

The impact of postoperative nausea and vomiting on the practice of day surgery for Chinese women with breast diseases

H.K. Choi ^a, Louis W.C. Chow ^{a,*}, L.C. Goh ^b, S.L. Tsui ^c, Francis C.W. Lee ^a

^a Department of Surgery, University of Hong Kong Medical Centre, Tung Wah Hospital, Hong Kong

^b Department of Anaesthesia, Tung Wah Hospital, Hong Kong

^c Department of Anaesthesia, Queen Mary Hospital, Pokfulam, Hong Kong

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Abstract

Background: Day surgery for breast disease is becoming popular but a key limiting factor of success is the development of postoperative nausea and vomiting (PONV). **Methods:** A prospective study of PONV was conducted on 62 patients undergoing breast surgery under general anaesthesia. Lumpectomy was performed in 40 patients. The other 22 patients underwent major breast operations including modified radical mastectomy and wide local excision and axillary dissection. A total of 10 mg of metoclopramide was injected intravenously on induction of anaesthesia and oral metoclopramide was prescribed as required to treat PONV. **Results:** PONV occurred in six (15%) and 14 (63.6%) patients undergoing minor and major operations respectively. The onset of PONV occurred earlier following minor than major operations. Eleven patients required antiemetics. Univariate analysis showed that the incidence and the first onset of PONV was significantly associated with major breast operation and duration of operation. Multiple regression analysis demonstrated that duration of operation was the only independent factor that affects the rate of PONV. However, the onset of nausea was associated with major surgery and the onset of vomiting with the duration of the operation. Patients with minor breast surgery were all discharged on the day of surgery. None of the six patients with PONV required readmission. **Conclusion:** Minor breast surgery can be readily performed as a day case. More effective antiemetic measures against PONV may be required in major breast surgery. © 2001 Elsevier Science B.V. All rights reserved.

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1. Introduction

The most common and distressing symptoms following surgery are pain and emetic problems. Pain causes the greater amount of suffering, particularly after major surgery. However, in some instances nausea and vomiting may be more distressing especially after minor surgery. Persistent nausea and vomiting may result in dehydration, electrolyte imbalance, tension on suture lines, venous hypertension and increased bleeding under skin flaps. There is also an increased risk of pulmonary aspiration of vomitus if airway reflexes are depressed from the residual effects of anaesthetic drugs.

It is evident that postoperative nausea and vomiting

(PONV) is affected by multiple factors. The incidence of PONV increases with the duration of operations [1–3]. PONV is more common in paediatric patients than in adults with a peak incidence in the preadolescent group (11–14 years). PONV in adult females is approximately two to three times more common than that in adult males. There is a positive correlation between body weight and PONV. Patients with a high level of preoperative anxiety and those with a history of vomiting after previous operations or motion sickness are at increased risk of developing emetic symptoms [1–3]. The incidence of PONV is also influenced by the type of surgical procedure, irrespective of the anaesthetic technique used. Certain operations are associated with a greater frequency of postoperative emesis, for example, intra-abdominal surgery, ear surgery, head and neck surgery, strabismus surgery and orchidopexy [1–3].

* Corresponding author. Department of Surgery, University of Hong Kong, Queen Mary Hospital, Pokfulam, Hong Kong. Fax: +852-28176904.

The impact of PONV on the practice of day surgery is great. PONV may also have important economic implications especially when intractable vomiting leads to hospitalisation. Although the problem could be reduced with the modification of anaesthetic techniques, patients may still have PONV when surgery is performed under heavy sedation. Minor breast surgery like lumpectomy is readily performed as day surgery using the modified technique. The acceptance of such practice has prompted surgeons to perform major breast surgery as day cases as well. The relationship between breast surgery and PONV has rarely been studied. We report a prospective study on the incidence of PONV after major and minor breast surgery and examine whether PONV would limit the practice of day surgery for breast disease.

2. Patients and methods

This study was carried out on 62 patients who had breast surgery performed under general anaesthesia. All the patients were female aged between 18 and 66 years and the mean age was 40. A total of 40 of them underwent minor breast surgery, namely excision of a breast lump. The other 22 patients had major operations including modified radical mastectomy and wide local excision and axillary dissection.

In all cases, induction of general anaesthesia was performed with thiopentone. Anaesthesia was maintained with nitrous oxide and isoflurane. Postoperative analgesia was provided by dologesic and intramuscular demerol. A standard antiemetic regimen of intravenous metoclopramide 10 mg injected prophylactically during induction was used for all patients. Duration of each operation was recorded.

