz poslijeoperacijsku bol, najčešća komplikacija nakon operacija u općoj anesteziji, a ima za posljedicu povećanje troškova liječenja, produljenje oporavka i hospitalizacije nakon operacijskog zahvata. Pojava PONV- a je za bolesnika vrlo neugodan doživljaj koji se može dodatno komplicirati aspiracijom želučanog sadržaja i razvojem aspracijske pneumonije, dehiscijencijom rane čime se mogu značajno produljiti i otežati poslijeoperacijski tijek i oporavak.

U skladu s preporukama za sprečavanje i liječenje PONV-a u našoj smo Klinici sastavili protokol postupaka u svrhu umanjenja pojavnosti PONV-a i svih neželjenih pojava koje mogu biti njegova posljedica. Terapijski postupci u slučaju njegove pojave također su uključeni u protokol.

Svrha ove studije je procjena očekivane pojavnosti PONV-a koristeći Apfelov model predviđanja, kao i učinkovitosti protokola za prevenciju PONV-a bilježeći učestalost tijekom prvih 24 sata nakon operacijskog zahvata u bolesnica koje su operirane radi tumora dojke.

Provedeno je prospektivno istraživanje na 164 bolesnice koje su operirane radi zloćudnog tumora dojke. Svakoj bolesnici procijenjena je očekivana pojavnost PONV-a Apfelovim bodovnim zbrojem i potom su provedeni preventivni i terapijski postupci u skladu sa protokolom. Tijekom 24 sata bilježena je pojavnost mučnine ili povraćanja.

KLJUČNE RIJEČI: *poslijeoperacijska mučnina i povraćanje (PONV), protokol, Apfelov bodovni zbroj*

INTRODUCTION

Postoperative nausea and vomiting (PONV), together with pain, are the most common complications in the immediate postoperative period occurring in about 30% of all patients undergoing surgery under general anesthesia, including also ambulatory surgery patients admitted to day surgery units. PONV is a limiting factor in the early discharge of surgery patients resulting in prolonged hospital stays and increased health care costs. Equally important elements of PONV are patient discomfort and exhaustion, and aspiration of gastric contents with subsequent pneumonia which may seriously jeopardize patient safety. The incidence of PONV in high risk patients can be as frequent as 80%.

Reduction in the incidence of postoperative nausea and vomiting implies a set of procedures aimed at adjusting anesthetic and surgical techniques, and the choice of type of postoperative pain management in accordance to patient's general health status, patient's tendency to develop PONV symptoms and type of surgery to be implemented.

The protocol developed in the University Hospital for Tumors in Zagreb, Croatia complies with both guidelines for the prevention and treatment of postoperative nausea and vomiting updated in 2004 (2) and the protocol of the Society for Ambulatory Anesthesia (SAMBA) published in 2007. It includes a number of procedures to ensure a multimodal approach to the prevention and management of PONV within 24 hours after surgery divided into the following five groups:

1. Risk assessment of PONV (Apfel score)
2. Risk reduction procedures
3. Administration of antiemetics in the prevention of PONV
4. Treatment of PONV
5. Treatment of postoperative pain

The aim of this study is to assess the efficacy of the protocol for the prevention of postoperative nausea and vomiting by comparing the PONV incidence after the protocol implementation with the PONV risk as assessed by the Apfel scoring system (1) in patients over 55 years of age undergoing surgery for breast cancer under balanced endotracheal anesthesia.

METHODS

A prospective study was performed in 164 patients having undergone surgery for breast cancer. Based upon the American Society of Anesthesiologists (ASA) physical status classification system, all the patients included in the study were classified as ASA class I-III. The mean patient age was 59.56 years.

During the preoperative anesthesia interview, the numeric value of the Apfel score was calculated in all patients (Table 1) who were then divided in 3 groups with regard to their potential risk of developing PONV (Table 2). In accordance with the protocol, the patients underwent procedures for PONV prevention.

Table 1.

