Research Article

Feasibility of Laparoscopic Cholecystectomy Under Spinal Anaesthesia

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Abstract:

Laparoscopic Cholecystectomy (LC) has been conventionally done under general anaesthesia (GA). Regional anaesthesia is usually preferred in patients where GA is contraindicated. In this study, we present experience of using spinal anaesthesia (SA) for LC with the contention that it is a good alternative to GA. Spinal anaesthesia was used in 134 patients in whom LC was planned.

There was no modification in the technique, and the intra abdominal pressure was kept at 8mm Hg to 12 mm Hg. Sedation was given if required, and conversion to GA was done in patients not responding to sedation or due to failure of SA. Results were compared with 100 patients who had undergone LC under GA.

Out of 134 patients, two patients required conversion to GA. Hypotension requiring support was recorded in 28 (20.89%) patients, and 32 (23.88%) experienced neck or shoulder pain, or both. Postoperatively, 2.9% (4) of patients had vomiting as compared to 33% (33) of patients who were administered GA. Injectable diclofenac was required in 36.56% (49) for abdominal pain within 2 hours postoperatively and oral analgesic was required in 106 (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 8 (5.9%) patients postoperatively. Average time of discharge was 1.9 days in patients operated under SA.

Key Words: Laparoscopic cholecystectomy, Spinal anaesthesia.

Introduction:

Conventionally General anaesthesia (GA) remains the choice for the majority of open abdominal surgical procedures, and regional anaesthesia is preferred only for patients who are at high risk under GA. The main reason for selecting spinal anaesthesia (SA) as the first choice for laparoscopic cases was its advantages over GA which include uniform total muscle relaxation, a conscious patient, economical, relatively uneventful recovery, pain free early postoperative period and the protection from potential complications of GA (Casey, 2000). It was thus a logical extension that we shifted to SA for all Laparoscopic Cholecystectomy (LC) cases. The world literature until about a decade ago, suggested GA as the only anaesthetic option for abdominal laparoscopic surgery, and it is only recently that reports of laparoscopic surgery being performed in select patients under spinal or epidural anaesthesia have started to appear (Sinha et al, 2008).

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Material and Methods:

This retrospective study was carried out at Subharti Medical College, Meerut from June 2006 to July 2009. The American Society of Anaesthesiologists (ASA) Grade l & 11 patients undergoing laparoscopic abdominal procedures were offered SA as the first choice. Since 2006, 134 patients have undergone abdominal laparoscopic cholecystectomy under SA. Patients who preferred GA or had contraindications for SA, like children less than 10 years of age, spinal deformity, cardiac problems and skin pathology overlying the SA site, were operated under GA and were taken as controls. In the study group, 26 had acute cholecystitis and had to be taken for emergency LC whereas, 105 underwent elective cholecystectomy. Pre-operatively, preloading with 1000 ml Ringer Lactate was done, and patients were pre-medicated 45 minutes before surgery with inj. Ranitidine 50mg intravenously and lnj. Metoclopramide 10mg intramuscularly. Spinal anaesthesia was administered using a 25FG lumbar puncture needle in LI-L2 intervertebral space. Three millilitre of Heavy Bupivacaine mixed with 25 microgram Fentanyl was used. Head down tilt to 20 degrees was kept for 10 minutes. The segmental level desirable to be achieved was T4-T5 to enable introduction of the epigastric port.

The patient was monitored for blood pressure, SpO_2, heart rate and patient's anxiety. During surgery, oxygen supplementation was administered through a ventimask at the rate of 5L/minutes. Injection Tramadol 25 mg or Pentazocine 15 mg was administered as slow IV or in drip in all patients. Injection Ketamine 25 mg was administered as slow 1V in patients complaining of anxiety, neck pain, shoulder pain, or both. If the patient was not relieved, a dose of Ketamine was repeated and if patient was still anxious and uncomfortable, conversion to GA was done. Bradycardia below 50 per minute was managed by 0.3 mg-0.6mg atropine IV or 0.2mg glycopyrolate. Hypotension, defined as a fall in blood pressure (BP) of greater than 20% of pre-anaesthesia BP at any time after SA, during or after surgery, was managed by 3 to 6 mg Mephentermine IV intermittently up to a maximum of 15mg. The laparoscopic procedure was carried out in the standard fashion with four ports without any modifications. The intraperitoneal pressure was kept between 8mm to 12 mmHg. 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 were urinary retention, headache and the incidence of postoperative vomiting. These were compared with corresponding parameters of 100 patients undergoing LC under GA.

Results:

This retrospective study included 134 patients who underwent LC under SA and 100 patients who underwent LC under GA between June 2006 to July 2009. In SA group, 103 patients were females and rest of them were males. The average age was 41.8 years. In GA group, 78 patients were females and 22 were males and their average age was 39.2 years. In SA group, acute cholecystits with cholelithiasis was the indication for LC in 19.4% of cases against 14% in GA group. In rest of the patients in both the group, LC was performed for chronic cholecystitis with cholelithiasis.

Average operative time required in elective LC was 28.4 minutes in SA group and 32.2 minutes in GA group. During emergency LC, in SA group a mean of 41.1 minutes was needed whereas 42.4 minutes was needed in GA group. The difference was insignificant. During operation under SA, 28 patients had hypotension, 32 had anxiety/neck & shoulder pain. Stomach distension requiring insertion of Ryle's tube was noticed in 2 patients against 82 patients in GA group. The difference was significant (p<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 III).

