

Laparoscopic cholecystectomy feasibility under spinal anesthesia

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Abstract

Introduction: Laparoscopic cholecystectomy may be performed using spinal anaesthesia instead of general anaesthesia (LC). In-depth investigation on the feasibility of laparoscopic cholecystectomy Spinal anaesthesia is administered. Aside from general anaesthesia, regional anaesthesia has been documented as a solo approach for executing LC (spinal/epidural/combined spinal epidural).

Material and Methods: The American Society of Anaesthesiologists anesthesiologists provided SA to 12 patients who had elective laparoscopic cholecystectomy with physical status I or II. Throughout the perioperative phase, only drugs for anxiety, pain reduction, nausea/vomiting alleviation, hypotension therapy, and adverse event management were administered. The operating table tilt was kept to a minimum and the CO₂ pneumoperitoneum pressure was less than 10 mm Hg during the LC procedure. Several studies were undertaken to examine postoperative complications as well as the duration of hospitalisation and patient feedback.

Results: Everyone had a successful spinal anaesthetic procedure and the maximum degree of sensory blocking was reached at T4. Only one patient had GA for surgery, and that patient was not able to have surgery with SA. Four patients (33.33%) complained of right shoulder discomfort after surgery, and Fentanyl was administered to two of them. There was no additional discomfort during or after the procedure. Midazolam was prescribed to two individuals for anxiety. One patient needed ephedrine because she was hypotensive, despite intraoperative crystalloid infusions of 1460 (SD 138) ml.

Conclusion: As a standard technique, a laparoscopic cholecystectomy may be performed under spinal anaesthesia. This is both feasible and safe. In hospitals with limited resources, such as those in developing countries, laparoscopic cholecystectomy may be done under spinal anaesthesia.

Keywords: Laparoscopic cholecystectomy; spinal anaesthesia, intrathecal morphine hyperbaric bupivacaine

Introduction

For laparoscopic cholecystectomy, endotracheal general anaesthesia (GA) is the anaesthetic method of choice (LC). Aside from general anaesthesia, regional anaesthesia has been documented as a solo approach for executing LC (spinal/epidural/combined spinal epidural). In the beginning, it was exclusively used for individuals who would otherwise be unsuitable for general anaesthesia due to their health status; but, more recently, it has been documented as a common procedure for otherwise healthy patients. It was formerly considered that endotracheal intubation was required for laparoscopic cholecystectomy ^[1].

With the introduction of CO₂ pneumoperitoneum, aspiration, abdominal pain, and hypercarbia were all

predicted outcomes. Recent research shows that low-pressure CO₂ pneumoperitoneum laparoscopic cholecystectomy under spinal anaesthetic is safe (SA) Laparoscopic cholecystectomy under regional anaesthesia has yet to achieve general acceptability, despite mounting evidence to the contrary. If spinal anaesthesia may be utilised instead of general anaesthesia as a standard procedure in clinical practise, then a randomised controlled trial will be conducted [2].

Implementation concerns have hampered the acceptability of laparoscopic surgery in rural regions of low and medium-income countries. Rural surgical personnel would need to be trained to do gasless laparoscopy as an alternative. This study examines rural North-East Indian surgeons' laparoscopic training [3].

In most cases, general anaesthesia is used during laparoscopic surgery. Patients with COVID-19 symptoms who need surgery are more likely to have problems related to the virus under general anaesthesia than under regional anaesthesia. A pandemic might lead to a lack of therapeutic medications because of Covid transfection during intubation procedures. Laparoscopy results in a quicker recovery and shorter hospital stay. A laparoscopy performed under regional anaesthetic may have various benefits in reducing the amount of Covid absorbed [4].

There is little usage of spinal anaesthesia in paediatric patients because of the extensive use of general anaesthesia in the United States. Although there is a wealth of evidence to the contrary, it is safe and effective. For the purpose of this research, the standard-of-care paediatric laparoscopic appendectomies conducted under spinal and general anaesthesia will be compared to the typical postoperative patient comfort, duration of hospital stay, and cost effectiveness [5].

