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LAPAROSCOPIC CHOLECYSTECTOMY IN CARDIOPULMONARY DYSFUNCTION PATIENTS

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ABSTRACT

Laparoscopic cholecystectomy (LC) has emerged as new gold standard for treatment of symptomatic cholelithiasis and increasing number of procedures are done for patients with various high risk comorbid conditions. In recent years development of surgical skills and better understanding of pathophysiology of pneumoperitoneum have made it possible to offer LC to patients suffering from various high risks. However by virtue of its positive pressure pneumoperitoneum and carbon dioxide (CO_2) insufflations, LC poses some deleterious effects on cardiopulmonary system. For high risk patient's preoperative preparation, active perioperative monitoring and low pressure pneumoperitoneum with intraoperative and postoperative complications were studied. In this prospective and retrospective hospital based observational study, we included 134 patients that underwent LC and laparoscopy converted to open cholecystectomy from May 2012- May 2016. Mean age was 61.5years, with male to female ratio of 5:11. The majority of our high risk patients (77.6%) had cardiac ailments including conduction disturbances, arrythmias, valvular heart disease, coronary artery disease, myocardial infarction and congenital heart diseases. Out of these, 4.4% patients had ejection fraction less than 30-40%. Respiratory comorbiditiescomplicated about 11.9% patients.Conversion rate to open cholecystectomy in our study was about 8.9%. Postoperative complications were reported in 16.4% of patients. Patients were grouped as per American Society of Anaesthesiologists (ASA) grading. We concluded that in presence ofthorough preoperative assessment and optimization, intraoperative balanced anaesthesia, low pressure pneumoperitoneum and postoperative care, laparoscopic cholecystectomy is safe for high risk patients.

Key words: Laparoscopic cholecystectomy, High risk patients, Cardiac dysfunction, Pulmonary dysfunction, Pneumoperitoneum.

INTRODUCTION

Laparoscopic cholecystectomy (LC) was first reported in Germany (1985) and France (1987) more than two decades ago (Reynold, 2001; Mouret, 1990; Cuschieri *et al*., 1991; Delaitre *et al*., 1992). Laparoscopic cholecystectomy has revolutionized minimally invasive surgery (Cuschieri *et al*., 1991; Barone and Lincer, 1991; Liu *et al*., 1996). The appeal of diminished pain and fatigue, early return to normal activities and superior cosmesis has made it popular surgery (Broadsky *et al*., 2000). A significant reduction in incidence of wound infection and postoperative ileus has been documented in patients undergoing Laparoscopic Cholecystectomy (Alponat *et al*., 1997; Ros *et al*., 2006). Laparoscopic Cholecystectomy has emerged as new gold standard for treatment of symptomatic cholelithiasis and increasing number of procedures are done for acute cholecystits (Hobbs *et al*., 2006; Hasl *et al*., 2001; Jan *et al*., 2006). Pneumoperitoneum (PP) complicates as per patients ASA status. CO_2 and elevated intra abdominal pressure due to pneumoperitoneum has potential harmful intraoperative circulatory and ventilatory effects although not clinically significant for ASAI&II, these are assumed to be deleterious for high risk patients ASAIII&IV and significant cardiopulmonary, renal, hepatic diseased patients (Dennis *et al*., 2009). Previously held ascontraindications to LC, pregnancy, cirrhosis, coagulopathy, previous abdomen surgery, morbid obesity, acute cholecystitis, are no longer considered as contraindication to LC but requires special care and preparation of patient by surgeon and careful evaluation of risk vs benefit (Joris *et al*., 1993; Dorsay *et al*., 1995). In recent years development of surgical skills and better understanding of pathophysiology of pneumoperitoneumhave made it possible to offer LC to patients suffering from various high risk conditions. However, by virtue of its positive pressure pneumoperitoneum and CO_2 insufflation, LC poses some deleterious effects on cardiopulmonary system (Zullinger *et al*., 1997) and concerns about the safety of this technique in patients with cardiac comorbidity remain justified (McLaughlin *et al*., 1995). Diminished stress, thorough preoperative patient evaluation, intraoperative balanced anesthesia and postoperative care can bring the patients with high risk cardio pulmonary dysfunction within the ambit of LC.

