Original Article

Subarachnoid block versus general anaesthesia for laparoscopic cholecystectomy-A comparative study

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Abstract

Background: Subarachnoid block in selected cases is a safer alternative to general anaesthesia for laparoscopic cholecystectomy because of advantages of neuraxial block over general anaesthesia.

Objective: The aim of study is to compare the outcome of patients between subarachnoid block and general anaesthesia for laparoscopic cholecystectomy.

Methods: Sixty patients aged 20-50 years of ASA grade I & II for laparoscopic cholecystectomy under spinal and general anaesthesia were randomly selected equally into two groups:

SA group: Spinal Aneasthesia group (n=30)
GA Group: General anaesthesia group (n=30)

Using CO2 pneumoperitoneum intra-abdominal pressure in SA group was kept at 10mmHg (Low) while in GA group was at 15mmHg (High). All patients in SA group were sedated after adequate block (T5).

Parametric data like pulse and blood pressure were analyzed by ANOVA test & nonparametric data like abdominal discomfort, right shoulder pain, nausea, vomiting were analyzed by chi-square test.

Results: The study revealed that one patient in SA group required conversion to GA. Per operatively in SA group hypotension was recorded in 10% of patients while in GA group it was 6.6%. On the other hand In SA group 10% of patients had vomiting, 10% experienced right shoulder pain. Postoperatively in GA group 20% of patients had vomiting, 10% of patients had right shoulder pain and 90% patients required injectable analgesics in the immediate postoperative period. On the other hand in SA group no patient had right shoulder pain, 3.3% of patients had vomiting, 6.6% of patients had post dural puncture headache. Average time of stay in hospital in both groups was 1.9 days.

Conclusion: It can be concluded that laparoscopic cholecystectomy under SA with low pressure CO2 pneumoperitoneum is a safer alternative to GA because there is no intubation related airway morbidity& mortality ,optimum muscle relaxation ,decreased surgical bed oozing , economical, pain free early postoperative period, more rapid return of gut function and decreased postoperative nausea & vomiting .

Keywords: *Laparoscopic cholecystectomy, Subarachnoid block, General anaesthesia.*

Introduction

Gall stone disease is a common surgical problem. Cholecystectomy is the treatment of choice for both calculus and a calculus cholecystitis. Now a days laparoscopic cholecystectomy has replaced more invasive open cholecystectomy because of advantages of less tissue trauma, short hospital stay, economical and increased turn over of patients. Conventionally general anaesthesia has been the technique of choice for laparoscopic cholecystectomy over decades. But subarachnoid block with low pressure CO2 pneumoperitoneum is a safer alternative for laparoscopic cholecystectomy because of advantages of SA over GA which include uniform muscle relaxation, a conscious patient, economical, relatively uneventful recovery, pain free early postoperative period and the protection from potential complications of GA (Casey, 2000).). The world literature until about a decade ago suggested GA as the only anaesthetic option for abdominal laparoscopic surgery. But now a days reports of laparoscopic cholecystectomy being performed in selected patients under spinal or epidural anaesthesia

have started to appear (Sinha et al, 2008).So SA is chosen in selected cases and the purpose of this study is to compare the outcome of patients between subarachnoid block and general anaesthesia for laparoscopic cholecystectomy.

Material and methods

After obtaining written informed consent, 60 patients (ASA grade I and II, aged between 20 to 50 years) were enrolled for the study. The study was conducted in Dhaka National Medical College & Hospital from May 2013 to May 2014.Patients fulfilled following inclusion criteria: ASA I or II, between 20 and 50 years, BMI $\leq$ 32, and normal coagulation profile. Exclusion criteria were Acute cholecystitis, pancreatitis, cholangitis, prior laparotomy for upper abdominal surgery and contraindication for spinal anesthesia as well as gallbladder wall thickness more than normal limit in ultrasonographic findings. Patients were randomly divided into two equal groups as follows: SA group: Spinal anesthesia group (n=30), GA Group : General anaesthesia group.(n=30) .

All patients were kept overnight fasting. In the morning of the day of operation IV line was made using 18G cannula and all patients received inj. metoclopramide 10mg & inj. Omeprazole 20mg intravenously 1 hour before sugery. All patients received 15ml kg^{-1} Ringer's lactate solution as preload.