Apfel score	
Characteristics	Points
Female sex	1
History of motion sickness or postoperative nausea and vomiting	1
Nonsmoker	1
Postoperative opioid treatment is planned	1

Table 2.

Points and level of PONV risk	
Points/Risk level	%
0 low	10
1 low	21
2 moderate	39
3 moderate	61
4 high	78

Protocol for PONV prevention

Step 1

Identification of patients with the high probability of developing nausea and vomiting with the Apfel score (Table 1)

Step 2

Reduction of baseline risk factors for PONV:

- Premedication with midazolam at a dose of 0.1 mg/kg
- Preoperative protection of the gastric mucosa with proton pump inhibitors
- Preoxygenation for 3 min + induction to anesthesia with propofol at a dose of 1-2 mg/kg
- Ventilation of patients with air/oxygen mix during anesthesia, do not use nitrogen oxidule
- Hydration with 1000 ml of a crystalloid solution during surgery
- Omission of muscle relaxants during anesthesia
- Avoid hypotension (RR<100 to be corrected with 5-10 mg ephedrine)
- Analgesia with nonsteroidal antirheumatics with continuous administration of tramadol at a dose of 300 – 400mg/day

Step 3

Prevention of PONV by prophylactic administration of antiemetic monotherapy or combination therapy regimen depending on the estimated baseline risk for developing PONV

Low risk: dexamethasone 4 mg before the induction of anesthesia Moderate risk: dexamethasone 4 mg and thiethylperazine 6.5 mg

High risk: dexamethasone 4 mg and tropisetron 5 mg 15 min before the end of surgery.

Step 4

Treatment of PONV:

- Small doses of tropisetron (0.5 -1) in case PONV develops in spite of the prophylaxis therapy in patients who did not receive the drug in the past 6 hours
- If prevention is not enough within 6 hours of tropisetron administration, then treatment with dexamethasone, thiethylperazine, doperidol and 12.5- 25 mg prometazine is used

On the day of surgery, all patients were premedicated with midazolam at a dose of 0.1 mg/kg, and those who reported chronic inflammation of the stomach lining also received protective treatment with a proton pump inhibitor.

Upon arrival to the operating room, a venous line was placed and PONV therapy according to the protocol started. After the placement of the system for monitoring cardiac and respiratory function, the induction of anesthesia was performed with propofol at a dose of 1 – 1.5 mg /kg TT and 2 -3 mg of midazolam. Anesthesia was further maintained with fentanyl and sevoflurane. During anesthesia, an air/oxygen mixture (FIO2 0.5) was used (5).

All patients were monitored for nausea and vomiting during the 24 hour postoperative period. The incidence of PONV was recorded within the specified time intervals: 0-2, 2-6, 6-12, 12-18, and 18- 24 hours after surgery.

RESULTS

The probability of PONV was assessed using the Apfel score. Mean Apfel score values, body mass index (BMI), age, ASA status and anesthesia duration are shown in Table 3.

Table 3.

Median age	59.56 years
Median ASA status	2.2
Median anesthesia duration	77.6 min
Median BMI	27.6
Median Apfel score	2.37

In the study group, 43 patients had a history of previous surgery, and after surgery, 19 (44.18%) reported nausea and vomiting as a complication in their early postoperative period (Table 4), which reflected the average expected incidence calculated by the Apfel score (2.37).

Table 4.

INCIDENCE OF PONV AFTER A PREVIOUS SURGERY

Previous surgery	43
No PONV	24 (55.81%)
PONV	19 (44.18%)

The use of our protocol in the study group resulted in the incidence of PONV of 9.76%, .i.e. vomiting, nausea or both occurred in 16 of total 164 patients (Table 5).

Table 5.

Total incidence of PONV	16/164 (9.76%)
PONV 0-2 h	6 /164 (3.65%)
PONV 2-6 h	6/164 (3.65%)
PONV 6-24 h	4/164 (2.43%)

Among patients who developed PONV, the incidence of so-called early nausea and vomiting was significantly higher, which can be ascribed to intraoperative use of inhaled anesthetics (Table 6). PONV occurring within 6 hours after surgery was developed by 75% of patients, i.e. by 12 out of 16 patients.

