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General Anesthesia vs Spinal Anaesthesia in Laparoscopic Cholecystectomy; safety, feasibility and affordability in rural Hospital in India

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Abstract

Introduction: General anaesthesia is choice of laparoscopic cholecystectomy (GA). Spinal anaesthesia is usually preferred in patients where general anaesthesia is contraindicated. In this study, the Spinal anaesthesia was used in 67 patients in whom LC was planned (study group). **Methods:** Laparoscopic cholecystectomy(LC) has been conventionally done under general anaesthesia. Regional anaesthesia is usually preferred in patients where GA is contraindicated. Spinal anaesthesia was used in 67 patents for laparoscopic cholecystectomy (study group). 50 patients were given GA as control group. There was no modification in the technique, and the intra-abdominal pressure was kept 8mm of Hg to10 mm of Hg. Sedation was given if required, and conversation to general anaesthesia was done in patients not responding to sedation or with failure of spinal anaesthesia. **Results:** Out of 67 patients, two patients required conversation to GA. Hypotension requiring support was recorded in 14 (20.89%) patients and 16(23.88%) experienced neck or shoulder pain or both.Postoperatively,2(2.9%) patients had vomiting as compared 17(34%) of patients who were administered GA. Injectable diclofenac was required in 25(37.3%) of patients for abdominal pain within 2hours postoperatively and oral analgesic 53(79.10%) patients within the first 24 hours in SA group. However, 96% of patients operated under GA required injectable analgesics in the immediate postoperative period. Postural headache was experienced by 5(7.46%) patients post-operatively. Average time of discharge was 1.9 in patients operated under S.A compared to2.1 days in G.A group. **Conclusion**: There is no risk of intubation-related airway obstruction, little risks of unrecognized hypoglycaemia in a diabetic patient, excellent muscle relaxation, decreased surgical bed oozing and a more rapid return of gut function when laparoscopic cholecystectomy is done using SA compared with GA.

Keywords: Spinal anaesthesia, Laparoscopic Cholecystectomy, General anaesthesia, Rural areas.

INTRODUCTION

General anaesthesia (GA) remains the choice for the majority of open abdominal surgical procedures and regional anaesthesia is preferred for patients who are at high risks under general anaesthesia. For last few years the trend has been doing almost all the open abdominal surgeries, including surgery of the upper abdominal surgeries, surgery of the upper abdominal organs like the stomach and hepatobiliary system under spinal anaesthesia (SA). The main reason for selecting spinal anaesthesia (SA) as the first choice for laparoscopic cases was its advantge over GA which include uniform total muscle relaxation, a conscious patients, economical, relatively uneventful recovery, pain free early postoperative period and the potential complication of GA [1]. It was thus logical extension that we shifted to SA for all laparoscopic Cholecystectomy (LC) cases.

The world literature until about 5years ago suggested only GA as the anaesthetic option for abdominal laparoscopic surgery being performed with select patients under spinal or epidural anaesthesia have started to appear.

MATERIAL AND METHODS

This retrospective study was carried out at Murshidabad Medical College and Hospital, West Bengal, India, a peripherally set, predominantly rural catering, Government Medical College from July2014 to June 2017. The American Society of Anaesthesiologist (ASA) GradeI & Grade II patients undergoing laparoscopic abdominal procedures were offered a as the first choice. Since 2014, 67 patients have undergone abdominal laparoscopic cholecystectomy under SA. Patients who preferred GA or had Contraindication for SA, like children less than 10yrs age, deformity of spine, cardiac problems and skin pathology overlying

