

ABSTRACT

BACKGROUND:

Laparoscopic surgery produces unique challenges to the anaesthesiologist due to pneumoperitoneum, CO₂ insufflation and positioning. Hemodynamic perturbations produced by pneumoperitoneum are like decrease in cardiac output and increase in mean arterial pressure, may not be tolerated by the patients with compromised cardiopulmonary reserve. A minimally invasive cardiac output monitor like Vigileo FloTrac through an arterial line, measures cardiac output from pulse contour analysis, enable us to identify the deleterious effect and thus intervene early.

OBJECTIVE:

The aim of the study was to compare the hemodynamic changes like cardiac output, stroke volume, stroke volume variations and mean arterial pressure in laparoscopic cholecystectomy using minimally invasive Vigileo FloTrac cardiac output monitor.

METHODOLOGY:

Sixty patients of ASA PS I of both sex, aged 18 to 60 years were randomized into two groups. In Group A – pneumoperitoneal pressure was set between 10 – 12 mmHg, Group B – pneumoperitoneal pressure was set between 14 – 16 mmHg. Under local anaesthesia, the patients radial artery was cannulated with 20 G arterial catheter and connected to FloTrac sensor of Vigileo monitor. Patient was premedicated with Injection. glycopyrrolate 0.01mg/Kg, 0.02 mg/Kg of midazolam and 2µg/Kg of fentanyl. After

preoxygenation patients were induced Injection propofol 2mg/Kg. Endotracheal intubation was facilitated with 0.1 mg/kg of Vecuronium bromide and mechanical ventilation was set with a tidal volume of 8ml -10ml/Kg and respiratory frequency was adjusted to achieve an end tidal CO₂ of 35 - 40mm of Hg and airway pressure maintained between 18-20cm of H₂O. Sevoflurane 1-2% in a mixture of oxygen (50%) and Nitrous oxide (50%) was used for anaesthetic maintenance.

For each Group A&B baseline NIBP-SBP/DBP ,HR, Mean Blood Pressure (MBP), Stroke Volume (SV), Stroke Volume Variation (SVV), Cardiac Output (CO), Cardiac Output Index (CI), End Tidal CO₂ (ET CO₂) were documented 5 min before & after intubation (B₁) to eliminate the bias of intubation response. Baseline registration of variables were obtained immediately before Pneumoperitoneum (B₂), which were measured every 5 min after Pneumoperitoneum was initiated. The positional influences on cardiac output, stroke volume, SVV were measured for reverse Trendelenberg and neutral position also recorded. Then one more value after deflation is also recorded.

RESULTS:

We observed that there is a statistically significant reduction of cardiac output and stroke volume and increase in mean arterial pressure in Group B- Intra abdominal pressure of 14 – 16 mmHg compared to Group A – IAP of 10 – 12 mmHg. There is no significant difference observed in SVV and HR in both groups. The primary outcome measure compared between two groups was

cardiac output, stroke volume, stroke volume variation. In our study we found that there was significant decrease in SV, CO and CI and increase in MAP, immediately after insufflation of CO₂ pneumoperitoneum and more pronounced after reverse Trendelenberg position and it remained so throughout the surgery. All these parameters returned to baseline after deflation of pneumoperitoneum in the supine position.

CONCLUSION:

A prospective randomized study conducted to compare cardiac output, stroke volume, stroke volume variation with two different pneumoperitoneal pressure, concluded that significant decrease in stroke volume and cardiac output were observed when the intra-abdominal pressure was 14 – 16 mmHg compared to intra-abdominal pressure was 10 – 12 mmHg without differences in stroke volume variation.

Hence we conclude that laparoscopic cholecystectomy can be done with a lesser hemodynamic perturbation in older patients with cardio vascular disease using a lesser intra-abdominal pressure of 10 – 12 mmHg with a minimally invasive cardiac output monitor.

KEY WORDS

CO₂ - Carbon dioxide, DBP - Diastolic Blood Pressure, EtCO₂ - End Tidal Carbon Dioxide, HR - Heart rate, IAP - Intra-abdominal Pressure, MAP - Mean Arterial Pressure, NIBP - Non Invasive Blood Pressure, PaCO₂ - Partial Pressure of Carbon Dioxide in Arterial System, SBP - Systolic Blood Pressure, SpO₂ - Oxygen Saturation, CO- Cardiac Output, SV – Stroke Volume, SVV - Stroke Volume Variation, CI – Cardiac Index, SVR – Systemic Vascular Resistance.