MINI-REVIEW

Prevention of Nausea and Vomiting: Methods and Utility after Surgery in Cancer Patients?

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Abstract

Most cancer patients experience nausea and vomiting after surgery. Today, many methods of treatment have been developed and used for the control of such symptoms. The most important are drug therapy, relaxation, oxygen therapy and gas therapy. In addition, dexamethasone, massage therapy and using a Venturi mask have also proven effective. Due to the nature of gas consumption which leads to nausea it is recommended that use of N2O in the operating room be avoided or applied in combination with oxygen or other gases with fewer complications.

Keywords: Cancer surgery - nausea - vomiting - control measures - oxygen - relaxation - N2O

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Introduction

Cancer has increased dramatically in developed as well as developing countries. Unfortunately most of cancer patients need to surgery and the most common and annoying problems after surgery is nausea and vomiting (PONV) (Gan , 2006;Korjuo et al., 2010). Despite the treatment with antiemetic drugs which occurred in 20-70% cases (Habib, 2004). PONV has been so annoying for cancer patients that could prevent them from continuing treatment. Also significant cost a lot due to need for a long hospitalization of the patient, that economically it was costly for society (Gan, 2006). This condition depended on the type of cancers and surgery could be more common, to treat the cancer.

Among the known side effects of nausea and vomiting were: dehydration, electrolyte imbalance, Stretch stitches and opening it, venous hypertension, bleeding and rarely, esophageal perforation (Rowbotham, 2005; Gan, 2006). Aaround the world, many studies have been done for the prevention and treatment of PONV but still no effective and specific performance is available in this area. (Bhatnagar et al., 2005).

One of the factors that exists in contribute to the increased incidence of nausea and vomiting after surgery was the stimulation increasing of vag more than expected because of sympathetic inhibition.Drop in blood pressure , Additives such as vascular contractile, neostigmine and epioeds to anesthetic agent were the other important factors that increases the chance of nausea and vomiting. Drop in blood pressure caused brainstem ischemia which led to stimulation of the vomiting center in the brain stem. Drop in blood pressure also caused of intestinal ischemia and the release of substances causing nausea Such as serotonin. The use of high concentrations of oxygen with brainstem ischemia and intestines could cause in decreasing nausea and vomiting with mechanism which has been mentioned (Bhatnagar et al., 2005).

Recently, many treatment methods have been developed and used for the control of post operation nausea and vomiting in cancer patients. The aim of the present study was to review methods of reduce post operation nausea and vomiting in cancer patients.

Effects of Relaxation on Post Operation of Nausea and Vomiting in Cancer Patients

So far a lot of studies and considerable research have been done in order to find more suitable ways to control nausea which caused by surgery in cancer patients. The appropriate method was the use of antiemetic for nausea and vomiting. But these drugs, depending on the type of cancer and needed surgery, were not effective for all patients and often cause unpleasant side effects. In recent decades relaxation therapies have devoted special attention for post operation nausea and vomiting in cancer patients.

In studies that have tested the effect of massage therapy for post operation, nausea and vomiting in cancer patients has showed that massage therapy which has had magical effect in reducing nausea and vomiting (Ratehanon 2011; Kearney, 2012; Kim, 2013). The foot and hand massage for 7 days after surgery has reduced till 30% of nausea and vomiting of cancer patients (Hickok et al., 2012).

In a study it showed that massage therapy has reduced

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pain, discomfort, nausea, fatigue, and conversely, has caused to notice relaxation response, and life force has been increased (Lefebvre, 2005). Ten-minute foot massage led to relaxation and ultimately improves the subjective experience of pain, nausea, and decreased heart rate (Houston et al., 2004). Also the 25-minute training of relaxation by using audio tape has been effective in reducing nausea and vomiting in cancer patients (Viswanathan et al., 2006). Gentle back massages have led to relaxation, emotional health, improved appetite and reduced nausea in cancer patients (Lapoint et al., 2006). Lapoint in his study has understood that acupuncture has anti-nausea effects, but the results were not statistically significant (Brandt, 2005).

Based on the above studies, it can be stated that, depending on the type of surgery that performed in cancer patients, massage therapy has been an effective method for reducing nausea and vomiting. This method caused to reduce mental relaxation-intellectual and pain in patients with low cost and can be used as an adjunct to deal with PONV (Table 1).