In SA group under full aseptic precaution lumbur puncture was performed in L^{2-3} interspace in sitting position with 25G Quincke's spinal needle splitting duramater by keeping the bevel end of the needle in lateral direction and 3ml. 0.5% heavy bupivacaine + 25 µgm fentanyl was injected into subarachnoid space after confirming free flow of CSF. Head down tilt to 10 degree was kept for 10 minutes to achieve desirable segmental block level at (T_4-T_5) to enable introduction of the epigastric port. After adequate block the patient was sedated with 25mg pethidine & 0.5 mg/kg ketamine in IV route. $C0_2$ pneumoperitoneum was done using low pressure and intra abdominal pressure was kept at 10 mm Hg. The patient was positioned to reverse trendelenburg with left lateral tilt. Ryle's tube was given according to the demand of the surgeon. All patients received O_2 3L/ min. via nasal prongs. Patients complaining of right shoulder pain was treated with shoulder massage and IV ketamine; if no response the patient was converted to GA.

In GA group the patient was preoxygenated with 100% O_2 for 5 minutes and the patient received fentanyl 1µgm kg^{-1} IV as premedication just before induction. The patient was induced with propofol 2mg kg^{-1} IV and endotracheal intubation was done with suxamethonium 1.5 kg^{-1} IV. GA was maintained with O_2, N_2O, halothane and increments of non depolarizing agent vecuronium. 01 mg kg^{-1} IV every 20 minutes. CO_2 pneumoperitoneum was done and the intra abdominal pressure was kept at 15 mm Hg. The patient was positioned to reverse trendelenburg with left lateral tilt. Ryle's tube was given according to the demand of the surgeon. Residual neuromuscular blockade was antagonized with .05 mg kg^{-1} neostigmine IV and .02mg kg^{-1} atropine IV at the end of the surgery.

Monitoring of patients were clinical and instrumental. Blood pressure were recorded perioperatively by ascultatory method. Hypotension defined as a decrease in SBP more than 20% from the base line was treated with bolus intravenous 5mg increaments of ephedrine. Oxygenation of patients were monitored by SpO_2 during, per & post operative period. Respiratory rate, pulse rate were recorded clinically during perioperative period. In SA Group incidence of nausea & vomiting, abdominal discomfort, right shoulder pain were recorded during, per & post operative period while post dural puncture headache were recorded post operatively.

PONV, right shoulder pain were recorded in GA group post operatively. Post operative analgesics requirements in both group were also noted.

All data were compiled and analyzed using ANOVA or chi-square tests as appropriate with the help of SPSS window version 11. The results were regarded as significant if p value <0.05.

Results

Sixty patients undergoing laparopscopic cholecystectomy was included in this study. They were randomly selected in 2 groups, 30 in each group (Gr-SA, Gr - GA).

Table-I: Demographic profile of patients

	SA group (n=30)	GA group (n=30)
Age	35±4	35± 5
Weight in kg	53±5	51±6
Height in cm	154±7	156±8

Values are expressed as Mean± SD. There were no statistically significant difference in age, weight, and height among groups. Therefore patients in these groups were homogeneous regarding demographic character.

Table-II: Operating time in SA and GA group

	SA group (n=30)	GA group (n=30)
Operative time in minutes	37.5 (30- 45)	40 (35-45)

Average operative time was 37.5 minutes in SA group and 40 minutes in GA group. The difference was insignificant.

Table-III: Observations of peroperative period in both groups

Peroperative	SA group (n=30)	GA group (n=30)	P value
Stomach distension requiring Ryle□s tube	1 (3.33%)	3 (10%)	0.389
Hypotension	3 (10%)	2 (6.6%)	0.967
Right shoulder pain	3 (10%)	0	0.562
Vomiting	3 (10%)	0	0.562
Conversion to GA	1 (3.3%)	NA	

Peroperatively hypotension, vomiting, right shoulder pain, stomach distension requiring Ryle□s tube among two groups were statistically insignificant. One patient in SA group required conversion to GA.

Table IV: Observations of post operative perioid in both groups

Post operative	SA group (n=30)	GA group (n=30)	P value
Vomiting	1 (3.3%)	6 (20%)	<0.01
Headache	2 (6.6%)	0	.692
Right shoulder pain	0	3 (10%)	.850
Pain treated with injectable analgesic	3 (10%)	27 (90%)	<0.01
Average hospital stay in days	1.9	2.1	NS

Post operative vomiting & analgesic requirements in both groups were statistically significant while headache (PDPH), Right shoulder pain & average hospital stay in both groups were statistically insignificant.

Discussion

Regional anaesthesia is seldom used in abdominal laparoscopic surgeries except for diagnostic laparoscopies. The prime indication for using regional anaesthesia in therapeutic laparoscopy is still limited and the preferred type of regional anaesthesia is epidural anaesthesia. Thus reports of laparoscopic surgery being done with patients under SA are even scarcer than those of patients under epidural anesthesia (Hamad et al, 2003; Ciofolo et al, 1990). The optimal anterior abdominal wall relaxation as well as the conscious and receptive patient under SA together with our experience of SA in open cholecystectomies inspired us to try SA for laparoscopic cholecystectomies. Another reason for preferring SA was preventing the common problems of GA.

