

COMPARISON OF FENTANYL AND MIDAZOLAM WITH SEVOFLURANE IN EMERGENCE AGITATION AFTER GENERAL ANAESTHESIA FOR LAPAROSCOPIC SURGERY: A PROSPECTIVE RANDOMIZED CONTROLLED STUDY

Anaesthesiology

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ABSTRACT

Background: Sevoflurane is widely used in anaesthesia due to its rapid onset and offset of action, smooth induction, and less hepatotoxicity. However, it is associated with emergence agitation, which can be frightening and harm the patient or the caregiver. While a definite preventive measure of emergence agitation is in search, the use of some drugs is associated with a lesser incidence of emergence related to sevoflurane. This study aimed to compare the incidence and severity of EA between TIVA using fentanyl + sevoflurane and midazolam + sevoflurane. **Methods:** This prospective randomized controlled study enrolled 60 patients who underwent laparoscopic surgery under general anesthesia. Patients were randomized into two groups of 30 each: sevoflurane and fentanyl (F) group and sevoflurane + midazolam (M) group. The same protocol was used for each group from induction to emergence, except for the use of different anesthetics during maintenance of anesthesia according to the assigned group: sevoflurane and fentanyl for the F group and sevoflurane + midazolam for the M group. The incidence of EA as the primary outcome was evaluated using scale: RICHMOND AGITATION SEDATION SCALE. Additionally, hemodynamic changes during emergence and postoperative sense of suffocation were compared. **Results:** The incidence of EA was significantly lower in the F group than in the M group in EA assessment scale (all $P < 0.001$). During emergence, the change in heart rate differed between the two groups ($P = 0.002$). The sense of suffocation was lower in the F group than in the M group ($P = 0.027$). **Conclusion:** FENTANYL reduced the incidence and severity of EA in patients undergoing laparoscopic surgery under general anesthesia. In addition, fentanyl was favourable for managing hemodynamics and postoperative sense of suffocation

KEYWORDS

Sevoflurane; Emergence Delirium; General Anesthesia; Intravenous Anesthesia; Laparoscopic Surgical Procedures; Fentanyl

INTRODUCTION

General anesthesia for laparoscopic surgery is frequently accompanied by agitation on 3 awakening during recovery. In particular, pneumoperitoneum induces suffocation, often accompanied by intense excitement on awakening [1–3]. Excessive emergence 5 agitation (EA) from anesthesia can cause serious problems, such as reoperation due to bleeding, unintentional extubation of the endotracheal tube [4]. In addition to the type of surgery, the type of anesthesia method (inhalational anesthesia or total intravenous anesthesia [TIVA]) and the timing and method of drug administration (bolus or continuous infusion) also affect EA [5–8]. Inhalational anesthetics with low blood/gas partition coefficients (desflurane and sevoflurane) are preferred general anesthetics because of their short wake-up time [9]. Of these, desflurane reduced the incidence of EA in adult patients compared with sevoflurane [9]. As an adjunct commonly used together with other inhalational anesthetics, the effect of nitrous oxide (N₂O) on EA varies depending on the study; however, it has been reported to be unrelated to EA or to attenuate EA [4]. midazolam is a novel benzodiazepine [10]. Midazolam can be used as a component of TIVA for general anesthesia and is often used in combination with fentanyl. We hypothesized that the effect of anesthesia maintenance through continuous intravenous administration of Fentanyl on EA would differ from that using midazolam. Therefore, this study aimed to compare the incidence and severity of EA between Fentanyl and Midazolam as anesthesia maintenance.

MATERIALS AND METHODS

This prospective randomized controlled study was conducted after being approved by the Institutional ethics committee.

Inclusion Criteria

Patients aged 20–60 years who underwent elective laparoscopic surgery under general anesthesia with an American Society of Anesthesiologists (ASA) Physical Status I–II were included in this study.

Exclusion Criteria

Emergency surgery; hemodynamic instability or respiratory failure; contraindications to the use of fentanyl and midazolam (hypersensitivity to benzodiazepine drugs, glaucoma, alcohol or drug dependence, sleep apnea syndrome, renal failure, or liver failure, psychiatric history and cognitive impairment).

All patients were randomly allocated to one of the two groups in a 1:1 ratio using online 15 randomization software (Researcher Randomizer; www.randomizer.org). One was the group that used sevoflurane and fentanyl (F group), and the other used MIDAZOLAM and sevoflurane (M group) for the maintenance of general anesthesia.

