Prediction of Postoperative Vomiting in Patients undergoing General Anesthesia for Gynecologic Laparoscopic Surgery

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Postoperative nausea and vomiting (PONV) so-called „big little problem" is a common and distressing adverse events after surgery and despite new anesthetics and advances in anesthetic practice an overall incidence after general anesthesia still remain about 25-30%. Nausea and vomiting often come together but may occur on their own. The etiology of PONV is multifactorial, including patients, anesthetic and surgical factors. Patient-related independent predictors are as follows: female gender, non smoking status, history of (h/o) PONV, h/o motion sickness (MS) or h/o migraine, age, anxiety. Anesthesia-related independent predictors are: preoperative, intraoperative and postoperative opioids, propofol and inhaled anesthetics, nitrous oxide, duration of anesthesia. Most types of surgery are not independent predictors with exceptions such as laparoscopic cholecystectomy and hysterectomy as well as strabismus surgery in children. Gynecologic laparoscopic surgery may have higher incidence of PONV compared to other surgeries especially with no PONV prophylaxis while incidence may be as high as 80% suggesting that additional predictors may be involved. The administration of prophylactic antiemetics, either alone or in combination, has been shown to reduce PONV. However, pharmacological prophylaxis does not eliminate PONV completely, increases the costs and the risk of side effects. Our hospital policy is not to use antiemetic prophylaxis routinely. Reducing baseline risk has been recommended as an effective strategy, including using specific approach to patient as well as anesthetic techniques that minimize the risk of PONV. We investigated the effect of menstrual cycle phase at the time of surgery on PONV and found that scheduling patients during the luteal phase may decrease the risk after gynecological laparoscopy. Our recently published study demonstrates that nitrous oxide, when administered with oxygen and volatile anesthetic sevoflurane, increases the incidence of postoperative nausea after gynecological laparoscopic surgery. This preliminary finding indicates that nitrous oxide may increase PONV in a dose-dependent fashion. Further, our study recently accepted for publication demonstrates that intraoperative different inspired oxygen fractions (FIO_2) of 0.8 and 0.5 when compared with standard FIO_2 of 0.3 does not prevent PONV but intraoperative FIO_2 of 0.8 has beneficial effect on vomiting during the first two hours after general anesthesia for gynecological laparoscopic surgery.

High risk patients can be identified before anesthesia using prediction model for PONV. Predictive models combine predictors of outcome and the relative weights of these predictors to calculate the risk of the outcome for each patient. There are only two predictive models for postoperative vomiting (POV) in adults. Koivuranta and colleagues developed a simplified predictive model based on logistic regression analysis with five strongest independent predictors: female gender, previous PONV, duration of surgery over 60 minutes, history of motion sickness, and nonsmoking. When 0, 1, 2, 3, 4 or 5 predictors were present the risk for POV was 7%, 7%, 17%, 25%, 38%, and 61%. Apfel and colleagues calculated the risk for postoperative vomiting according the formula

POV= 1/(1+exp(-z)), z = 1,28 x (gender) – 0,029 x (age) – 0,74 x (smoking) + 0,63 x (h/o POV or MS) + 0,26 x (duration) – 0,92. Female gender, young age, non-smoking, h/o POV or MS, and high duration of anesthesia were independent predictors. The predictive accuracy and generalizability of these predictive models is limited. Model calibration can be influenced by the outcome incidence of the population in which the model is studied. Model discrimination is influenced by the heterogeneity (distribution of predictor values) of the population in which the model is applied.

For further research it is necessary to explore possible interactions and relationships among variables in order to refine and improve PONV predictive model.