The pneumo-peritoneum induced rise in intra-abdominal pressure including pressure on the diaphragm and carbon dioxide induced peritoneal irritation were the factors to be considered. These factors could be overcome by using nitrous oxide, which is less irritating for the peritoneum as compared to carbon dioxide and by using low pressure (8-10 mm Hg) pneumo-peritoneum. Using low pressure CO_2 pneumoperitoneum with intraperitoneal pressure of 10 mm of Hg when using SA for laparoscopic cholecystectomies have been reported to reduce the abdominal discomfort and chances of neck and right shoulder pain (Putensen-Himmer et al, 1992). We have been operating at average pressure of 10mm of Hg using carbon dioxide, and no changes were necessary in port placement in SA as compared with GA patients. Surprisingly neck and right shoulder pain have never been a major problem in the present study. They occurred in only 10% of patients who were managed with inj. Ketamine 25 mg IV and repeated if required. One of them required conversion to GA. Pursnani et al (1998) noted that shoulder and neck pain occurred in 2 out of 6 patients operated under spinal anaesthesia. On the other hand, in the series of Hamad et al (2003), out of 310 LC performed under SA, only one patient had to be given GA because of intolerable shoulder pain. Chiu et al (1996) also noted shoulder pain in 1 of 11 patients of bilateral spermatic varices operated laparoscopically under epidural anaesthesia. The other reason for conversion in this study was an incomplete effect of SA.

In addition to SA related hypotension, the pneumo-peritoneum induced rise in intra-abdominal pressure could be another cause for the persistence of hypotension. In the present study, the incidence of hypotension was comparable in LC performed under SA and open surgery with SA. Hartmen et al (2002) reported hypotension in 5.4% of cases, Palachewa et al (2001) in 15.7%, Throngnumchai et al (1999) in 20.2% of their cases of

SA group as compared to 10% cases of the present study. Incidence of hypotension in this study was statistically insignificant. This conclusively proves that the incidence of hypotension is no different whether laparoscopic surgery or open surgery is being done under SA and that an intra-peritoneal pressure of 8mm Hg to 12 mm Hg does not add to the problem of decreased venous return and persistence of hypotension. Although Chiu et al (1996) have mentioned that a high SA block up to T2-T4 may cause myocardial depression and reduction in venous return, this was not substantiated in our study. An added advantage cited has been the decrease in surgical bed oozing because of hypotension, bradycardia associated with SA (Casey, 2000).

The main debatable point is the status of respiratory parameters among the two modes of anaesthesia during laparoscopic surgery. In this context it can be stated that spontaneous physiological respiration during SA would always be better than an assisted respiration as in GA.Intubation related morbidity & mortality can be avoided in SA group and this is the most beneficial effect of SA. In addition, pulmonary function takes 24 hours to return to normal after laparoscopic surgery under GA (Putensen-Himmer et al, 1992). In present study none of the patients experienced respiratory problems during the surgery in both groups.

No significant difference was noticed in operating time under SA or GA. Instead, the time from application of total anaesthesia to wheeling the patient out of the operating room actually decreases when the patient is being operated under SA, because the intubation and extubation time of GA is saved.

In the postoperative period after SA the patient is always receptive and more compliant to suggestions. A specific advantageof SA seems to be the decrease in the requirement of analgesia during early post operative period .In this study injectable diclofenac was required by 10% of SA patients for their abdominal pain as compared to 90% of GA group. This was statistically significant.

Postdural puncture headache was seen in 6.6% of patients of SA group while headcahe was not observed in GA group. This was statistically insignificant.

Complications like sore throat, relaxant induced muscle pain, dizziness, and postoperative nausea and vomiting (PONV) often create high morbidity after GA. The problem with PONV was seen in 3.3% of our SA patients while 20% in GA patients which was statistically significant. Another important advantage of SA is that other complications specific to GA, including cardiac, myogenic, and possible cerebral complications do not occur with SA. Mobilization and ambulation in both SA and GA patients was achievable within 8 hours to 12 hours after surgery.

Conclusion

It can be concluded that if the patient is cooperative , the operating surgeon as well as the anaesthesiologist is skilled & vigilant spinal anaesthesia in selected cases is a safer alternative to general anaesthesia for laparoscopic cholecystectomy because of advantages of neuraxial block over general anaesthesia.Advantages are no intubation related mortality & morbidity, little risk of unrecognised hypoglycaemia in a diabetic patient, excellent muscle relaxation, decreased surgical bed oozing, economical, pain free early post-operative period, a more rapid return of gut function and decreased postoperative nausea & vomiting. These are additional advantages in an old patient or those with COPD or other systemic diseases like hepatic and renal disease and diabetes mellitus.

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