Materials and Methods

Ethical committee of Israna Medical College-Teaching Hospital in Israna, Panipat, Haryana, India, approved this research before it was carried out. In order to be considered, patients had to have completed an informed permission form between September and October 2018 and meet the following criteria: ASA physical status I or II, between the ages of 18 and 65 with a body mass index (BMI) of 30 kg m² or below. To be excluded, participants needed to be free of any acute biliary or pancreatic conditions as well as any past open upper abdominal surgery, any other study medication, or any disease that may complicate or contraindicate SA. Before surgery, an anesthesiologist advised to patients that intravenous medicines or a switch to general anaesthesia (GA) may be used in the event of discomfort or pain. They were also made aware of the visual analogue scale and the rating of symptoms. The preoperative regimen was the same for all of the individuals. Before surgery, each patient was given Diazepam 5 mg, Ranitidine 150 mg, and Metoclopramide 10 mg by mouth. Non-invasive monitoring was established in the operating room, and 500 mL of Ringer Lactate solution was administered intravenously. All patients received intravenous administration of 4 mg Ondansetron and 8 mg Dexamethasone. Patients received a single dosage of a third-generation Cephalosporin to help prevent infection. Pre-anaesthetic heart rate, MAP, RRR, and pulse oximetry measurements were performed.

The SA procedure was carried out while the patient was seated. 2 cc of 1% Lignocaine was injected into the interspinous area between the L2 and L3 vertebrae. A 25-gauge introducer needle was used to enter the 27-gauge pencil tip spinal needle into the subarachnoid space at the L2-L3 intervertebral location. CSF flow was established within 20 seconds after administering 0.5 percent hyperbaric Bupivacaine and 0.15 mg of Morphine intrathecally. The Trendelenburg position was maintained for 3 minutes or until pin-prick stimulation every 30 seconds proved to be at or above T6 level, whichever came first, in order to test for the degree of sensory block. We used the phrase "time for induction" to keep track of how long it took a patient to enter the operating room and begin operation. For LC, the same technology was employed. At a flow rate of one litre per minute, the umbilical port was utilised to provide CO₂ at a maximum intra-abdominal pressure of 10 millimetres of mercury (mm Hg). Before dissecting the pneumoperitoneum, 12 ml of 0.25 percent Bupivacaine was administered into the right subdiaphragmatic region and the gall bladder.

The operating table was tilted as little as possible, with the exception of a little head up and left lateral tilt. As long as the anaesthetic approach didn't increase the surgical procedure's complexity, surgeons were ready to request general anaesthesia (GA). Orogastric tubes were used to relieve stomach pressure only when the surgeon requested it. Subhepatic drains were inserted in accordance with the surgeons' wishes. Clinical observation and hemodynamic condition were recorded at five-minute intervals for each patient throughout the procedure. Ephedrine 6 mg intravenous bolus and repeated every 3 minutes to titrate to the effect, which was defined as a reduction in mean arterial pressure of more than 20% below the preanaesthetic value were used to treat hypotension. An rise in mean arterial pressure of at least 20% above the pre-anaesthesia value is required to be deemed hypertension and treated with 0.5 mg Atropine. In the event of discomfort, pain in the belly or shoulders, headaches and nausea and vomiting, patients were asked to notify their doctors. All of these should have been reported. Each one of these actions was counted and recorded. Anxiety and discomfort were treated with intravenous boluses of midazolam (2 mg) and fentanyl (50 mcg). A mask was used to give 5 L/min of oxygen. For those patients who were dissatisfied, they were told that the surgery could be performed under general anaesthesia if they so desired. A detailed explanation was provided for every change in anaesthesia or surgical method. Pneumoperitoneum and operation times were documented. At the conclusion of operation, CO₂ was carefully and thoroughly drained from the patient's body. Additionally, the amount of time it took for the patient to be transferred out of the operating room, known as "patient turn over time", is documented. On a scale of 1 to 10, operating surgeons were asked to rate the procedure's technical difficulties.