Effect of Drug Therapy on Post Operation of Nausea And Vomiting in Cancer Patients

Many drugs used for prevention and treatment of PONV after surgery in cancer patients that the most important of them included antihistamines, phenothiazines, and Butyrophenone and anticholinergics. The usage of these drugs due to their effects associated with limitations (Ekangaki et al., 2005). For this reason, researchers were searching for compounds which would be more effective with fewer side effects. Generally midazolam and benzodiazepine drugs have been the most common type of drugs which used as premedication before surgery with addition to the anti-anxiolytic effect, especially they were effective drugs for nausea and vomiting in post operation in cancer patients (Ayala, 2012). The effect of midazolam premedication with injection has been demonstrated in reducing the incidence and severity of post-operative nausea and vomiting in cancer patients (Vigil et al., 2012; Canbay et al., 2013).

About the effect of betamethasone several studies have done on reducing nausea and vomiting with variety of patients such as cancer patients that we pointed out the most valid of them. (Isik, 2013) In one study it has shown that the rate of post operation nausea and vomiting in cancer patients that had received betamethasone reduced till 30% compared to control group (Dietrich et al., 2011). Oral clonidine in the supply of medicines has considered preventing of nausea and vomiting after surgery. Prescription oral clonidine1 hour before surgery for breast cancer patients has reduced the amount and severity of nausea and vomiting after the operation (Ruthstrom et al., 2012). Clonidine significantly reduced the frequency and the number of vomiting in cancer patients after surgery than metoclopramide (Coskun et al., 2013) in the comparative study of clonidine, betamethasone,

Table 1. Effects of Relaxation on Post-operation Nausea and Vomiting in Cancer Patients

Authur	Sample size	Design/population	method	Outcome
Kearney et al., 2012	114	Women with breast cancer require surgery	Case-control	Massage therapy has had a great effect in reducing nausea and vomiting in patients
Ratehanon et al., 2011	48	Men with lung cancer requiring surgery	Case-control	message therapy has been effective In reducing nausea and vomiting in cancer patients
Kim et al., 2013	90	Gastric cancer patients in different age and sex groups	Case-control	Massage therapy has effected in reducing nausea and vomiting in cancer patients
Hickok et al., 2012	120	Cancer patients over 12 years in both genders	Case-control	Foot and hand massage till 7 days after surgery has reduced nausea and vomiting till 30% for cancer patients
Houston et al., 2004	75	Cancer patients in different age groups and sex	Cease control	Ten-minute foot massage has been effective in reducing nausea and vomiting in cancer patients
Lefebvre, 2005	120	Women with breast cancer has been undergoing radiotherapy for over 20 years	Clinical trial	Massage therapy has been effective in reducing nausea
Yusrizal et al., 2006	56	Cancer patients in different groups of cancer in both sexes	Cease control	Behavioral therapies, cognitive, relaxation and visualization has not had any effect on nausea and vomiting in cancer patients
Viswanathan et al., 2006	112	Cancer patients have normal hearing in both genders	Cease control	Use relaxation techniques has been effective to reduce audio tape delayed nausea and vomiting in cancer patients
Lapoint et al., 2006	44	patients under chemotherapy over 20 years in both genders	Cease control	The use of acupuncture has not been statistically significant in patients undergoing chemotherapy antiemetic effects
Brandt et al., 2005	87	Chemotherapy in both genders in different types of cancer	Cease control	Gentle back massage to has been effective in reducing nausea in patients with cancer receiving chemotherapy

Dexamethasone has had the greatest impact in reducing nausea and vomiting in cancer patients (Harter, 2002). Although dexamethasone had antiemetic effect in patients with cancer (Nortcliffe et al., 2003; Madan et al., 2005; Chen et al., 2006; Ayala et al., 2012), the mechanism of the action have not discovered. But perhaps apply its effectiveness s by preventing central prostaglandin.

