ORIGINAL ARTICLE

ANESTHESIA RELATED COMPLICATIONS OF LAPAROSCOPIC CHOLECYSTECTOMY

Fiyyaz Akhter Qureshi

ABSTRACT

Objective: To determine the incidence of intraoperative anesthesia-related complications of laparoscopic cholecystectomy.

Design: A descriptive study.

Place and Duration of Study: The study was conducted in Anesthesia Department of Hayat Shaheed Teaching Hospital, Peshawar from April 1995 to April 1996.

Subjects and Methods: One hundred consecutive patients (ASA I and ASA II) were anesthetized and monitored intraoperatively for detection of complications. The operative findings and data were recorded on a proforma and finally the results were analyzed.

Results: One hundred patients with male to female ratio of 1: 8.09 in the age range of 20-80 years (mean 39 years) underwent general anesthesia for laparoscopic cholecystectomy. The duration of operation in 94 laparoscopic cholecystectomy was from 20 to 80 minutes (mean 60.63 minutes).The incidence of intraoperative hypotension was 9%. Four percent of the patients developed arrhythmias. Increase in end-tidal-carbon dioxide ($ETCO_2$) was observed in 3% of cases. Conversion rate to open cholecystectomy was 6%. Damage to intraabdominal vessels with trocar insertion occurred in 1% of cases.

Conclusion: Although laparoscopic cholecystectomy has major surgical and anesthetic advantages, there are anesthesia related complications requiring specific anesthetic interventions to improve patients outcome without compromising their safety.

KEY WORDS: *Anesthesia. Laparoscopic cholecystectomy. Intraoperative complications. Arrythmias. End-tidal- CO_2, Intraabdominal vascular damage.*

INTRODUCTION

Laparoscopic cholecystectomy is a relatively not-so-old surgical procedure, gaining increasing popularity and presenting new anesthetic challenges. Laparoscopic cholecystectomy has revolutionized the surgical management and has become the gold standard for treatment of patients with symptomatic cholelithiasis.[1] Its advantages include diminished postoperative pain and wound infections, more rapid recovery of pulmonary functions, shorter hospitalization and associated reduced cost, more rapid returns to full activity and superior cosmetic results.[2] The first laparoscopic cholecystectomy was performed in Pakistan in 1991 by a visiting American surgeon. The first such procedure at Hayat Shaheed Teaching Hospital in Peshawar was carried out by a visiting surgeon from Singapore in 1992.[3] The adverse anesthetic outcomes during laparoscopic cholecystectomy are mainly because of deleterious local and systemic effect of carbon dioxide pneumoperitoneum, physiologic changes associated with patient positioning and surgical instrumentations.[4] Although the surgical advantages of laparoscopic cholecystectomy have been reported, the anesthetic problems associated with this new technique have not been well-described and no studies of patients undergoing laparoscopic cholecystectomy have examined anesthesia related critical observations in the operative room in our setup. Awareness of these potential complications and knowledge of their management should prevent mortality and reduce morbidity, thus improving patient's care and safety.[5]

*Department of Anaesthesia, Postgraduate Medical Institute, Hayatabad Medical Complex, Peshawar.

Correspondence: Dr. Fiyyaz Akhter Qureshi, H.No. 74, Street No. 3, Gulberg Colony No. 1, Peshawar. E-mail: fizq@brain.net.pk

Received November 27, 2002 ; accepted June 13, 2003.

MATERIALS AND METHODS

This study was carried out in Anesthesia Department of Hayat Shaheed Teaching Hospital, Peshawar, from April 1995 to April 1996. During this period 100 consecutive patients (meeting ASA I and II criteria) were included in this study. All those patients who were jaundiced and suffering from major cardiorespiratory illness (falling in ASA III, IV physical status scale) were excluded. Pre-operative evaluation of the patients comprised a detailed history (including a review of previous medical records), a meticulous physical examination focusing on cardiorespiratory status, airway examination and indicated laboratory tests.

All patients were pre-medicated with tablet lorazepam 1 mg orally, night before surgery and were pre-loaded with 1 liter of Ringer lactate solution and given 10 mg I/V metoclopramide before induction of anesthesia to minimize postoperative nausea and vomiting. All the patients were given general anesthesia with muscle relaxation, using halothane as volatile anesthetic agent and diclofenac sodium 75 mg intra muscular for pain relief.

