

Study of Total Intravenous Anaesthesia in laparoscopic Surgery

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Abstract

Background: Total intravenous anaesthesia in laparoscopic surgery is safer than open laparotomy operations because propofol, a sedative hypnotic agent with excellent recovery drug and having anti-emetic properties, and new synthetic opioids (fentanyl congeners) provide excellent analgesia; hence, TIVA has become more popular in laparoscopic surgery.

Method: 45 adult patients aged between 18 to 65 undergoing laparoscopic surgery were studied. A solution of propofol containing different concentrations of sufentanil (1 µgm per ml and 2 µgmper ml) was infused. Patient's HR, SBP, DBP, MAP, and peripheral O₂ saturation from the anaesthesia monitor was taken as a baseline measurement. All the hemodynamic parameters were recorded intra-operatively at different intervals of duration.

Results: The changes in mean values of hemodynamic values were insignificant, and only significant parameters were noted. 158.12 (± 80.9) mean value time to rescue analgesia (in minutes) Post-surgical complications are 3 (6.6%) Nausea and vomiting

Conclusion: Propofol, containing different concentrations of sufentanil, provides hemodynamic stability with the least post-surgical complications; hence, total intravenous anaesthesia is an ideal substitute for inhalation anaesthesia in laparoscopic surgery because inhalation anaesthesia has a higher risk of hemodynamic instability.

Keywords: hemodynamic parameters Total intra venous, Anaesthesia, Propofol, Sufentanil, laparoscopy.

Introduction

A minimally invasive technique called laparoscopic surgery has been widely used in the surgical field due to its advantages such as less incisional bleeding, less trauma, and quick post-operative recovery. Though a large number of studies have shown that, the degree of stress caused by laparoscopic surgery is less than that caused by conventional laparotomies, CO₂ pneumoperitoneum,

intra-abdominal pressure, hypercapnia, and surgery at the end of an internal pressure drop similar ischemia and reperfusion injury factors can induce the body stress response⁽¹⁾. This can lead to changes in endocrine metabolism, triggering an inflammatory immune response. Moreover, the imbalance of homeostasis does not stop with the end of the operation, but excessive stress lasting for a certain period can change the homeostasis of the body. Anaesthesia of such patients is a great challenge

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for an anaesthesiologist⁽²⁾. Anaesthesiologists need careful preoperative evaluation and correct intra-operative management to ensure that the side effects of anaesthesia can be reduced and patients can recover quickly.

Total IV anaesthesia (TIVA) is commonly applied during gynaecological laparoscopic surgery. Total IV anaesthesia is an evolved concept of general anaesthesia. Propofol, a sedative hypnotic agent with excellent recovery characteristics at the end of infusion and additional anti-emetic properties, has become the drug of choice for TIVA. Newer synthetic opioids (fentanyl congeners) provide excellent analgesia for various types of surgeries due to their advantages like synergistic action with propofol, rapid induction, less cardiovascular and respiratory depression, and rapid recovery⁽³⁾⁽⁴⁾. Hence, an attempt is made to evaluate the efficacy of TIVA.

Material and Method

45 adult patients aged between 18 to 65 regularly visited Mahatma Gandhi Medical College and Hospital in Jamshedpur, Jharkhand were studied.

Inclusive Criteria: patient grade-I, II gave written consent and were ready to undergo laparotomy were selected for the study.

Exclusion Criteria: Patients with known drug allergies, type II diabetes, cardiovascular disease, and immune compromised patients were excluded from the study.

Method

A detailed history of occupation and social status was noted. Pre-anaesthetic checkups were done, and solutions of propofol containing different concentrations of sufentanil were prepared as per the protocol 1 µg/ ml and 2 µg/ ml. Pre induction measurements of heart rate (HR), systolic blood pressure (SBP), diastolic blood pressure (DBP), mean arterial pressure (MAP), and peripheral oxygen saturation from the anaesthesia monitor were taken as the baseline measurements. All the hemodynamic parameters were recorded intraoperatively; separate recording of the time duration required for rescue analgesia was done, as was the prevalence of postoperative complications.

Duration of study from February - 2022 to February - 2023

Statistical analysis: The hemodynamic parameters indicating the prevalence of complications were also noted. The mean values of hemodynamic variables were statistically insignificant, and only significant parameters were noted. This was done in SPSS software. The ratio between the male and female was 1:2.

Observation and Results

Table-1: Out of 45 patients mean time to rescue for analgesia (minutes) was 158.12 (± 80.94).

Table-2: Post-surgical complication were Nausea and vomiting in 3 (6.66%) patients

Table 1: Mean time to rescue Analgesia

Parameter time to rescue	Total No. of Patients	Mean value
Analgesia (minutes)	45	158.12 (± 80.94)

Table 2: Post surgical complication during study

Parameters	No. of patients	Percentage (%)
Nausea and vomiting	3	6.6

Discussion

Present study of TIVA in laparoscopic surgery in the Jharkhand population. The mean time to rescue analgesia (in minutes) was 158.12 (± 80.94) (Table-1) and the most common post-surgical complication was nausea and vomiting in 3 (6.6%) patients (Table-2). All hemodynamic parameters were insignificant. These findings are in more or less agreement with previous studies⁽⁵⁾⁽⁶⁾⁽⁷⁾.

Day care surgery is a planned surgery where patients requiring early recovery and discharge are admitted for a short stay for surgery on a non-resident basis⁽⁸⁾. Laparoscopic surgery is the most common surgical procedure performed worldwide and is widely used now days for laparoscopic appendectomy, lap cholecystomy, laphernioplasty, other urology surgeries, and gynaecological surgeries like diagnostic laparoscopy for infertility, hysteroscopy for embryo transfer, etc. TIVA is an

evolved concept of general anaesthesia that obviates the need for volatile anaesthetics. Though laparoscopic surgical technique has a minimally invasive method, a stress response exists and runs throughout the peri-operative period of laparoscopic surgery, which alters hemodynamic parameters and may cause morbidity and mortality. Hence the appropriate anaesthetic drugs like propofol in combination with sufentanil in different concentrations as per the need of reducing stress during the peri-operative period. Sufentanil is analogue of fentanyl suitable for post-operative pain control because it has no active metabolites, shows a higher therapeutic index, and has a lower frequency of respiratory suppression⁽⁹⁾. For outpatient surgeries, intravenous sufentanil produces equivalent anaesthesia to isoflurane or fentanyl. Recovery tends to be more rapid after sufentanil, and the requirement for post-operative analgesia is lower⁽¹⁰⁾.

Propofol is the preferred intravenous agent in day care surgeries as it has smooth induction, rapid recovery, and some antiemetic properties⁽¹¹⁾. In the present study only few patients required additional sufentanil boluses to maintain adequate depth of anaesthesia. Sufentanil mixed with propofol provides better hemodynamic stability in laparoscopic cholecystectomies with good post operative analgesic.

Summary and Conclusion

Present TIVA in laparoscopic surgeries. Propofol is a sedative and hypnotic agent with excellent recovery properties, and sufentanil, an opioid analgesic, enhances its properties. It is an ideal combination for laparoscopic surgery, but this study demands that such clinical trials of TIVA must be conducted where larger numbers of patients and the latest technologies are available to confirm the significance of the present TIVA study.

Limitation of Study: Owing to the tertiary location of the research centre, the small number of patients, and the lack of the latest techniques, we have limited findings and results.

This research paper was approved by the Ethical Committee of Mahatma Gandhi Medical College and Hospital, Jamshedpur, Jharkhand, 831011

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