Another hypothesis has suggested these drugs by reducing the return 5HT in the central nervous system or performed this procedure by creating a barrier permeability of blood-brain to serum of proteins (Ekangaki, 2005). Although most studies of PONV have been under general anesthesia population However, in despite of other population groups also has been shown the use of dexamethasone to reduce the incidence of PONV (Wakim et al., 2006). In a case study, the effect of dexamethasone 8 mg have evaluated with placebo hysterectomy, it showed that dexamethasone decreased in the incidence of PONV with compare to the control group in this population (Marro et al., 2006). In the study of clinical trial was a randomized of PONV in women who had undergone surgery under spinal anesthesia; in both groups the dexamethasone and granisetron (Granisetron) were compared. Dexamethasone significantly has reduced immediately the incidence of PONV and 24 hours after surgery with compared to gzaniztron (Denehy et al., 2005). Finally, it can be concluded that the prescription of dexamethasone in patients with cancer dramatically has reduced the incidence of nausea and vomiting after surgery, and it did not have any specific side effect, however, in order to extend its application to other population groups, it requires further studies (Table 2).

Table 2. Impact of Drug Therapy on Post Operation Nausea and Vomiting in Cancer Patients

Authur	Sample size	Design/population	method	Outcome
Ekangaki et al., 2005	450	Cancer patients receiving chemotherapy for various age and sex groups	Case control	Antihistamines, phenothiazines, and Butyrophenone and anticholinergics PONV to deal with the complications of chemotherapy
Canbay et al., 2013	48	Cancer patients undergoing surgery with age wise &sex wise	Case control	The effect of premedication with midazolam injection have been demonstrated in reducing the incidence and severity of post operation nausea and vomiting in cancer patients
Vigil et al., 2012	14	Cancer patients undergoing surgery with age wise & sex wise	Clinical trial	Continuous infusion of midazolam was more has been effective in comparison with ondansetron for the prevention of nausea and vomiting in cancer patients
Isik et al., 2013	60	Cancer patients undergoing surgery aged 20-40 years in both sex	Case-control	Betamethasone has been effective in the prevention of nausea and vomiting in patients after surgery
Dietrich et al., 2011	42	Men with prostate cancer aged 25-70 years	Clinical trial	Postoperative nausea and vomiting in cancer patients have reduced receiving betamethasone to 30% with compared to control groups
Ruthstrom et al., 2012	54	Women with breast cancer	Clinical trial	Clonidine prescription orally 1 hour before surgery for breast cancer patients has caused to reduce the amount and severity of nausea and vomiting
Coskun et al., 2013	85	Cancer patients undergoing surgery for various age and sex groups	Case-control	Clonidine with comparison to metoclopramide has reduced the frequency of metoclopramide and the number of vomiting after surgery in cancer patients
Harter, 2002	320	Cancer patients receiving chemotherapy for various age and sex groups	Pro-spective	Dexamethasone in patients with cancer who were undergoing chemotherapy has had anti-nausea effects
Chen et al., 2006	600	candidate patients surgery with age wise & sex wise	Cease-control	Dexamethasone has decreased the amount of PONV after surgery in patients
Madan, et al., 2005	150	Cancer patients undergoing surgeryaged 14-65 years both genders	De-scrip-tive	Dexamethasone has been effective in preventing post operation nausea and vomiting in cancer patients
Nortcliffe et al., 2003	540	candidate Patients undergoing surgery for various age and sex groups	Analyti-cal	Dexamethasone alone or in combination with other compounds Anti-nausea surgery has reduced the rate of PONV among different populations
Wakim et al., 2006	1500	Dissatisfaction of patients with PONV	Cease control	to reduce the incidence of PONV has shown by using dexamethasone
Marro et al., 2006	82	Abdominal hysterectomy under epidural morphine	Clinical trial	Dexamethasone has shown significantly decreasing in the incidence of PONV compared with the control group
Denehy et al., 2005	115	Women who had undergone surgery under spinal anesthesia	Clinical trial	Dexamethasone has reduced the incidence of PONV immediately and 24 hours after surgery compared with gezaniztrone

Table 3. Effect of Oxygen Therapy on Post Operation Nausea and Vomiting in Cancer Patients