Without premedication, the patients were allowed to enter the operating room after fasting for at least 8 h. With monitoring for electrocardiogram, non-invasive blood pressure, pulse oximetry, neuromuscular monitor with acceleromyography, and body temperature, anesthesia was induced with propofol (2 mg/kg) and fentanyl (0.5–1 µg/kg), followed by intubation after injecting atracurium. An infusion of fentanyl at 2 mcg/kg/h was used for maintenance of anesthesia. Mechanical ventilation was used in the volume-controlled mode at a tidal volume of 8 ml/kg and a respiratory rate of 12 breaths/min. Anaesthesia in the F group was maintained with 2% end tidal concentrations of SEVOFLURANE and 50% N₂O to maintain a bispectral index (BIS) of 40–60. In the M group anaesthesia was maintained with midazolam 1–2 mg/kg/h with an effect of BIS of 40–60 and systolic blood 3 pressure within 80–120% of the preoperative value. The hemodynamic parameters were maintained during surgery using the same protocol in both groups. All patients underwent surgery in the supine position during the entire period of anaesthesia, and they got the same regimen of patient-controlled analgesia for postoperative pain control. The neuromuscular block was reversed with neostigmine owing to neuromuscular function monitoring. Extubation was conducted after confirming BIS > 80, tidal 11 volume ≥ 5 ml/kg, spontaneous respiratory rate 10–25/min, train of four ratio ≥ 0.9, and response to verbal commands. After extubation, all patients were transferred to the post anesthesia care unit (PACU).

Measurements

Emergence agitation was assessed EA assessment tools Richmond Agitation-Sedation Scale [RASS], during the emergence period (the time interval between the discontinuation of all anesthetics administered and 5 min after extubation) by the attending anaesthesiologists.

RESULTS

Richmond Agitation Sedation Scale

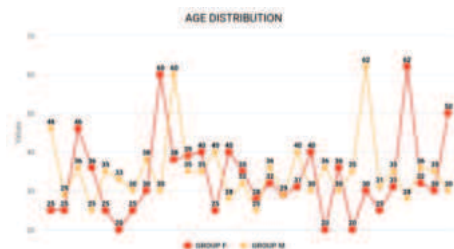


Group F the average RASS SCORE was 1.733 (range MEAN ±SD:

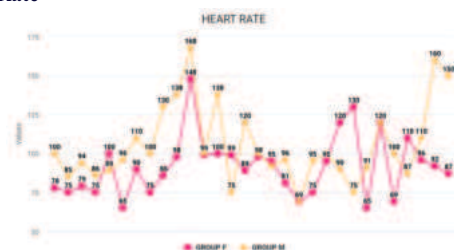
1.733±1.04); Group M the average RASS SCORE was 2.866(range MEAN±SD: 2.866±0.89)

The RASS Score In Group M Was Significantly Higher Than In Group F;(P<0.05) CI 0.95

Age Distribution



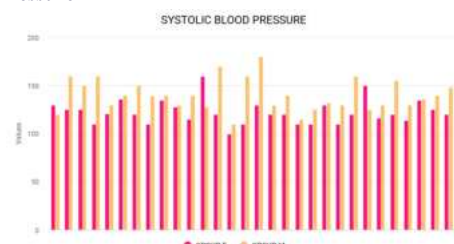
Heart Rate



GROUP F the average HEART RATE was 91.93/min (range MEAN ±SD: 91.93±19.50); GROUP M the average HEART RATE was 104.47/min (range MEAN±SD: 105.47±24.82)

The Heart Rate In Group M Was Significantly Higher Than In Group F;(P<0.05);CI 0.95

Blood Pressure



GROUP F the average systolic BP was 122.93mmhg (range MEAN ±SD: 122.93±12.49);GROUP M the average systolic BP was 139.82mmhg (range MEAN±SD: 139.82±16.60)

THE systolic BP In Group M Was Significantly Higher Than In Group F;(P<0.05);CI 0.95

DISCUSSION

One of the critical risk factors for the occurrence of ED has been found to be the use of short-acting inhalational anesthetics where there is a relatively rapid phase of transition between anesthesia and return of consciousness and awareness (Ali and Abdellatif 2013; Tazeroualti et al. 2007). The halogenated inhalational anesthetic agents have been postulated to impair the balance between central neuronal synaptic inhibition and excitation (Lapin et al. 1999 and Ko et al. 2001).

Even though ED usually lasts for a short duration, it is a highly alarming phase that may require supplemental doses of sedatives and analgesics in the PACU (Voepel-Lewis et al. 2003.; Gonsalvez et al. 2018) In the present study, it was observed that the incidence of ED was less with the use of FENTANYL compared to MIDAZOLAM. The occurrence of ED in the two groups was statistically significant. Patients in the study groups did not have delayed recovery or significant side effects in the postoperative period.

CONCLUSION

Fentanyl as continuous infusion as maintenance anaesthesia is effective in preventing the emergence delirium during the postoperative period in patients undergoing laparoscopic surgeries

without delay in recovery from general anesthesia.

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Conflict of Interest – None declared

Ethical Approval – The study was approved by the institutional ethics committee

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