Table 6.

PONV 0-2 h	6/16 37.5%
PONV 2-6 h	6/16 37.5%
PONV 6-24 h	4/16 25%

Only one of the patients, despite additional therapy, still felt the symptoms of nausea accompanied with vomiting (on three occasions) up to 18 hours after surgery. After administration of additional therapy, all other patients felt no symptoms at all.

In the group with early PONV, 6/16 patients developed nausea and vomiting immediately after surgery or up to two hours following the procedure.

Only 12 of total 164 patients received tropisetron (7.3%) while in 4, the administered combination of thiethylperazine 6.25 mg and 4 mg dexamethasone produced a satisfactory effect.

All patients received therapy for postoperative pain which had been started in the operating room using postoperative techniques of continuous intravenous analgesia (NSAID) combined with continuous tramadol infusion.

DISCUSSION

From studies by other authors it is known that the use of guidelines for PONV prevention significantly reduces the incidence of this adverse effect in the postoperative period (3). A multimodal approach to prevent postoperative nausea and vomiting includes the identification of patients at high risk for PONV, pretreatment in perioperative course, prophylactic antiemetic therapy administration (4), as well as the choice of anesthetic technique and postoperative analgesia.

The results of the present study show the expected incidence of PONV, according to the mean of the Apfel score value of 2.37, was 40% in our patients, which tends to be somewhat higher than the expected incidence quoted in the literature, especially when taking into consideration such a homogenous group of patients aged over 50, for whom the expected incidence of PONV is lower. A possible explanation for this higher figure may be a relatively high share of patients who had experienced PONV after a previous surgery (19/164).

The present study shows that the expected incidence of PONV calculated by the Apfel score in all patients slightly exceeds 40%, and this complies with the mean incidence of PONV in previously operated patients and also confirms its predictive value. In our study, the incidence of PONV was 9.76% (16/164) and 4 times lower than both the expected incidence and incidence of PONV in previously operated patients (44%).

According to the results of this study, of 16 patients who experienced PONV twelve developed the symptoms within 6 hours after surgery, or in the early postoperative period, which can be related to the administration of inhalational anesthetic agents. I the remaining 4 patients, PONV occurred in the late postoperative period, and its occurrence can be related to the administration of opioid analgesics, which shows that inhalational anesthetics have a stronger emetic effect than opioid analgesics.

CONCLUSION

The use of the protocol for the prevention of PONV significantly reduced its incidence in the postoperative recovery period of patients undergoing surgery for breast cancer.

Anamnestic data about the PONV incidence after previous surgery confirm the predictive value of the Apfel score in everyday practice.

The significant reduction in the occurrence of PONV obtained by the use of the protocol against PONV justifies its further use. A high share of patients with early postoperative vomiting resulting from inhalational anesthesia suggests the need to use either total intravenous anesthesia (TIVA) (6) or regional anesthesia techniques – i.e. paravertebral block.

However, taking into consideration that balanced anesthesia with inhalational anesthetics is a most commonly used anesthesia technique, further research on the relationship between volatile anesthetics and the occurrence of PONV is required.

Good postoperative analgesia is an important part of the strategy for preventing nausea and vomiting. Besides adequate analgesia, the choice of continuous techniques for pain management, as defined in our protocol, resulted also in a low incidence of late PONV for which the administration of opioid analgesics is a responsible factor.

Regional anesthesia techniques, total intravenous anesthesia (TIVA) as well as the use of alternative analgesics in the early postoperative period (clonidine, magnesium, ketamine, local anesthetics) should be included in the protocol for patients at a very high risk to develop postoperative nausea and vomiting (7). With inclusion of these techniques in the protocol, its efficacy will be improved and the incidence of this unpleasant complication reduced.

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Author's address: Ljilja Štefančić, M.D., Department of Anesthesiology and ICU, University Hospital for Tumors, Sestre milosrdnice University Hospital Center, Ilica 197, 10000 Zagreb, Croatia