Postoperatively, the incidence of nausea and vomiting were recorded every four hours. Vomiting is defined as a forceful expulsion of gastric contents via the mouth and nausea an unpleasant but not painful sensation referred to the pharynx and upper abdomen, associated with a desire to vomit or feeling that vomiting is imminent [4]. Patients with nausea or vomiting were treated with oral metoclopramide. The amount of metoclopramide taken and length of postoperative hospital stay of each patient were recorded.

2.1. Statistical analysis

Statistical analysis was performed by using the SPSS statistical package program (SPSS, Los Angeles, California). The relationship between PONV and different variables was analyzed by using independent sample *t*-test and Pearson correlation test. Multiple regression analysis was adopted to identify independent variables which affect postoperative nausea and vomiting. A

P-value of 0.05 or less was considered statistically significant.

3. Results

Postoperative nausea and/or vomiting occurred in 20 patients. Fourteen patients had up to four episodes of nausea and 18 patients up to four episodes of vomiting. A total of 11 patients required metoclopramide to control the symptoms. Seven of them required 10 mg and the other four patients required 20 mg.

Six patients who underwent minor breast operations developed nausea and/or vomiting which occurred in 14 patients following major breast surgery performed (Fig. 1). By using independent sample *t*-test, the incidence of PONV was found to be significantly higher after major than minor breast operations (*t*-value = 3.51; *P* = 0.01).

Patients undergoing minor surgery were younger. The mean age was 37.4 (S.E. 1.9) years for patients undergoing minor surgery whereas the figure was 46.1 (S.E. 2.6) years for major surgery. The difference was statistically significant (*t*-value, 2.68; *P* = 0.01). However, when analysis was performed correlating PONV with age, no statistical correlation was demonstrated.

The duration of operations ranged from 10 to 150 min. All minor breast operations were finished within 45 min with a mean of 24 min. The major breast operations took 60–150 min with a mean duration of 98 min. The relationship between the incidence of PONV and duration of operation is shown in Fig. 2. The occurrence of PONV correlated significantly with duration of operations (correlation coefficient, 0.48; *P* < 0.01).

The onset of symptoms occurred shortly after operation in all cases, with earlier onset after minor surgery. The mean time of onset of nausea for minor and major surgery was 0.03 (S.E. 0.003) and 1.22 (S.E. 0.54) h, respectively. The difference was statistically significant (*t*-value, 2.18; *P* = 0.04). The onset of vomiting fol-

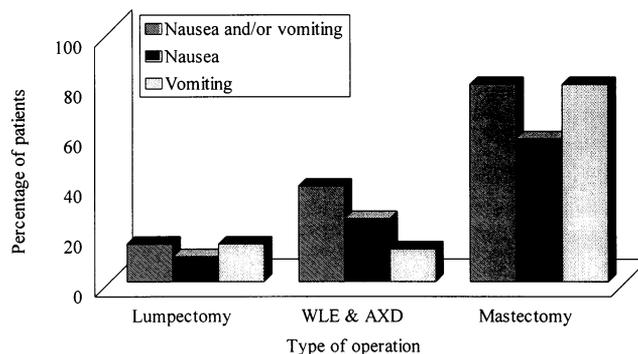


Fig. 1. The relationship between nausea and/or vomiting and type of operation.

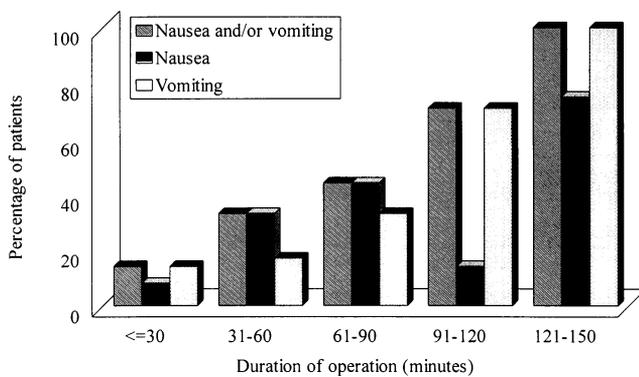


Fig. 2. The relationship between nausea and/or vomiting and duration of operation.

lowed a similar pattern. The mean time of onset of vomiting for the corresponding groups was 0.31 (S.E. 0.18) and 3.42 (S.E. 1.2) h, respectively. The difference was also statistically significant (t -value, 2.54; $P = 0.019$). The influence of the duration of operation on the onset of symptoms was also studied. There was a significant positive correlation of duration with the first onset of nausea (correlation coefficient, 0.30; $P = 0.025$) and vomiting (correlation coefficient, 0.36; $P = 0.007$).

