ORIGINAL ARTICLE

Haemodynamic Changes During Laparoscopic Cholecystectomy Under Sevoflurane Anaesthesia

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ABSTRACT

Aims & Objectives: The objective of the study is to determine the effect of sevoflurane on the haemodynamic changes during laparoscopic cholecystectomy.

Methods: In this study total 160 cases were selected. Induction of anaesthesia was done with Thiopentone Na and intubation, with cuffed endotracheal tube, using succinylcholine I/V. Anaesthesia was maintained with Nitrous oxide (66%) in Oxygen and Sevoflurane at 1 MAC. Changes in heart rate and blood pressure were noted during surgery.

Conclusion: Sevoflurane provided good operating conditions throughout the procedure. It provides a safe and effective intraoperative control of cardiovascular homeostasis.

Keywords: Cholecystectomy, Laparoscopic, Haemodynamics, Sevoflurane.

INTRODUCTION

The use of laparoscopic techniques has become common in clinical practice. Cholecystectomy is an operation that requires long hospital stay. It is now being performed as a day case procedure. This is made possible only by using the laparoscopic techniques.

Although laparoscopic cholecystectomy is not a very much invasive procedure, it can cause multiple intraoperative haemodynamic changes. The anaesthesia management for patients undergoing laparoscopic cholecystectomy must take into account the surgical requirements and the physiological changes during surgery.

Various anaesthetic drugs are used for laparoscopic cholecystectomy but the choice is shifting towards shorter acting drugs. In our setup Halothane and Isoflurane are the two commonly used volatile agents, while a recent introduction is Sevoflurane. Halothane is a direct myocardial depressant and also arrhythmogenic. Sevoflurane appears to have more favourable physico-chemical properties. It does not increase the chances of arrhythmias nor does it causes coronary steal phenomena.

Despite the advantages laparoscopic procedures can cause life threatening complications that are usually not experienced with the traditional open procedure. Though there is a need to modify the anaesthetic techniques to facilitate this novel surgical procedure to be performed safely. The study was designed to observe the effects of sevoflurane on haemodynamics during laparoscopic cholecystectomy, as it is a relatively newer drug in our setup.

MATERIAL AND METHODS

The study was descriptive case series. In this study 160 patients of ASA P1 and P2 status aged 20--60 years both sex undergoing laparoscopic cholecystectomy were selected. Morbidly obese patients those having valvular heart disease or uncontrol hypertension were excluded from the study. Moreover, patients having sensitivity to sevoflurane or susceptibility to malignant hyperthermia were also not included in the study. On the arrival of the patient in the operation theatre on the day of the surgery a free flowing I/V cannula was secured on the non-dominant hand. Premedication was given in the form of midazolam 0.03mg/kg I.V and nalbuphine 0.06mg/kg I.V. Patient monitoring was done for ECG, Blood Pressure, Heart Rate and Pulse oximetery with following intervals: before induction (T1), after induction (T2), after insuflation of CO_2 (T3), head up position (T4), every 10 minutes till the completion of surgery (T5a, T5b,.....), after exsuflation of CO_2 (T6) ten minutes after recovery (T7).

Induction of anaesthesia was done with Thiopentone Na 5mg/kg I.V and intubation with cuffed endotracheal tube using succinylcholine 1.5mg/kg I.V. Anaesthesia was maintained with

66% N_2O in O_2 and sevoflurane at 1 MAC. Inj atracurium besylate 0.6mg/kg was as loading dose with subsequent increments of 1/3 of loading dose to maintain muscle relaxation for mechanical ventilation. Main outcome measurables to be noted will be heart rate (to see bradycardia), systolic blood pressure (to see hypotention). Other variables noted were tachycardia and hypertention.

DATA ANALYSIS

Data was entered and analyzed by using SPSS version 11.0 software programme. Descriptive statistics was calculated. Age was presented as mean + SD. Gender, hypotention and bradycardia was presented by frequency and percentage.