The variables monitored included pulse oximetry, end-tidal-carbon dioxide by Capnography, electrocardiographic (ECG) monitoring and electronic non-invasive blood pressure monitoring. Carbon dioxide was routinely used for producing pneumoperitoneum. The CO_2 pressure was kept to the maximum of 13 mm of Hg in all patients. This was a simple descriptive observational study hence no test of significance could be applied.

Results

The data variables collected and included in this study were age, gender, operation time and intraoperative critical observations in the theatre during anesthesia. One hundred patients were given general anesthesia for laparoscopic cholecystectomy out of which 11 were males and 89 females. The age range was from 20 years to 80 years (mean 39 years) (Table I) with male to female ratio of 1: 8.09. Duration of operations in 94 laparoscopic cholecystectomy was from 20 minutes to more than 80 minutes (average 60.63 minutes) (Table II).

Table I: Age distribution in 100 laparoscopic cholecystectomy.

Age range (years)	No of cases	Percentage
Upto 20 years	02	2%
21 - 40 years	56	56%
41 - 60 years	37	37%
31 - 80 years	5	5%

Table II: Operation time in 94 laparoscopic cholecystectomy.

Operation time (in min)	No of cases	Percentage
Upto 20 min	01	1.07%
21 - 40 min	43	45.74%
41 - 60 min	26	27.65%
61 - 80 min	20	21.28%
More than 80 min	4	4.26%

The critical intraoperative observations during anesthesia are noted in Table III. Hypotension during anesthesia was present in 9% of patients and were noted among the age group of 41-60 years, 4% of patients developed cardiac dysrhythmias, 3 patients developed tachycardia and one patient developed bradycardia among the age group of 40-60 years. The increase in end-tidal-carbon dioxide was seen in 3% of cases. Conversion rate to open laparotomy was in 6 patients (6%). Significant bleeding with trocar insertion was observed in one (1%) of case. Mortality rate was zero.

Table III: Intraoperative critical observation in 100 laparoscopic cholecystectomies.

Complications	No. of patients	Percentage
Hypotension	9	9%
Dysrythmias	4	4%
Increased $ETCO_2$	3	3%
Conversion to open laparotomy	6	6%
Bleeding with trocar insertion	1	1%

$ETCO_2$=end-tidal-carbon dioxide.

Discussion

This study of 100 cases of laparoscopic cholecystectomy provides evidence of considerable peroperative morbidity associated with the procedure and laparoscopic cholecystectomy is not a entirely safe operation.[6] Anesthetist must be cognizant of possible complications. It is only by an appreciation of the potential complications of a procedure that their incidence can be minimized.

Intraoperative hypotension was observed in 9% of cases as compared to 12.9% reported by Rose.[7] This hypotension mainly occurred in the patients of age group of 41-60 years of age and may be related to a decrease in cardiac output secondary to decreased venous return from inferior vena-caval compression or the head up position which improves surgical exposure of the gall bladder during laparoscopic cholecystectomy.[8] The mechanism of decrease of cardiac index may be multifactorial and include the intraabdominal pressure attained, the volume of CO_2 absorbed, the patients intravascular volume, the ventilatory technique, surgical conditions and the anesthetic agent employed.[9]

It is, therefore, recommended to closely monitor the intra abdominal CO_2 pressure keeping it less than 13 mm of Hg, carry out pre-operative volume loading, and avoid the extreme head up position. Anesthetic agent that directly depress the heart should be avoided and those with vasodilatation action should be fovoured.[9]

Cardiac arrhythmias are common during laparoscopies. An estimated 4% of patients developed cardiac arrhythmias when CO_2 is used to produce pneumoperitoneum, compared to 17% arrhythmias documented by Shanta and Harden.[10] Out of these 4 patients 3 patients developed tachycardia while one patient developed bradycardia. All of them belonged to the age group of 40-60 years. Most of these arrhythmias are considered to be benign and due to positional changes.[11] Deviations of electrical axis to left, increased R-wave amplitude and T-wave inversion can be produced by excessive distension due to pneumoperitoneum. These arrhythmias are reversed after deflation of pneumoperitoneum. Therefore, careful monitoring of ECG during these procedures, and to maintain end-tidal carbon dioxide to approximately normal level by slight hyperventilation is recommended.