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the spinal site were operated under GA and was taken as controls. In the study group 13 had acute cholecystitis and had to be taken for emergency LC whereas, 51 underwent elective cholecystectomy preoperatively, preloading with 1000ml Ringer's Lactate was done and patients were premeditated 45 mins before surgery with glycopyrrolate 0.2mg I.M +Diazepam 10mg or midazolam5mg I.M +Diclofenac Na 3ml (25mg/ml). Inj Ranitidine50mg intravenously and Inj Metoclopramide 10mg intramuscularly. Spinal anaesthesia was administered using a 25FG or 26FG lumber puncture needle in L1-l2 intervertebral space.3mL to5mL of sensorcaine (Bupivacaine Hcl5mg + sod. Chl .8mg/ml) was used. Headdown tilt 10 degrees to 20 degrees was kept for 5minutes.The segmental level achieved was T4-T5 to enable introduction of epigastric port. The patients was monitored for blood pressure, SPO2, SpCo2, heart rate, and patients anxiety was defined as anxiety that resulted in inability to complete the procedure under SA and requiring conversation to GA. During surgery, oxygen supplementation was optional and administered through a ventimask, at the rate of 5L/mins only in patients withSpo2 below 95%.In patients, complaining of neck pain, shoulder pain or both, Tramadol 25mg or Fortwin15mg was administered as slow I.V or in drip. In patients who still had persistence of pain.Ketamine25mg administered as slow I.V was used. If the patient was still anxious conversation to GA was done. Bradycardia below50/minutes was managed by 0.3mg-0.6mg atropine I.V or 0.2mg glycopyrrolate. Hypotension, defined as a fall in B.P of greater than 20% of original B.P at any time after SA during or after surgery, was managed by 3 to 6mg mephentermine I.V intermittently upto a maximum of 15mg and subsequent persisting hypotension was managed by dopamine 4ug to 6ug/Kg/min during the operative period or in the postoperative period or during both, until stabilization of blood pressure has been done. The laparoscopic procedure was carried out in the standard fashion with fours port without any modification. The peritoneal pressure was kept between 8mm to12 mm of Hg. The postoperative parameters evaluated (in non-sedated patients) included operative site pain, assessed by a verbal numeric pain scale: no pain, mild bearable pain not requiring any medication, moderate pain and severe pain, both requiring medication. The other parameters included urinary retention; headache and the incidence of postoperative vomiting. These were compared with corresponding parameters of 50 patients undergoing LC under GA.

RESULTS

This retrospective study included 67 patients who underwent LC under SA and 50 patients who underwent LC under GA between July 2014 to June 2017. In SA group, 52 patients were females, rest of them were males. The average age was 42.1yrs in GA group. 39 patients were females and 11 patients were males and there average age was 40.2yrs. In SA group, acute cholecystitis with cholelithiasis was the indication for LC in19.4% of cases against 14% in GA group. In rest of the patients in both groups LC was performed for chronic cholecystitis with cholelithiasis (Table 1).

Average operative time required in elective LC was 28.6mins in SA group and 32.6mins in GA group. During emergency LC, in SA a mean 41.6mins was needed whereas 42.6mins in GA group (Table 2). The difference was insignificant. During operation under SA, 14 patients had hypotention,16 had anxiety/neck &shoulder pain. Stomach distention requiring insertion of Ryle's tube was noticed in 3 patients against in 41 patients in GA group. The difference was significant (p value<0.01). Two patients of SA group had to be given GA due to failure of SA in one and neck & shoulder pain in another which was not relieved by drugs (Table 3).

The incidence of vomiting and pain treated with injectable analgesics or with oral drugs was significantly more in patients of GA groups than SA groups (p value<0.01). The incidence of urinary retention was more in SA group(p value<0.01).Headache was experienced by 5 patients in SA group only. Postoperative stay on an average was 1.9 days in SA group and 2.1 days in GA group and the difference was insignificant (Table 4).