Results

Everyone had a successful spinal anaesthetic procedure and the maximum degree of sensory blocking was reached at T4. Only one patient had GA for surgery, and that patient was not able to have surgery with SA. Four patients (33.33%) complained of right shoulder discomfort after surgery, and Fentanyl was administered to two of them. There was no additional discomfort during or after the procedure. Midazolam was prescribed to two individuals for anxiety. One patient needed ephedrine because she was hypotensive, despite intraoperative crystalloid infusions of 1460 (SD 138) ml. There were no further medications needed for the other individuals. During a patient's open cholecystectomy and hepatico-jejunostomy operation, a nasogastric tube and a subhepatic drain were inserted and the patient was kept sedated for the duration of the procedure, which lasted 134 minutes.

Surgery time for the other patients ranged from 26 to 54 minutes and the laparoscopist deemed their procedures to be of modest complexity. Four patients had intravenous Tramadol analgesia after surgery, and no one requested Pethidine. Ondansetron 4 mg was administered intravenously to one patient who had vomited. A little post-dural puncture headache was experienced by one subject. Two patients had modest shoulder discomfort that continued for up to six hours and did not need any extra analgesics.

Urinary retention necessitated an immediate catheterization in one patient. Eleven patients were able to be discharged from the hospital 48 hours following their procedure. An open cholecystectomy patient was released from the hospital 16 days following surgery. None of the participants died or had any significant morbidities over the course of the study. At the time of discharge, every patient received an overall satisfaction rating of 8 or above (out of 10). According to the findings, patients reported the same levels of satisfaction following discharge.

Table 1: Patient details and outcome indicators

Sex (M/F) (n)	3/9
Age (yr)	32 (21.48)
BMI (kg mi)	26.6 (24-30)
ASA I: ASA II (n)	9:3
Time for induction (min)	11 (9-16)
Operative time (min)	42 (26-54)

Pneumoperitoneum time (min)	36 (22-44)
Intraoperative fluid (mL)	1460 (138)
Conversion to general anaesthesia (n)	1
Conversion to open surgery (n)	1
Operative technical difficulty score	2 (1-4)
Patient turn over time (min)	3 (1-5)
Discharge from Hospital within 48 hrs (n)	11
Patient satisfaction score at discharge (10:9:8) (n)	2:6:4
Post discharge patient satisfaction score (10:9:8) (n)	4:6:2

Table 2: Intraoperative events

Shoulder pain	4
Hypotension	1
Hypertension	0
Bradycardia	0
Abdominal discomfort/pain	1
Fentanyl need	2
Midazolam need	2

Table 3: Postoperative events, number of patients

Nausea/vomiting	2/1
Right shoulder pain	2
Urinary retention	1
Post-dural puncture headache	1
Respiratory depression	0
Tramadol need	4
Pethidine need	0

Table 4: Postoperative pain scores on Visual Analogue Scale

Time (hr)	At rest	Sitting up
1	0 (0-2)	0 (0-3)
2	0 (0-3)	0 (0-3)
4	0 (0-3)	1 (0-3)
8	1 (0-3)	1 (0-4)
12	1 (0-3)	1 (0-6)
18	2 (0-4)	2 (0-7)
24	2 (0-6)	2 (0-7)
48	2 (0-7)	2.5 (0-6)

Discussion

We found that laparoscopic cholecystectomy may be done successfully under spinal anaesthesia with the patient breathing on their own. Only additional effort, patience and readiness to augment intravenous adjuncts if necessary and switch to normal general anaesthesia if necessary are required for this to succeed. Low-dose Morphine coupled with hyperbaric Bupivacaine provides further postoperative analgesia. Throughout their stay in the hospital, none of our patients requested parenteral opioids. "Pre-emptive injection of intra-peritoneal Bupivacaine, avoidance of sore throat and stress response associated with endotracheal GA, minimal reaction to stress related to a minimally invasive anaesthetic procedure, like SA, and preoperative use of Dexamethasone among other things helped to maintain analgesia" [6]. Two patients with severe shoulder pain were given fentanyl throughout the surgery and stayed silent the whole time. We also identified a 25% incidence of shoulder-tip pain in Van Zundert AAJ *et al's*.