Authur	Sample size	Design/population	Method	Outcome
Lindbohm et al., 2007	84	Women with breast cancer over 30 years, requiring surgery	Case-control	The incidence of PONV has reduced by 19% oxygen
Bynner et al., 2005	95	Gastric cancer patients in different age groups and sex who need surgery	Case-control	The group that had received 80% oxygen compared with control group had 50% reduction
Purhonen et al., 2003	35	Women with breast cancer at different ages who require surgery.	Case-control	comparison between 30 and 50 percent oxygen therapy in patients with breast surgery only had a small effect on nausea and not on vomiting
Jaakkola, 2009	55	Women with cervical cancer who requires surgery in different ages	Case-control	80% inspired oxygen during and 6 hours after surgery has had significant in decreasing the incidence of nausea and vomiting than the control group.
Kreisarin et al., 2013	75	Patients with various cancers in both sexes aged over 12 years and below 70 years, who require surgery.	Case-control	80% oxygen prescription during surgery and 6 hours after surgery, has had high impact and control of nausea and vomiting in cancer patients after surgery.
Kurz et al., 2012	62	Men with lung cancer at different ages who require surgery.	Case-control	80% oxygen prescription during surgery and 6 hours after surgery, has had high impact and control of nausea and vomiting in cancer patients

Table 4. Effect of Gas on Post-Operation Nausea and Vomiting in Cancer Patients

Authur	Sample size	Design/population	method	Outcome
Stoeliting et al., 2002	570	Candidate Patients undergoing surgery with age wise & sex wise	Clinical Trial	less Nausea and vomiting in patients in halothane than isoflurane
Kumkeaw, 2005	450	Candidate Patients undergoing surgery with age wise & sex wise	Clinical Trial	less Nausea and vomiting in patients in halothane than isoflurane
Gaur et al., 2005	210	Candidate Patients undergoing surgery with age wise & sex wise	Clinical Trial	N2O did not increase the incidence of nausea and vomiting after surgery
Mathiv et al., 2006	115	Candidate Patients undergoing surgery for over 35 years in both sexes.	Clinical Trial	The combination of propofol and N2O had stressed on increasing incidence of nausea and vomiting associated with N2O
sohajil et al., 2006	75	Candidate Patients undergoing surgery with age wise & sex wise	Descriptive	N2Ohad increased incidence of nausea and vomiting but had no effect on the incidence of vomiting.
Perreault et al., 2007	120	Candidate Patients undergoing surgery with age wise & sex wise	Clinical Trial	Addition of inspired oxygen (FIO2) during surgery reduced the incidence of post operation of nausea and vomiting
Normandin et al., 2005	65	Cancer patients undergoing surgery, 20-65 years	Clinical Trial	consumption of N2O by 50 percent with oxygen and halothane MAC 1 did not increase with comparison by MAC 5/1 halothane nausea and vomiting after surgery
Toyooka, 2012	33	Candidate Patients undergoing surgery with age wise & sex wise	Case-control	Post operation of nausea and vomiting in cancer patients has been more effective than Halothane.
Koerschgen et al., 2013	72	Cancer patients undergoing surgery over 12 years in both sex groups	Case-control	Effects have not had any significant difference of enflurane than desflurane with group control in nausea and vomiting in cancer patients after surgery

Effect of Oxygen Therapy on Post Operation of Nausea and Vomiting in Cancer Patients

Today oxygen therapy for prevention of post operation of nausea and vomiting get the center of researcher's attention. And it considered in different masks with different percentages in different types of surgery diseases in order to be aware of the other possibility for patients with various disease.

Many hypotheses have been proposed about the mechanism of action of oxygen in the prevention of nausea and vomiting that the most acceptable of them

was reduction in blood pressure and ischemic bowel or intestinal manipulation which could cause to release toxic substances such as serotonin. The mechanism could be true in explaining the antiemetic effect of oxygen in surgical manipulation and pressure within the abdomen due to intestinal ischemia that may occur. Other factors have been proposed to reduce the effect of oxygen, on decreasing dopamine which caused to control of nausea and vomiting (Golfam, 2009). Studies have shown that the prescription of 80 percent oxygen during the surgery and 6 hours after surgery has reduced nausea and vomiting of after surgery in women with breast cancer, (Purhonen et al., 2003; Sinikka et al., 2003; Piper et al., 2006; Lindbohm et al., 2007). Gastric cancer, (Bynner et al., 2005) and cervical cancer (Kurz et al., 2012; Kreisarin et al., 2013). According to the studies reviewed in this section, it can be concluded that in surgery, especially in patients with cancer who were following the loss of fluid, resulting in hypotension and the other hand with open abdomen and irritable bowel, using high oxygen can led to reduce in nausea and vomiting, especially in the recovery room. Also has found that oxygen supplementation continued intermittently until 6 hours after surgery for cancer patients can caused better results depending on the type of cancer. It should be noted that in order to had a better understanding about the mechanisms of oxygen on nausea and vomiting in cancer patients, further studies have performed the different types of cancer surgery on patients in different groups (Table 3).