Table 1: Profile of Patients in S.A and G.A group

		Spinal anaesthesia (n=67)	General anaesthesia (n=50)
Age	Average years	42.1years	40.2years
Sex	Females	52(76.6%)	39(78%)
	Males	15(23.4%)	11(22%)
Indication	Ach.Cholecystitis+Cholelithiasis	13(19.4%)	7(14%)
	Chr.Cholecystitis+Cholelithiasis	54(80.6%)	43(86%)

Table 2: Operating Time in S.A and G.A group

Operative time	Spinal anaesthesia (n=67)	General anaesthesia (n=50)
Elective Surgery In minutes	28.6(16-53)	32.6mins (17-59)
Emergency surgery In mins	41.6(19 -93)	42.6mins(22-112)

Table 3: Perioperative effects of S.A &G.A group

Perioperative	Spinal anaesthesia (n=67)	General anaesthesia (n=67)	P value
Hypotension	14(20.89%)	No Such	-
Anxiety/Neck &shoulder Pain	16(23.88%)	No Such	-
Stomach distention	2(1.49%)	41(82%)	<0.01
Conversation to G.A	2(1.49%)	no such	-

Table 4: Observation of Postoperative Period in S.A group.

Postoperative	Spinal anaesthesia (n=67)	General anaesthesia (n=50)	P value
Vomiting	2(2.9%)	17(34%)	<0.01
Pain treated with Injectable analgesic	25(37.3%)	48(96%)	<0.01
Pain treated with oral Analgesic	53(79.10%)	46(92%)	<0.01
Urinary retention	10(4.92%)	2(4%)	<0.01
Headache	5(7.46%)	0	<0.01
Average stay in Hospital in days	1.9	2.1	NS

NS=not significant

DISCUSSION

Regional Anaesthesia is seldom used in abdominal laparoscopic surgeries except for diagnostic laparoscopies. The prime indication for regional anaesthesia in therapeutic laparoscopies is still limited to patients unfit for GA and the preferred type of regional anaesthesia. Thus reports of laparoscopic surgery being done with patients under S.A. are even scarcer than those of patients under epidural anaesthesia [2, 3].

In the study set up, the surgeons were performing the majority of the open abdominal surgeries primarily with patients under Spinal anaesthesia (SA) for the last 8 years. Rarely in upper abdominal surgeries, especially those focus the cardio-oesophageal junction or liver, supplemental sedation or conversation to GA is required. It was thus logical that after performing the initial few laparoscopic surgeries

using GA in2009, we shifted to SA as the anaesthesia of choice for all our abdominal laparoscopic procedures. The optimal anterior abdominal wall relaxation and conscious and receptive patient under SA together with our experience of SA in open cholecystectomies for last 8years inspired us to try SA for all LCS. Another reason for preferring SA was preventing the potential complication of GA. The initial concern was never the subcostal level of anaesthesia (T4-T5) for the epigastric and subcostal ports, because we had been successfully making upper abdominal incisions in open abdominal surgeries without discomfort to the patient. The pneumoperitonium 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 changes in methodology of port site placement and using nitrous oxide which is less irritating for the peritoneum compared to carbon-dioxide, maintaining low intraperitoneal pressure of 8mmof Hg when using SA have been reported to reduce the discomfort chances of neck and shoulder pain [4, 5]. Surprisingly, neck pain and shoulder pain have never been a major problem in our patients. They occurred in only 23.88% of patients in our study for which inj. ketamine had to be given. one of them required conversation to GA. Pursnani *et al*. (1998) noted that shoulder and neck pain occurred in 2 out of 6 patients operated under epidural anaesthesia and it was easily managed [6]. 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 [2]. Chiu *et al* (1996) noted shoulder pain 1 in of 11 patients of bilateral spermatic varices operated under epidural anaesthesia. The other reasons for conversation in the study was incomplete effect of SA. Conversation to GA because of abdominal distention & discomfort during epidural anaesthesia was reported in 1 of 11 patients [7]. One out of 6 patients in the Ciofolo *et al* study required conversion to an open procedure because of uncontrolled movements under epidural anaesthesia [3].

The potentiality of intubation and ventilation-related problems including an increase in mechanical ventilation to achieve an adequate ventilation pressure exits during GA as compared to SA.

