



TO COMPARE GENERAL ANAESTHESIA AND COMBINED GENERAL ANAESTHESIA WITH SPINAL ANAESTHESIA ON HEMODYNAMIC PARAMETERS AND POST OPERATIVE ANALGESIA IN LAPAROSCOPIC SURGERIES.

Anaesthesiology

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ABSTRACT

Background and Objective: Laparoscopic surgery has become a standard for both minor and major abdominal procedures, presenting unique anesthetic challenges. This study aims to compare the efficacy of general anesthesia (GA) alone with combined general and spinal anesthesia (GA+SA) in maintaining hemodynamic stability and providing postoperative analgesia in laparoscopic surgeries. **Methodology:** Sixty patients with ASA physical status I or II undergoing laparoscopic surgery were randomly assigned to either the GA or GA+SA group. Hemodynamic parameters, intraoperative drug use, recovery time, duration of postoperative analgesia, and incidence of side effects were measured. **Results:** Patients in the GA+SA group showed significantly better hemodynamic stability, with reduced intraoperative heart rate and blood pressure fluctuations ($p < 0.001$). The GA+SA group also required lower doses of metoprolol and sevoflurane ($p < 0.001$), had prolonged postoperative analgesia, and experienced a lower incidence of postoperative nausea and vomiting (PONV) compared to the GA group ($p = 0.039$). **Conclusion:** Combining GA with SA improves hemodynamic stability and provides superior postoperative analgesia in laparoscopic surgeries compared to GA alone. This approach may be beneficial in reducing intraoperative drug use and minimizing side effects, supporting its consideration in clinical practice.

KEYWORDS

INTRODUCTION

Laparoscopic surgery has become widely adopted for various abdominal procedures due to its minimally invasive nature, shorter recovery times, and reduced postoperative complications(1). However, the technique introduces unique anesthetic challenges, particularly related to the physiological changes caused by pneumoperitoneum, such as increased systemic vascular resistance and altered cardiovascular and respiratory function(20). Traditionally, these surgeries are conducted under general anesthesia (GA), but managing the hemodynamic shifts often requires higher anesthetic doses or additional vasodilators, which may increase recovery time and risk of adverse effects.

To address these challenges, recent studies have explored combining GA with regional anesthesia techniques, such as regional nerve blocks, epidural and spinal anesthesia (SA), which offers several advantages(2). Spinal anesthesia provides sympathetic blockade, potentially countering the systemic vascular resistance caused by pneumoperitoneum and maintaining more stable hemodynamic parameters. Additionally, combining GA and SA could enhance postoperative analgesia, reducing the need for opioid-based pain management and lowering the risk of postoperative nausea and vomiting (PONV)(3).

There has been plethora articles studying combination of epidural anaesthesia and various regional blocks namely TAP block along with general anaesthesia technique for laproscopic surgeries. These techniques even though have been proved successful in counteracting the changes associated with general anaesthesia but these technique are not as cost effective and technically difficult as compared to spinal anaesthesia(4).

This study aims to evaluate the effectiveness of combined GA and SA versus GA alone in laparoscopic surgeries by examining hemodynamic stability, intraoperative drug requirements, and postoperative analgesia. We hypothesize that the combination of GA and SA will yield improved hemodynamic outcomes and superior pain control, presenting a viable alternative for enhancing patient comfort and recovery in laparoscopic procedures.

Methodology

This study was a comparative interventional study design conducted over two years at Jawaharlal Nehru Medical College, Datta Meghe Institute of Medical Sciences. After receiving approval from the institutional ethics committee, 60 patients, aged 16-60 years, with ASA physical status I or II, scheduled for laparoscopic surgery were enrolled. Written informed consent was obtained from each patient.

Patients were randomly assigned to one of two groups of 30 each: Group GA+SA, which received combined general and spinal anesthesia, and Group GA, which received general anesthesia alone. Randomization was performed use of computer-generated table.

