Rev Bras Anestesiol. 2016;66(1):12–18

REVISTA BRASILEIRA DE ANESTESIOLOGIA
Official Publication of the Brazilian Society of Anesthesiology
www.sba.com.br

SCIENTIFIC ARTICLE

Effects of a novel method of anesthesia combining propofol and volatile anesthesia on the incidence of postoperative nausea and vomiting in patients undergoing laparoscopic gynecological surgery☆

Hiroaki Kawano*, **Naohiro Ohshita, Kimiko Katome, Takako Kadota, Michiko Kinoshita, Yayoi Matsuoka, Yasuo M. Tsutsumi, Shinji Kawahito, Katsuya Tanaka, Shuzo Oshita**

Department of Anesthesiology, Tokushima University Hospital, Tokushima, Japan

Received 20 May 2014; accepted 3 July 2014
Available online 30 October 2014

KEYWORDS
Postoperative nausea and vomiting;
Propofol;
Sevoflurane;
General anesthesia;
Laparoscopy

Abstract
Background: We investigated the effects of a novel method of anesthesia combining propofol and volatile anesthesia on the incidence of postoperative nausea and vomiting in patients undergoing laparoscopic gynecological surgery.
Methods: Patients were randomly divided into three groups: those maintained with sevoflurane (Group S, $n = 42$), propofol (Group P, $n = 42$), or combined propofol and sevoflurane (Group PS, $n = 42$). We assessed complete response (no postoperative nausea and vomiting and no rescue antiemetic use), incidence of nausea and vomiting, nausea severity score, vomiting frequency, rescue antiemetic use, and postoperative pain at 2 and 24 h after surgery.
Results: The number of patients who exhibited a complete response was greater in Groups P and PS than in Group S at 0–2 h (74%, 76% and 43%, respectively, $p = 0.001$) and 0–24 h (71%, 76% and 38%, respectively, $p < 0.0005$). The incidence of nausea at 0–2 h (Group S = 57%, Group P = 26% and Group PS = 21%, $p = 0.001$) and 0–24 h (Group S = 62%, Group P = 29% and Group PS = 21%, $p < 0.0005$) was also significantly different among groups. However, there were no significant differences among groups in the incidence or frequency of vomiting or rescue antiemetic use at 0–24 h.
Conclusion: Combined propofol and volatile anesthesia during laparoscopic gynecological surgery effectively decreases the incidence of postoperative nausea. We term this novel method of anesthesia ''combined intravenous-volatile anesthesia (CIVA)''.

☆ Presented in part at the 57th Annual Meeting of the Japanese Society of Anesthesiologists, Fukuoka, Japan, 3-5 June 2010.
* Corresponding author. Present address: Department of Anesthesiology, Tokushima Prefectural Central Hospital, Tokushima, Japan.
E-mail: hir.kawano@gmail.com (H. Kawano).

http://dx.doi.org/10.1016/j.bjane.2014.07.005

PALAVRAS-CHAVE
Náusea e vômito pós-operatórios;
Propofol;
Sevoflurano;
Anestesia geral;
Laparoscopia

Efeitos de um novo método de anestesia combinando propofol e anestesia volátil sobre a incidência de náusea e vômito no pós-operatório em pacientes submetidas à laparoscopia ginecológica