Table 1: Distribution of Patients by Age

Age (year)	Number	Percentage
20 – 30	46	28.8
31 – 40	52	32.5
51 – 60	47	29.3
Total	**160**	**100.0**
Mean + SD	**42.3±3.9**	

Table 2: Distribution of Patients by Sex

Sex	Number	Percentage
Male	022	13.7
Female	138	86.3
Total	**160**	**100.0**

Table 3: Distribution of Hypotension n = 180

Time	Hypotension	Number	Percentage
Before Induction (T1)	No	-	-
After Induction (T2)	No	-	-
CO_2 Insufflations (T3)	Yes	15	9.37
Head up (T4)	No	-	-
Every 10 min (T5a)	No.	-	-
(T5b)	No	-	-
(T5c)	No	-	-
(T5d)	No	-	-
After exsufflation (T6)	No	-	-
10 min after recovery (T7)	No	-	-

Table 4: Distribution of Hypertension n = 160

Time	Hypotension	Number	Percentage
Before Induction (T1)	No	-	-
After Induction (T2)	Yes	10	6.25
CO_2 Insufflations (T3)	No	-	-
Head up (T4)	No	-	-
Every 10 min (T5a)	No.	-	-
(T5b)	No	-	-
(T5c)	No	-	-
(T5d)	No	-	-
After exsufflation (T6)	No	-	-
10 min after recovery (T7)	No	-	-

Table 5: Distribution of Bradycardia n = 160

Time	Hypotension	Number	Percentage
Before Induction (T1)	No	-	-
After Induction (T2)	Yes	15	9.37
CO_2 Insufflations (T3)	No	-	-
Head up (T4)	No	-	-
Every 10 min (T5a)	No.	-	-
(T5b)	No	-	-
(T5c)	No	-	-
(T5d)	No	-	-
After exsufflation (T6)	No	-	-
10 min after recovery (T7)	No	-	-

Table 6: Distribution of Tachycardia n = 160

Time	Hypotension	Number	Percentage
Before Induction (T1)	No	-	-
After Induction (T2)	Yes	10	6.25
CO_2 Insufflations (T3)	No	-	-
Head up (T4)	No	-	-
Every 10 min (T5a)	No.	-	-
(T5b)	No	-	-
(T5c)	No	-	-
(T5d)	No	-	-
After exsufflation (T6)	No	-	-
10 min after recovery (T7)	No	-	-

RESULTS

Division of patients according to age shows majority of the patients, 52 (35.5%) were between 31-40 years of age and minimum patients, 15(9.4%) were between 51-60 years of age with mean age of 42.3 + 3.9 years (Table -1).

There were 22 (13.7%) male patients while remaining 138 (86.3%) were female (Table-2).

Cases of hypotension were 15 (9.37%), at CO_2 insufflation (T3), Hypertensive patients were 10 (6.25%) after induction (T2), bradycardia was found in 15 patients (9.37%) at CO_2 insufflation (T3) and patient with tachycardia were 10 (6.25%) after induction (T2) (Tables 3 - 6).

DISCUSSION

The study was carried out in general operation theatre Sir Ganga Ram Hospital, Lahore. This study was designed to see whether the haemodynamic changes produced by pneumoperitoneum were in any way altered by the use of sevoflurane and the results were quiet encouraging.

It was found that increased intra-abdominal pressure, due to the insufflation of gas and the reverse Trendelenberg position, used for laparoscopic cholecystectomy induces haemodynamic disturbances mainly because of decreased preload and increased afterload. This procedure with associated position changes and pneumoperitoneum significantly and reversibly decreases the cardiac performance.

In the study almost at the time of CO_2 insufflation bradycardia and subsequent hypotention was observed only in 15 patients out of 160 patients (9.37%) for which they were given Inj Ephedrine I/V. Apart from these findings the rest of the procedure remained uneventful. The decrease in heart rate and fall in the blood pressure is most likely due to rapid stretching of the peritoneum at the start of insufflation which is probably a reflex which is vagaly mediated which might be initiated by stretching of peritoneum.

Response of the blood pressure to volatile anaesthetic agents is a function of the agent's effects on the vascular resistance and cardiac output. Both cardiac output and vascular resistance are affected by the direct effects of the anaesthetic agent and by the indirect effects of anaesthetic on the autonomic nervous system.

One of the marvelous advantages of sevoflurane is its safety profile when administered to patients who have even severe cardiovascular disease. While observing effects of sevoflurane on haemodynamics a stable heart rate is found during sevoflurane administration. It is noted that sevoflurane offers more stable heart rate profile. This is also indicating that sevoflurane has little or no effect on cardiac parasympathetic tone. Hence it is found that sevoflurane maintains haemodynamic stability satisfactorily.

CONCLUSION

Sevoflurane provided good operating conditions throughout the procedure. It provides a safe and effective intraoperative control of cardiovascular homeostasis. Another debate is the cost of the agent which is a major issue in the developing world.

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Corrigendum

Dr. Ch. Tahir Mehmood name was miswritten as Muhammad Tahir as author of article title ”Effectiveness of Paravertebral Block (PVB) for perioperative analgesia in patients undergoing Breast and Gall Bladder Surgery” Volume No:10, Issue No: 2. April to June, 2016 Page No: 15-19.