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MATERIALS AND METHODS

Data was collected from department of Minimal Invasive Surgery SKIMS from May 2012 to May 2016. Preoperatively every patient underwent thorough assessment include complete history, general physical, examination, having cardiologist and anesthesiologist consultations. The patients were grouped according to the American Society of Anaesthesiologist's (ASA) functional classification system. Patients belonging to ASA II, III and IV were included in this study. Patients were thoroughly investigated which ranged from the baseline investigations like hemogram, liver and kidney function, coagulation profile, ECG, chest radiography to more detailed studies like echocardiography, pulmonary function, USG abdomen and occasionally MRI/MRCP. Intraoperative management included providing balanced anaesthesia, keeping ready life saving measures as temporary pacing, defibrillator and life saving drugs e.g. Esmolol, Ephedrine, Atropine, Adenosine and Adrenaline. Prior to the surgery, the mode of permanent pacemaker was changed with help of a cardiologist. Other patient directed measures included securing A-Line, central line for CVP monitoring and delivery of emergency drugs, secure epidural catheter for perioperative pain management.

Establishment of pneumoperitoneum

One of the critical components is to establish Pneumoperitoneum in Cardiopulmonary high risk patients. In our study Pneumoperitinium was established in every patient with some specific considerations with slow rate of insufflation at rate of 3-4L/min, low average pressure PP in range of 10-12 mmHg, minimising the time of PP and intermittent desufflation if time of PP was prolonged beyond one hour.

Postoperative management

Appropriate postoperative is the cornerstone in carrying out LC in high risk patients. The post operative protocol included closely monitoring vitals, CVP, SPO_2, electrolytes and ABG. Ventilatory support was provided, if needed. In selected patients with stable rhythm, temporary pacing was turned off and in patients with permament pacemaker, the mode was changed back in consultation with the cardiologist. Adequate analgesia was provided using both epidural and parenteral anaesthesia. Attempts were made at early mobilization and early discharge from the hospital.

RESULTS

Total of 134 patients were enrolled with mean age of 61.5years. Majority of patients belonged to age group 40-60 year (51.5%). Females outnumbered males with 69.4% female versus 30.6% males (M:F ratio 5:11). Pain abdomen was the most common symptom seen in 76.9% followed by dyspepsia (56.7%) and vomiting (29.9%). Most of our patients belonged to ASAII, ASAII and ASAIV categories with percentages of 27.6%, 32.1% and 40.3% respectively. Patients with cardiac dysfunction constituted 77.6% (Table 1). Coronary artery disease (CAD) was present in 3.7%, CAD with Stent in 3.7% and CAD with previous surgical intervention as coronary artery bypass surgery (CABG) in 1.5%.Nine percent patients had ischemic heart disease with myocardial infarction (MI) 7.5% and angina 1.5%. Heart block complicated 21.7% patients. Arrhythmias were seen in 2.2%patients with paroxysmal supra ventricular tachycardia (PSVT) 0.7% and atrial fibrillation (AF) 1.5% being common arrhythmias. Dilated cardiomyopathy (DCM) was present in 6% of patients. Respiratory dysfunction complicated about 11.9% .Conversion rate to open procedure in our study was about 8.9%.

Table 1. Various comorbidities studied

Comorbidities	N	%
Coronary Artery Disease	11	8.9%
Ischemic Heart Disease	12	9%
Conduction Defects	29	21.70%
Rheumatic Heart Disease	6	4.40%
Congenital Heart Disease	2	1.40%
Arrhythmias	3	2.20%
Pacemaker	10	7.50%
COPD	13	9.7%
Asthma	1	0.7%
Chronic Bronchitis	2	1.5%
Diabetes	25	18.7%
Hypothyroid	27	20.1%
ECHO(EF 30-40%)	9	6.3%
Regional wall motion (RWM)	7	5.2%
PFT(Mod to Severe decrease)	12	8.9%

Intraoperative complications (Table 2) that had prevailed due to hemodynamic changes in response to pneumoperitonium, were in following order; tachycardia 3.7% (5/134), tachycardia with ST segment changes 0.7% (1/134), bradycardia 1.4%, bradycardia with hypotension 2.2% (3/134). Temporary pacing was required 5.2 %(7/134). Majority (79.8%) of patients in this study had uneventful intraoperative period. Postoperative complications were reported in 16.4% of patients, while 83.6% of patients had uneventful postoperative course. Common complications were tachycardia 10.4 %(14/134), hypertension 0.7% (1/134) and bradycardia was seen in 0.7% of patients. Post operative ventilator support was required in 0.7% patients. One patient, belonging to ASAIV category, suffered fatal MI with consequent death.

Table 2. Intraoperative complication and management

Intraoperative complication	Intraoperative management			Total N (%) of total (134)
	Esmolol N	Ephedrine N	None N	
Tachycardia	5	0	0	5 (3.7%)
Unstable Brady with Hypotension	0	3	0	3 (2.2%)
Bradycardia	0	0	0	2 (1.4%)
Tachycardia with ST changes	1	0	0	1 (0.7%)
Arrhythmias	0	0	0	0 (0%)
Uneventful	0	0	107	107 (79.8%)

DISCUSSION

Almost all major comorbidities were included in this study with main focus on cardiac and pulmonary patients. Elderly age is itself a high risk for laparoscopic cholecystectomy.