Anesthetic Protocols

For Group GA+SA, spinal anesthesia was administered in the lateral position using a 25-gauge Quincke needle at the L3-L4 interspace with 15 mg of heavy bupivacaine. After 20 minutes, or once the spinal block reached a T6 level, general anesthesia was induced with IV glycopyrrolate 0.02 mg, Inj fentanyl 2mcg/kg, propofol 2mg/kg, and vecuronium 0.1mg/kg for muscle relaxation, followed by endotracheal intubation. Patients were maintained on oxygen-nitrous mixtures, sevoflurane, and intermittent vecuronium boluses.

In Group GA, general anesthesia was induced similarly, but without spinal anesthesia. The maintenance protocol was identical to that used in Group GA+SA.

The incidences of hypotension were managed by inj mephentermine 6 mg i.v. boluses, hypertension by inj metoprolol 1 mg i.v. boluses, bradycardia by inj atropine 0.5mg i.v. boluses.

Monitoring and Measurements:

Baseline heart rate, systolic and diastolic blood pressure, mean arterial pressure (MAP), and oxygen saturation were recorded and monitored continuously. Measurements were taken at baseline, after spinal anesthesia (for GA+SA), after pneumoperitoneum creation, and every 10 minutes until extubation.

Outcome Measures

The primary outcomes were hemodynamic stability (evaluated by heart rate, systolic and diastolic blood pressure, and MAP) and intraoperative drug requirements (metoprolol and sevoflurane use). Secondary outcomes included recovery time and duration of postoperative analgesia, assessed via Visual Analogue Scale (VAS) scores and the time to first rescue analgesia. Side effects, such as postoperative nausea and vomiting (PONV), were also recorded.

Statistical Analysis

Data were analyzed using SPSS (version 20) and GraphPad Prism (version 6). Continuous data were compared using Student's t-test, and categorical data were assessed via the chi-square test. Statistical significance was set at $p < 0.05$.

RESULTS

Patient Demographics

There were no significant differences in demographic data between

Group GA and Group GA+SA, including age, gender, ASA physical status, weight, height, and duration of surgery ($p > 0.05$). Both groups were therefore comparable at baseline.

Table 1: Demographic Data

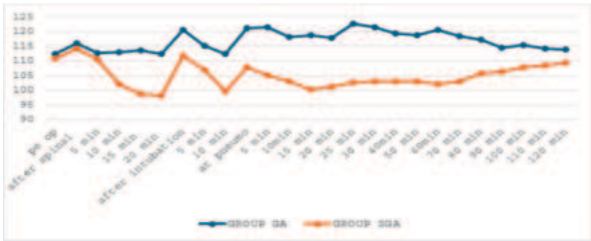
Demographic Data	Group GA	Group SGA	P-value
Age (years)	35.07±10.18	36±11.4	0.74 (NS)
Gender	46.67 %- Males 53.33 %- Females	40 %- Males 60 %- Females	0.60(NS)
ASA Physical Status	40 % - I 60 % - II	43.33% - I 56.67 % - II	0.79(NS)
Height (centimetres)	163.53±9.36	164.33±5.41	0.69(NS)
Weight (kilograms)	59.33±6.52	57.63±4.63	0.24(NS)
Duration of surgery (minutes)	111.13±3.69	112.33±3.91	0.23(NS)

Hemodynamic Stability:

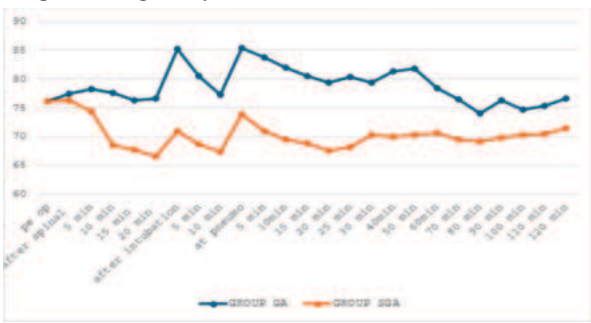
Patients in the GA+SA group maintained better hemodynamic stability throughout surgery compared to the GA group. Heart rate and blood pressure (systolic, diastolic, and MAP) were significantly lower in the GA+SA group following pneumoperitoneum and remained stable throughout the procedure ($p < 0.001$).