PONV settled faster after minor than major surgery. The duration of symptoms for minor and major surgery was 5.7 (S.E. 0.41) and 8.4 (S.E. 0.72) h, respectively. The difference was statistically significant (t -value, 3.3; $P = 0.03$). All patients with minor breast operations performed could be discharged on the day of operation. None of these patients required readmission.

Multiple regression analysis was carried out on factors significantly associated with the occurrence of PONV. It was confirmed that duration of operation was the only independent factor that determined postoperative nausea ($B = 0.02$; $P = 0.014$) and vomiting ($B = 0.03$, $P = 0.019$). With regards to the first onset of symptoms, regression analysis showed that major surgery was significantly associated with nausea ($B = 1.25$; $P = 0.01$) and duration of operation was the significant factor for vomiting ($B = 0.30$; $P = 0.01$).

4. Discussion

This study showed that the duration of operation is the only independent factor that affects the incidence of postoperative nausea and vomiting. Similar findings have been demonstrated by other investigators. Bellville reported an almost three fold greater incidence of postoperative nausea and vomiting after surgery in parallel with an increase in the duration of operation [5]. The relationship between duration of surgery and PONV is not easily explained. Increased effects of anaesthetic drugs after prolonged operation may contribute to the

increased incidence of PONV. Several mechanisms have been suggested to explain why anaesthetic agent causes postoperative emesis. Anaesthetic drugs may stimulate the sympathetic nervous system and increase the amount of circulatory catecholamines. Emesis then occurs due to the direct effect of catecholamines on the chemoreceptor trigger zone in the area postrema [4].

PONV may also occur because of the action of anaesthetic drugs on the antiemetic centre. This area of the brain stem inhibits the emetic centre and prevents emesis when it is active. It is possible that PONV occurs because the antiemetic centre is very sensitive to the depressant effects of anaesthetics and is slow to recover its tonic activity in the postoperative period. Thus PONV may result from both a direct emetic effect of the anaesthetics and an indirect effect of prolonged inhibition of the antiemetic centre [4].

Anaesthetics may disrupt mucosal enterochromaffin cells of the gastrointestinal tract and induce release of 5HT resulting in afferent vagal firing and initiation of the vomiting reflex. 5HT itself is also an important neurotransmitter which activates the emetic centre in the brain stem. There is considerable evidence that some anaesthetics increase the synthesis of 5HT [4,6].

The endocrine effects of anaesthetic drugs are complex. Anaesthetics may increase the production of a number of peptide hormones, including angiotensin II, gastrin, neurotensin and somatostatin, which have been shown to induce emesis [4]. They may also cause suppression of gastric and small intestinal motility and thus inducing PONV. The vasodilatory effects of anaesthetics on cerebral blood vessels may result in an increase in intracranial pressure. Such disturbance could contribute to PONV.

Rising hospital costs have focused attention on limiting the length of stay of postoperative patients. Increasing numbers of surgical operations have been performed as day cases since 1970. Splinter has recently shown that the incidence of unanticipated admission after day case surgery was ~1%; 18% of these admissions were due to nausea and vomiting [7]. It is apparent that PONV is still a problem for day case surgery. The minor breast surgery in our study was performed on a day basis. Five of the 40 patients experienced one episode and one patient two episodes of vomiting postoperatively. The results of our antiemetic regimen (i.e. prophylactic intravenous metoclopramide on induction of anaesthesia and postoperative oral metoclopramide for control of nausea and vomiting) seem satisfactory as none of the patients in this group required readmission.

For major breast surgery, studies have shown that the postoperative morbidity rate following mastectomy was not increased with significantly shortened hospital stay. The incidence of complications such as wound infection and seroma formation was not increased even

in patients discharged before removal of drains successful. Reduction in hospital stay of three to six days after major breast operations have been reported with success [8–11]. A substantial reduction in hospital costs could be achieved without the expense of increased patient morbidity [9,10]. If the strategy for minor breast surgery is applied, it is apparent that the only limiting factor to perform major breast operations as day cases is PONV. For the group of 22 patients who had major breast operations performed, 14 out of the 22 patients had postoperative nausea and/or vomiting. Only one third of patients were free from emetic symptoms. The efficacy of the standard antiemetic regimen was obviously unsatisfactory, if these cases are to be performed as day surgery. Modification of this antiemetic regimen or the use of more potent antiemetic drugs may allow major breast operations to be carried out as day cases, when PONV is better controlled.

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