Resumo
Justificativa: Investigamos os efeitos de um novo método de anestesia, combinando propofol e anestesia volátil, sobre a incidência de náusea e vômito no período pós-operatório de pacientes submetidas à laparoscopia ginecológica.
Métodos: As pacientes foram randomicamente divididas em três grupos: manutenção com sevoflurano (Grupo S, n = 42), com propofol (Grupo P, n = 42) ou com a combinação de propofol e sevoflurano (Grupo PS, n = 42). Avaliamos as respostas completas (sem náusea e vômito no pós-operatório e sem uso de antiemético de resgate), incidência de náusea e vômito, escore de gravidade da náusea, freqüência de vômitos, uso de antiemético de resgate e dor no pós-operatório em 2 e 24 h após a cirurgia.
Resultados: O número de doentes que apresentou uma resposta completa foi maior nos grupos P e PS que no Grupo S em 0-2 h (74%, 76% e 43%, respectivamente, p = 0,001) e 0-24 h (71%, a 76% e 38%, respectivamente, p < 0,0005). A incidência de náusea em 0-2 h (Grupo S = 57%, Grupo P = 26% e Grupo PS = 21%, p = 0,001) e 0-24 h (Grupo S = 62%, Grupo P = 29% e grupo PS = 21%, p < 0,0005) também foi significativamente diferente entre os grupos. Porém, não houve diferença significativa entre os grupos em relação à incidência ou frequência de vômitos ou uso de antiemético de resgate em 0-24 h.
Conclusão: A combinação de propofol e anestesia volátil durante a laparoscopia ginecológica efetivamente diminui a incidência de náusea no pós-operatório. Denominamos este novo método de anestesia ''anestesia combinada intravenosa volátil (ACIV)''.

Introduction

Volatile anesthetics exert cardioprotective effects mediated by the activation of adenosine triphosphate-sensitive potassium (KATP) channels in cardiac myocytes.[1,2] They also affect coronary vasodilation by activating KATP channels in vascular smooth muscle cells.[3,4] Therefore, the use of volatile anesthetics for clinical anesthesia may be beneficial in prevention of coronary artery disease.

Total intravenous anesthesia (TIVA) with propofol also has many advantages. It decreases the incidence of postoperative nausea and vomiting (PONV),[5,6] decreases cerebral blood flow and intracranial pressure,[7] and attenuates postoperative pain[8] and neuroendocrine stress response.[9]

Because of these benefits combined with the rapid onset and cessation of action, both volatile anesthetics and propofol are extensively used for clinical anesthesia.

We hypothesized that a novel method of anesthesia combining propofol and volatile anesthesia can provide the benefits of both while decreasing the disadvantages of each anesthetic. In this study, we investigated the effects of combined propofol and volatile anesthesia on the incidence of PONV in patients undergoing laparoscopic gynecological surgery.

Materials and methods

After obtaining approval for this study from the Ethics Committee on Human Studies of Tokushima University Hospital, written informed consent was obtained from all patients. All patients were scheduled for elective laparoscopic gynecological surgery (removal of ovarian tumors and cysts, adhesiolysis, myomectomy, salpingostomy, ovarian drilling and oophorectomy) under general endotracheal anesthesia, with an American Society of Anesthesiologists (ASA) physical status of I and II. The study's exclusion criteria were as follows: obesity (body mass index >33 kg/m^2); neurological, renal, or liver disease; and the use of drugs with antiemetic properties, including corticosteroids. Risk factors associated with PONV were recorded.

Patients were randomly assigned to one of the following three groups by the sealed envelope method: those maintained with sevoflurane (Group S), those maintained with propofol (Group P), and those maintained with combined propofol and sevoflurane (Group PS).

No preanesthetic medication was administered. All patients were monitored by electrocardiography, noninvasive arterial blood pressure measurement, pulse oximetry, capnography, and the bispectral index (BIS) monitoring. No nasogastric tubes were inserted. General anesthesia was induced with intravenous remifentanil, thiamylal (Group S) or propofol (Groups P and PS) and rocuronium. Anesthesia was maintained with remifentanil and sevoflurane, propofol, or combined propofol and sevoflurane in 2:1 air and oxygen.

In Group S, anesthesia was maintained with sevoflurane (end-tidal concentration approximately 1 minimum alveolar concentration). In Group P, anesthesia was maintained with an infusion of propofol (4–8 mg/kg/h). In Group PS, anesthesia was maintained with combined propofol (2 mg/kg/h) and sevoflurane (end-tidal concentration approximately 0.5 minimum alveolar concentrations). Sevoflurane concentration (Group S) and propofol infusion