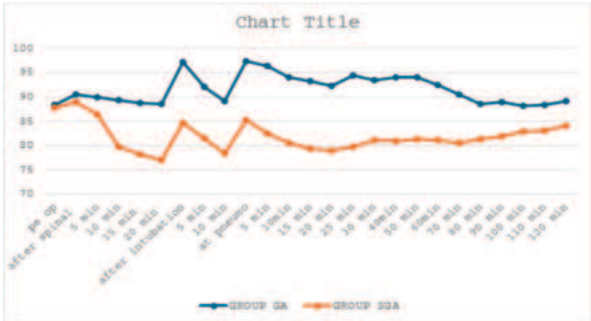
Graph 1: Changes in Heart Rate (in bpm)



Graph 2: Changes in Systolic Blood Pressure



Graph 3: Changes in Diastolic Blood Pressure (in mmHg)



Graph 4: Changes in Mean Arterial Pressure (in mmHg)

Intraoperative Drug Requirements:

The GA+SA group showed significantly lower consumption of both metoprolol and sevoflurane compared to the GA group. The average metoprolol dosage was 4.11 ± 0.83 mg for the GA group and 0 mg for the GA+SA group ($p < 0.0001$). Sevoflurane use was also reduced in the GA+SA group, averaging 1.11 ± 0.24 , compared to 1.92 ± 0.25 in the GA group ($p < 0.0001$).

Postoperative Analgesia:

The GA+SA group experienced significantly prolonged postoperative analgesia, with a longer time to first analgesic requirement post-surgery compared to the GA group. The GA+SA group required fewer doses of postoperative analgesia overall.

Side Effects

The incidence of postoperative nausea and vomiting (PONV) was significantly lower in the GA+SA group (6.67%) compared to the GA group (26.67%) ($p = 0.039$). No other significant side effects were observed in either group.

DISCUSSION

This study assessed the effectiveness of combined general and spinal anesthesia (GA+SA) compared to general anesthesia alone (GA) in maintaining hemodynamic stability and enhancing postoperative analgesia during laparoscopic surgeries. Consistent with previous findings, our study showed that the GA+SA group experienced reduced fluctuations in heart rate and blood pressure following pneumoperitoneum, indicating superior hemodynamic control(5).

The mechanisms underlying these results likely involve spinal anesthesia's ability to induce sympathectomy, leading to peripheral vasodilation and reduced systemic vascular resistance(6). This effect helps counteract the increase in systemic vascular resistance associated with pneumoperitoneum, thereby improving intraoperative hemodynamic stability. The reduced requirement for intraoperative metoprolol and sevoflurane in the GA+SA group further suggests that the combination approach may lower the need for additional medications to control blood pressure and heart rate fluctuations, consistent with findings from similar studies(7).

Our results also revealed a significant reduction in postoperative analgesia requirements for the GA+SA group, along with a lower incidence of PONV. Spinal anesthesia likely contributed to this outcome by inhibiting central sensitization and reducing the need for rescue analgesics(5). The extended duration of analgesia in the GA+SA group highlights the potential benefit of this combined approach in improving postoperative comfort.

CONCLUSION

In conclusion, this study demonstrates that combined general and spinal anesthesia (GA+SA) offers improved hemodynamic stability and enhanced postoperative analgesia in laparoscopic surgeries compared to general anesthesia (GA) alone. The GA+SA approach resulted in lower intraoperative drug requirements, prolonged postoperative analgesia, and reduced incidence of postoperative nausea and vomiting. Although the findings support the benefits of GA+SA, further research on alternative anesthetic approaches, such as peripheral nerve blocks, is warranted to provide additional options for optimizing patient care in minimally invasive surgeries. This approach may be particularly beneficial for patients requiring heightened hemodynamic control and extended postoperative analgesia.

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