The pneumoperitoneum-induced rise in intraabdominal pressure could be another cause of hypotension. When the comparison of hypotension figures recorded in 14(20.89%) patents with figures in patients undergoing open surgery with SA, has been done it endorses the hypothesis. Thus while Bernd *et al* reported hypotension in 5.4% of their SA patients,. Palachewa *et al* found an incidence of 15.7%, Throngnumchai *et al* had an incidence20.2%, and Hyderally *et al* reported a 10% to 40% incidence [8, 9, 10, 11]. This then conclusively proves that the incidence of hypotension is no different whether laparoscopic surgery or open surgery is being done with SA and that an intra peritoneal pressure of between 8mmHg to 10mmHg does not add to the problem of decrease venous return and persistence of hypotension. Although Chui *et al* have mentioned that a high SA block upto T2-T4 may cause myocardial depression and reduction of venous return, this was never substantiated in our series. An added cardiovascular advantage cited has been the decrease in surgical bed oozing because of hypotension bradycardia, and improved venous drainage associated with SA [1].

GA patients unlike SA patients frequently have an additional problem of stomach inflation as a result of mask ventilation. This often requires Ryle's tube insertion, which amounts to unnecessary intervention in a body cavity.

The main debatable point, however, seems of respiratory parameters among the two modes of anaesthesia during laparoscopic surgery. In this context it can be stated that spontaneous respiration during SA would always be better than an assisted respiration [12].

In addition, pulmonary function takes 24 hours to return to normal after laparoscopic surgery under GA. However, the observation are not uniform and conflicting reports of respiratory parameter alterations in patients under regional anaesthesia and GA are present. On the other hand, Chiu *et al*, reported a significant arterial blood gas alteration during epidural anaesthesia [7]. Ciofolo *et al* (1990), concluded that the epidural anaesthesia for laparoscopy does not cause any ventilatory depression [3].

In this present study, none of the patients had any significant variation in pao2 or paco2 during the surgery with SA.

Perioperative shoulder pain never persisted in the postoperative period. In the postoperative period after SA, there was no restlessness as commonly seen after GA and the patient is always receptive and more complaint to the suggestions. A specific advantage of SA seems to be decrease in the requirement of postoperative analgesia. Injectable diclofenac was required by 37.3% of SA patients for their abdominal pain as compared to 96% of GA group. Injectable analgesic was required between 2to 6hours after surgery in SA while within 2 hours after extubation in GA patients. Postural headache was seen 7.46% of patients of SA group which persisted for an average 2.3 days and responded when the patient was made lie down and with an increased intake of fluids and salt. Complication of SA in LC is less seen as compared to the study of Palachewa *et al*. [9] Headache was not observed in GA groups. The significantly high incidence of urinary retention in patients operated under SA. Complications like sore throat, relaxant induced muscle pain, dizziness and post-operative nausea and vomiting (PONV) often create high morbidity after GA. The problem was seen in 2.9% of the SA group in the present study but has been reported as high as 8.1% in other studies [13]. Even But PONV is highest after GA, especially when nitrous, opiate or reversal agents are used. Even with the newer agents like propofol and isoflurane, the incidence of PONV, which is as high as 30% and substantially increases the cost of anaesthesia. Our GA patients had an incidence of 34% of PONV, which was significantly higher compared with that in SA patients. Another important advantage of SA is that other complication specific to GA including cardiac, myogenic and general Complication do no occur with SA. Mobilization and ambulation in both SA and GA patients was achievable within 8 hours to12 hours after surgery. Karnofsky performance status showed a 95% to 100% satisfaction level in 98% of the patients. This means the patient was happy and would probably recommended this approach to friends. This is actually true because a sizeable number of our patients now actually demand that they be operated on while under SA.

CONCLUSION

There is no risk of intubation-related airway obstruction, little risks of unrecognized hypoglycaemia in a diabetic patient, excellent muscle relaxation, decreased surgical bed oozing and a more rapid return of gut function when laparoscopic cholecystectomy is done using SA compared with GA. This is in addition to the obvious advantages in an old patient or those with COPD or other systemic disease like hepatic and renal disease and diabetes.

Laparoscopic cholecystectomy done with the patient under spinal anaesthesia have several advantages over laparoscopic cholecystectomy done with the patient under general anaesthesia.

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