Improvements in perioperative care for the aging population have resulted in an increasing number of elderly patients being considered for surgery. Increased risks and complications of surgery in the elderly may be reduced by minimally invasive surgery which is associated with a shorter hospital stay and fewer complications in elderly patients (Dennis *et al*., 2009; GurkanYetkin *et al*., 2009). Among high risk patients majority belongs to cardiac dysfunction group. With appropriate cardiological support, LC may be safely performed in patients with significant cardiac dysfunction. The study showed that LC may be safely performed in patients with significant cardiac dysfunction. Such patients need proper evaluation by cardiologists and anesthesiologists and a single transthoracic echocardiography estimation of left ventricular ejection fraction should not be given undue importance. If considered safe to undergo general anaesthesia such patients should not be denied the benefits of LC. Optimization of cardiac status, administration of balanced anaesthesia and low-pressure pneumoperitoneum are essential steps to ensure patient safety (Sagar Sadhu *et al*., 2011; Pessaax *et al*., 2000; Malik *et al*., 2007). Cardiovascular changes follow a pattern of progressive depression of cardiac index and increase of SVR following induction of general anesthesia, insufflation of the abdomen with CO_2 and institution of the reverse Trendelenburg position (Richard *et al*., 1995). Pneumoperitoneum (PP) complicates patient as per his ASA status. Carbon dioxide and elevated intra abdominal pressure due to pneumoperitoneum have potential harmful intraoperative circulatory and ventilatory effects, although not clinically significant for ASA I & II, these are assumed to be deleterious for high risk patients in ASA I & II and in those with significant cardiopulmonary, renal, hepatic diseases. For LC in patients with ASA III&IV, risk for anaesthesia has significant adverse affects that could be attributed to CO_2 pnemoperitoneum (Dennis *et al*., 2009). High Risk patients under this study were grouped as per American society of

Anesthesiologists (ASA) grading. Among cardiac patients 46% belonged to ASA IV, while 38.4% to ASA III and 15.3% grouped as ASA II. Ten of the cardiac patients with MI belonged to ASA IV. Haemodynamic and ventilatory changes during LC in ASA III patients can be stabilized by gradual abdominal insufflation to 12mmHg followed by a limited 10degree head up tilt (Hashmotto *et al*., 1993; Malik *et al*., 2007). Pneumoperitoneum was established in every patient with slow rate of insufflation at the rate of 3-4mmHg/min, low average pressure in range of 10-12 mmHg. Duration of pneumoperitoneum almost all cases especially in Cardiac patients was kept between 60-90mintues with mean of 75min in about 99.3% of patients and in 0.7% patients it was above 90min. Induction of PP was kept at slow rate 3-4mmHg/min in all most all patients especially in high risk cardiac patients that is critical factor for controlling haemodynamic changes during surgery. Conversion to open cholecystectomy was mostly seen in ASA IV group of patients with rate of 8.9%.Most common reason being adhesion in Calot's triangle in about 75% of patients followed by prolonged pnemoperitoneum (PP), intolerance to pnemoperitoneum and bleeding (Malik *et al*., 2007). Intraoperative balanced anesthesia had brought the patients with high risk cardio pulmonary dysfunction within the ambit of LC. Management of intraoperative complications was done on instant basis with some life saving drugs available beforehand and availability of all resuscitative measures in OT. Patients who had suffered tachycardia were given Esmolol; patients having bradycardia with hypotension were infused Ephedrine, patients with tachycardia with ST changes treated with Esmolol. Patients who developed isolated bradycardia received expectant treatment. One of merits of LC that was evident in this study was diminished hospital stay with 95.8% of patients that had underwent LC had stayed for 12-24hrs post operatively with 3.4% of patients remained for more than 24hrs.

Conclusion

Preoperative optimization, administration of balanced anaesthesia, low-pressure pneumoperitoneum, management of intraoperative complications on instant basis with availability of all resuscitative measures in operation theatre and postoperative care can bring the patients with high risk cardio pulmonary dysfunction within the ambit of laparoscopic cholecystectomy. Conversion rate to open cholecystectomy was mostly seen in ASA IV group of patients, with most common reason for conversion being adhesions in Calot's triangle. The chances of life threatening complications are rare, and in the eventuality, can be easily managed in a hospital with adequate critical care support.

REFERENCES

Alponat A, Kum CK, Koh BC. 1997. Predictive factors for conversion of laparoscopic Cholecystectomy. *World J Surg*., 21:629-33.