Effect of gas on post operation of nausea and vomiting in cancer patients

Drugs used for general anesthesia were either for intravenous induction or anesthesia, by inhalation used to maintain anesthesia. Already a gas (nitrous oxide) and four inhaled anesthetics (halothane, isoflurane, enflurane, desflurane) have been commonly presented as an inhalation anesthetic. These differences were based on their physical, chemical and pharmacological. Since, in general anesthesia central nervous system was affected. The main complaint of patients are include nausea, headache, dizziness, blurred vision, Impaired balance, and sleep disorders are mental changes, Which sometimes lasted for several days after surgery, which can decrease the activity of cancer patients and Especially activities that require alertness accuracy and completeness (Miller, 2005). In the current study we examined, the most commonly used anesthetic gases and their effects on nausea and vomiting in cancer patients.

Halothane and isoflurane were both with the same mechanism causing headaches. Although they did not make a significant difference but headaches and nausea were more common in isoflurane (Cupta et al., 2004; Wang et al., 2014).

But the duration of headache and nausea in halothane was less than isoflurane that it was a significant difference. It seems that the vascular effects, increased intracranial pressure of brain and metabolic control was more inconsistent for the use of isoflurane. Although some of the useful properties of isoflurane were higher as the more power relaxant and low irritation and activation of central nervous system and rapid induction of anesthesia in comparison with halothane; but the prevalence of headache is more in isoflurane than halothane, which can lead to complaints and dissatisfaction of patients. Halothane had fewer effects on the digestive system and increased in blood pressure and lower visceral increased ICP may explain less of nausea and vomiting that compared with using halothane than isoflurane. The amounts of post operation nausea and vomiting have reported that cancer patients under anesthesia with halothane gas were less than isoflurane (Stoeliting et al., 2002; Kumkeaw, 2005; Toyooka, 2012). In studies that determined to survey the nausea. And also in comparison study the effects of using Enflurane has named in comparison with des flora to prevent nausea and vomiting in cancer patients after surgery. These two drugs in post operation of nausea and vomiting in cancer patients were not significantly different than in the control group (Koerschgen et al., 2013). N2O did not increase incidence of post operation nausea and vomiting in cancer patients (Ulla, 2006). In another study the effects of existing in recovery has emphasized the consumption of propofol and combination of propofol and N2O on increasing incidence of nausea and vomiting induced N2O (Mathiv et al., 2006). In a study in which has concluded on the comparison of incidence of nausea and vomiting induced by intravenous and inhaled anesthetic that the N2O had increased incidence of nausea and vomiting, but has not had any effect on the incidence of vomiting (Sohajil et al., 2006; Zahrina et al., 2014).

Conclusions

In this review we had examined recent studies of drug treatment oxygen therapy, medical gases and relaxation therapies for the prevention and controlling of post operation of nausea and vomiting in cancer patients. Finally, we concluded the analysis methods as amount of relaxation methods used to prevent nausea and vomiting caused by surgery depended on the type of cancer and surgery which has had done on the body, massaging different parts of the body decrease both nausea and vomiting, and in terms of physical and mental health of patients have had The best results and also without any adverse effects. And also among existing medical methods for reducing nausea and vomiting in cancer patients, prescription of dexamethasone has reduced post operation nausea and does not have any special side effects than existing drugs. We have concluded that the use of oxygen therapy with high concentrations of oxygen could have acceptable result in the aforementioned subject, for example, 80% during operation and 6 hours after surgery in cancer patients. In discussing the effect of gas as it is possible is better to use Halothane gas and if they need assumption of N2O gas it is better to use combination of gas with a percentage of oxygen.

The conclusion of this study was as follow that the best choice for the control of nausea and vomiting in cancer patients during surgery and 6 hours after that is the use of oxygen with high concentration and also among the gases halothane and nitrok side in combination with oxygen and among the drugs dexamethasone recommend to use for

controlling nausea and vomiting after surgery in cancer patients. Due to the excellent results of using massage therapy recommend in terms of reducing the incidence of nausea and vomiting as well as a great impact on mental health patients at certain hours of the day either before surgery or after surgery, depending on the type of cancer and surgery.

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