Postoperatively, the incidence of vomiting and pain treated with injectable analgesics or with oral drugs was significantly more in patients of GA group than SA group (p<0.01). However, the incidence of urinary retention was more in SA group (p<0.01). Headache was experienced by 8 patients in SA group only. Postoperative hospital stay on an average was 1.9 day in SA group and 2.1 day in GA group and the difference was insignificant (Table IV).

Table I: Profile of patients in SA and GA group.

		Spinal Anaesthesia (n=134)	General Anaesthesia (n=100)
Age	Average Years	41.8 Years	39.2%
Sex	Female	103(76.8%)	78(78%)
	Male	31(23.2%)	22(22%)
Indication			
Ac cholecystitis + Cholelithiasis		26(19.4%)	14(14%)
Ch. Cholecystitis + Cholelithiasis		108(80.6%)	86(86%)

Table II: Operating time In SA and GA group.

Operative time	Spinal Anaesthesia (n=134)	General Anaesthesia (n= 100)
Elective surgery in minutes	28.4 (16 – 54)	32.2 (17 - 59)
Emergency surgery in minutes	41.1 (19 – 92)	42.4 (21- 111)

Table III: Perioperative side effects in SA & GA group.

Perioperative	Spinal Anaesthesia (n= 134)	General Anaesthesia (n=100)	p value
Hypotension	28(20.89%)	-	-
Anxiety/Neck & Shoulder pain	32(23.88%)	-	-
Stomach distension requiring Ryle's tube	2(1.49%)	82(82%)	<0.01
Conversion to GA	2(1.49%)	NA	-

Table IV: Observations of post operative period in SA group.

Postoperative	Spinal Anaesthesia (n=134)	General Anaesthesia (n=100)	*p* value
Vomiting	4(2.9%)	33(33%)	<0.01
Pain treated with Injectable Analgesic	49(36.56%)	96(96%)	<0.01
Pain treated with oral analgesic	106(79.10%)	91(91%)	<0.01
Urinary retention	18(13.43%)	3(3%)	<0.01
Headache	8(5.97%)	0	<0.01
Average Stay in Hospital in days	1.9	2.1	NS

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 to patients unfit for GA, 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 patient's under epidural anesthesia (Hamad et al, 2003; Ciofolo et al, 1990). The optimal anterior abdominal wall relaxation, and the conscious and receptive patient under SA together with our experience of SA in open cholecystectomies for last eight years, inspired us to try SA for all LCs. Another reason for preferring SA was preventing the potential problems 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 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 changes in methodology of port-site placement and using nitrous oxide, which is less irritating for the peritoneum as compared to carbon dioxide; maintaining a low intra-peritoneal pressure of 8 mm of Hg when using SA have been reported to reduce the discomfort and chances of neck and shoulder pain (Putensen-Himmer et al, 1992). We have been operating at an 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, anxiety, neck pain and shoulder pain have never been a major problem in the present study. They occurred in only 23.88% of patients for which inj. Ketamine had to be given. 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 epidural anaesthesia, and it was easily managed. 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 under epidural anaesthesia. The other reason for conversion in this study was an incomplete effect of SA.Conversion to GA because of abdominal distension & discomfort during epidural anaesthesia was reported in 1 of 11 patients by Chiu et al (1993). One out of 6 patients in the study by Ciofolo et al (1990) required conversion to an open procedure because of uncontrolled movements under epidural anaesthesia.

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 20.89% cases of the present study. 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 series. An added advantage cited has been the decrease in surgical bed oozing because of hypotension, bradycardia, and improved venous drainage associated with SA (Casey, 2000).

The main debatable point, however, seems to be 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. The

potentiality of intubation and ventilation-related problems including an increase in mechanical ventilation to achieve an adequate ventilation pressure exists during GA as compared to SA. In addition, pulmonary function takes 24 hours to return to normal after laparoscopic surgery under GA (Putensen-Himmer et al, 1992). However, the observations 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 (1996) reported a significant arterial blood gas alteration during epidural anaesthesia. Ciofolo et al (1990) concluded that epidural anaesthesia for laparoscopy does not cause ventilatory depression. Even, in the present series, none of the patients had any significant variation in PaO2 or PaCO2 during the surgery with SA.

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 appreciably when the patient is being operated under SA, because the intubation and extubation time of GA is saved.

Preoperative shoulder pain never persisted in the postoperative period. In the postoperative period after SA, there was no restlessness as is commonly seen after GA, and the patient is always receptive and more compliant to suggestions. A specific advantage of SA seems to be the decrease in the requirement of postoperative analgesia. Injectable diclofenac was required by 36.56% of SA patients for their abdominal pain as compared to 96% of GA group. The injectable analgesic was required between 2 to 6 hours after surgery in SA while within 2 hours after extubation in GA patients. Postural headache was seen in 5.9% of patients of SA group, which persisted for an average of 2.3 days, and responded when the patient was made to lie down and with an increased intake of fluids and salt. Complication of SA in LC is seen less as compared to the study of Palachewa et all (2001). Headache was not observed in GA group. The significantly high incidence of urinary retention in patients operated under SA could be due to the prolongation of muscle paralysis with SA. 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 2.9% of our SA patients, but has been reported as high as 8.1% in study by Sinha et all (2008). 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.

It can be concluded that LC under SA is a better alternative as there is no intubation related airway obstruction, 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. This is in addition to the obvious advantages in an old patient or those with COPD or other systemic diseases like hepatic and renal disease and diabetes.

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