Barone JE. and Lincer RM. 1991. The southern surgeons Club. A prospective analysis 0f 1518 laparoscopic Cholecystectomy. *N Engl J Med*., 325(21):1517-8.

Broadsky A, Matter I, Sobo E, Cohen A. 2000. Laparoscopic Cholecystectomy for acute cholecystitis: the need for conversion and probability of complication be predicted. *SurgEndosc*., 14:755-0.

Cuschieri A, Dubios F, Muiel J. 1991. The European experience with laparoscopic cholecystectomy. *Am J Surg*., 116(3):385-7.

Delaitre B, Testas P, Dubois F. 1992. Complication of cholecystectomy by laparoscopic approach. Apropos 6512 cases. Chirurgie, 118(1-2):92-9.

Dennis, R., R Guy, F Bajwa. 2009. Laparoscopic Cholecystectomy in Patients Over 80 years is Feasible and Safe: Analysis of 68 Consecutive Case. *W J LaparoSurg*., 2(2):22-25.

Dorsay DA, Greeny, FL, Balsinger CL. 1995. Hemodynamic changes during laparoscopic Cholecystectomy with trans esophageal echocardiography. *SurgEndoce*., 9:128-134

GurkanYetkin, MD, Mehmet Uludag, MD, Sibel Oba, MD, BulentCitgez, MD, InciPaksoy, MD. 2009. Laparoscopic Cholecystectomy in Elderly Patients. *JSLS*, 13:587–591

Hashmotto S1, Hashikura Y, Munakata Y, Kawasaki S, Makuchi M, Hayashi K *et al*. 1993. Changes in cardiovascular and respiratory systems during laparoscopic Cholecystectomy. *J Laparoendosc Surg*., 3(6); 535-9.

Hasl DM, Ruiz OR, Gerace C *et al*. 2001. A prospective study of bile leaks after laparoscopic Cholecystectomy. *SurgEndosc*., 15:1299-1300.

Hobbs MS, Mai Q, *et al*. 2006. Surgeon experience and trends in intra-operative complications in laparoscopic Cholecystectomy. *BJS*, 93:844- 53.

Jan JT, Suyapto DR, Neo EL, Leong PS. 2006. Prospective audit of laparoscopic Cholecystectomy experience at secondary referral centre in south Australia. *ANZJSurg*., 76:335- 8.(Medline).

Ji W, Li LT, Li JS. 2006. Role of laparoscopic subtotal Cholecystectomy in the treatment of complicated cholecystitis. *HepatopancInt*., 5(4):584-9.

Joris JL, Norbit DP, Legrand MJ, Jacquet NJ, Lamy ML. 1993. Hemodynamic changes during laparoscopic Cholecystectomy *SurgGynecol Obestet*., 175(6):535-538

Liu CL, Fan ST, Lai EC. 1996. Factors effecting conversion of laparoscopic Cholecystectomy to open surgery. *Arch surg*., 135:98-101.

Malik AM1, LaghariAA, TalpurKA, MemonA, PathanR, Memon JM. 2007. LC in elderly patients. *J Ayub Med Coll Abbottabad*., 19(4);45-48.

McLaughlin JG, Scheeres DE, Dean RJ, Bonnel BW. 1995. The adverse hemodynamic effects of laparoscopic Cholecystectomy. *Surg Endosc*., 9:121–124.

Mouret P. 1990. Celioscopoic surgery Evolution or revolution. Chirurgie, 116(10):829-32.

Pessaax, P.J., J Tuech, Regenet N, Fauvet R, Boyer J, Arland JR. 2000. Laparoscopic Cholecystectomy in Elderly. *Gastroenterol ClinBiol*., 24(4);400-3

Reynold W.Jr. 2001. The first laparoscopic cholecystectomy. *JSLS*, 5(1)89-94.

Richard WM, Wahaba, FrescocisBeiqe, Simcha J, Keilman, 1995. *CAN J Anaesth*., 42(1):51 - 63.

Ros A, Carlsson P, Rahmgvist, Bachmank K. 2006. Non randomized patients in Cholecystectomy trial, characteristics, procedure and outcome. *BMC Surg*., 6:17.

Sagar Sadhu, Sujitsarkar, TarshidA, Jahangir, RakeshVerma, Furqan sheikh *et al*. 2011. LC in patients with cardiac dysfunction. *Indian J Surg*., 73(2);90-95.

Zullinger A, Krayer S, Singer TH *et al*. 1997. Haemodynamic effects of pneumoperitoneum in elderly patients with an increasing cardiac risk. *Eur J Anaesthesiol*., 14(3):266-275

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