Investigation, which is consistent with our results [7]. Those who had LC under SA were more likely to have shoulder pain, according to Tzovaras G *et al.* [8]. Studying laparoscopic surgery under epidural anaesthesia, 48 percent of patients experienced soreness in their shoulders throughout the procedure. This is contrary to our results. Prophylactic Bupivacaine injections were omitted from the latter experiment. With our reduced intra-abdominal pressure cut-off of 10 mm Hg, minor tilting of the operating table, and pre-emptive injection of Bupivacaine into the right subdiaphragmatic region and above the gall bladder, shoulder pain was very rare in our patients. Approximately 30% to 50% of people who have laparoscopic surgery under general anaesthesia experience soreness in their shoulders [9].

The low frequency of postoperative shoulder pain seen in our study may have been due to patients who had been treated with extraordinary care (16.66 percent). Bupivacaine placement in right subdiaphragmatic space and over gall bladder, moderate liver retraction with little irrigation, and full evacuation of residual CO₂ might all have had a role in lowering the IAP. In addition, the treatment went off without a hitch. We employed a low-pressure pneumoperitoneum with an intra-abdominal pressure limit of 10 mm Hg to prevent diaphragmatic irritation and abdominal and respiratory discomforts [10]. The use of low-pressure pneumoperitoneum did not restrict the surgical space or the surgeon's vision, and all procedures were completed with the greatest possible technical ease. Due to probable technical difficulties, this study did not include obese patients who may need a greater intra-abdominal pressure. LC under SA may be effective in obese individuals who have been carefully selected if the surgeons have the required skill and aptitude [11-14].

Because of its reduced perioperative morbidity and better prognosis than general anaesthesia, regional anaesthesia is preferred for sicker patients. There are several operations for which SA is not the first choice; yet, in the current LC environment, GA as the only appropriate technique must be regarded outmoded. In spite of the fact that this was not a comparable research, it seems that the spinal anaesthetic method prolonged anaesthesia induction time (11 minutes). As a result, the patient's recuperation went smoothly, the patient turnover time was only 3 minutes, and the patient's satisfaction was excellent. For obvious reasons, researchers are always looking for ways to keep patient suffering and costs to a minimum. As a result, novel approaches to perioperative care can only be put into practise after rigorous testing to ensure their viability and safety. A successful fast-track surgery programme relies heavily on judgments and actions made by an anaesthesiologist, an essential member of the surgical care team [15]. Our institution has yet to do LC on an outpatient basis, but with enough expertise, we may be able to modify this trend in the future. Since we have limited healthcare resources, we've been looking for ways to reduce the total cost of surgery without sacrificing the quality of the procedure. The evidence is mounting that regional anaesthesia may play a significant role in this area.

Conclusion

As a standard technique, a laparoscopic cholecystectomy may be performed under spinal anaesthesia. This is both feasible and safe. In hospitals with limited resources, such as those in developing countries, laparoscopic cholecystectomy may be done under spinal anaesthesia. By using hyperbaric Bupivacaine and Morphine for elective laparoscopic cholecystectomy, we believe this is the first experiment to demonstrate the safety and efficacy of this technique. We performed an elective laparoscopic cholecystectomy using just spinal anaesthesia, low-pressure CO₂ pneumoperitoneum, and a small operating table tilt. It shows that spinal anaesthesia reduces intraoperative hemodynamic abnormalities and is beneficial in the treatment of postoperative pain and patient satisfaction. This strategy requires a competent laparoscopist and a passionate anaesthesiologist who is always ready to reinforce this approach with intravenous adjuncts and alter the anaesthetic technique to general anaesthesia.

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