Increase in end-tidal carbon dioxide, was observed in 3% of cases in this study, which was remedied easily by increasing the minute volume. This increase in end-tidal carbon dioxide is probably a result of carbon dioxide absorption from peritoneum.[12] Therefore, it is essential to monitor $ETCO_2$, so that appropriate changes to the minute volume can be initiated early, if required.

The incidence of bleeding following trocar insertion was 1%, which was due to abdominal wall vessel injury. This can be prevented by the better surgical skill.

During the study the conversion rate to open cholecystectomy was 6% in comparison to 6.5% documented by Gigot JF.[13] Out of the 6 conversions, 3 were immediate due to acute cholecystitis and obscure anatomy. Fourth conversion was due to lack of CO_2 supply in the middle of operation and the remaining 2 conversions were due to short length of veres needle which could not cross the thick fatty abdominal wall to produce pneumoperitoneum. This conversion rate can be minimized by the combined efforts of surgeon and anesthetist by proper evaluation and selection of patients for the procedure. The anesthetist should be prepared at all the times for open laparotomy.

The average time of operation was 60.63 minutes in our study as compared to 90 minutes by Lichten.[1] This shorter time was mainly because none of the patient was subjected to per operative cholangiography due to its non-availability in our hospital.

CONCLUSION

General anesthesia for laparoscopic cholecystectomy is associated with significant but transient complications. With the identification of these problems specific anesthetic interventions should be instituted to improve patients' outcome without compromising patients' safety.

REFERENCES

1. Lichten JB, Reid JJ, Zahalsky MP, Friedman RL, Laparoscopic cholecystectomy in the new millennium, *Surg Endosc* 2001; **15**: 867-72.
2. Wolfe BM, Gardiner B, Frey CF, Laparoscopic cholecystectomy: a remarkable development (editorial). 1991; **265**: 1573-4.
3. Aurangzeb M, Kabir M, Jan MA. Saeed T. Laparoscopic cholecystectomy: experience of 100 cases in Peshawar. *Pak J Surg* 1995: **11**: 114-6.
4. Joshi GP. Complications of laparoscopy. *Anaesthesiol Clin North Am* 2001; **19**: 89-105.
5. Joshi GP. Abdominal surgery. In: Benumof JL, Saidman L, (edi). Complications in anesthesiology. St Louis: *Mosby-Year book* 1999, 577.
6. Petel N, Strongene, Kosinski R, Antiporda S, Yuvore KG, Baker T. The rapid recovery of respiratory function after laparoscopic cholecystectomy. *Anesth Analg* 1991; **72**: 211.
7. Rose DK, Cohen MM, Jan Sutter DI. Laparoscopic cholecystectomy: the anesthetist's point of view. *Can J Anesth* 1992; **39**: 809-15.
8. Lee CM. Acute hypotension during laparoscopy; a case report. *Anesth Analg* 1975; **54**: 142-3.
9. Juris JL, Nirot DP, Legrang MJ, Jacquet NJ, Lammy ML. Hemodynamic changes during laparoscopic cholecystectomy. *Anesth Analg* 1993; **67**: 1067-71.
10. Shanta TR, Harden J. Laparoscopic cholecystectomy: anesthesia related complication and guidelines. *Surg Laparosc Endosc* 1991; **1**: 173-8.
11. Heinonen J, Jakki S, Tammisto T. Effect of the Trendelenburg tilt and other procedures on the position of endotracheal tubes. *Lancet* 1969; **1**: 850-53.
12. Hodgson C, McClel RMA, Newton J. Some effects of the peritoneal insufflation of carbon dioxide at laparoscopy. *Anesthesia* 1970; **25**: 382-90.
13. Gigot JF. Laparoscopic cholecystectomy: which results in the current practice of general surgeon? The Belgian Group of Endoscopic Surgery. Paper presented at the Third World Congress of Endoscopic Surgery at Bordeax, June 18-20, 1992.