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Mohit Roy
Associate Professor,
Department of Critical Care Medicine and Anaesthesia,
National Institute of medical Science and Research Jaipur Rajasthan, India

Rakesh Modi
Dr. Associate Professor,
Department of Critical Care Medicine and Anaesthesia,
National Institute of medical Science and Research Jaipur Rajasthan, India

Corresponding Author:
Mohit Roy
Associate Professor,
Department of Critical Care Medicine and Anaesthesia,
National Institute of medical Science and Research Jaipur Rajasthan, India

Safety of laparoscopic cholecystectomy and its surgical outcome under spinal anesthesia

Mohit Roy and Rakesh Modi

Abstract
Introduction: The aim of this prospective randomized study was to compare the surgical outcome of LC performed with the patient under spinal anesthesia with that of LC performed with the patient under general anesthesia in the management of symptomatic uncomplicated gallstone disease.
Materials and Methods: In the spinal anaesthesia group, the patients were placed in sitting or left lateral decubitus position as deemed comfortable. The subarachnoid space puncture was performed between the L3-L4apophyses and 2.5–3.5 ml of hyperbaric 0.5% bupivacaine was injected.
Results: In the above figure it is seen that there was statically significant difference in intraoperative hypotension between the two groups (p value 0.008) but there was insignificant difference in hypertension between two groups.
Conclusion: Intraoperative hypotension and bradycardia need to be addressed during laparoscopic cholecystectomy under spinal anaesthesia. It provided with good patient selection laparoscopic cholecystectomy under spinal anaesthesia.

Keywords: Spinal anesthesia, laparoscopic cholecystectomy, gallstone

Introduction

This has been attributed to the minimally invasive nature of the procedure, which is associated with less post-operative pain, reduced hospital stay, and earlier return to daily activities [1, 2]. The potential for LC to be performed as a day case has been recognized only a few years after the introduction of the procedure.[3] Several randomized studies comparing day-case and overnight-stay LC have confirmed that day-case LC in selected patients was feasible and safe and was associated with a high degree of patient satisfaction without an increase in the complications rate [4, 7].

Adequate pain relief is an important aspect of day- case surgery. Various methods have been attempted to decrease postoperative pain following LC such as peritoneal instillation of normal saline or local anaesthetic and wound infiltration with local anesthetic.[8,9] Spinal anaesthesia is a less invasive anaesthetic technique that has lower morbidity and mortality rates, compared with general anesthesia [10].

Spinal anesthesia (SA) is a commonly used anaesthetic technique that has a very good safety profile. SA has several advantages over GA. These advantages include the patients' being awake and oriented at the end of the pro- cedure, less postoperative pain, and the ability to ambulate earlier than patients receiving general anesthesia. More- over, the incidences of nausea and vomiting are less with selective spinal anesthesia than with general anesthesia [11]. SA is more effective than GA in blunt- ing the neuroendocrine stress and adverse responses to surgery [12]. Some possible problems related to the technique of general anesthesia such as teeth and oral cavity damage during laryngoscopy, sore throat, and pain related to intubation and/or extubation are pre- vented by administering selective spinal anesthesia to patients undergoing laparoscopic interventions [13]. There are multiple reports that have been published regarding the feasibility of SA for LC in patients fit for GA [14-20].

The choice of anaesthesia for laparoscopic surgery has for long been general anaesthesia because of the following reasons: a) The patient's airway is under the control of the anaesthesiologist, b) Minimal chances of aspiration due to gastric regurgitation, c) No patient discomfort and shoulder pain due to pneumoperitoneum, d) Controlled ventilation to manage hypercarbia, e) No patient discomfort due to change in position, f) No complications due to decreased sympathetic outflow such as hypotension and bradycardias seen with regional anaesthesia, g) Better hemodynamic status [21, 22].

Materials and Methods
Permission from Institutional ethical committee was sought for and obtained. All 60 patients were explained about the study and written informed consent obtained. All patients were interviewed by the anaesthesiologist in a pre-operative visit who in turn specifically instructed them about possible intraoperative events while under SA, like vomiting, shoulder pain and anxiety. It was instructed to them that in eventuality of ibid events occurring, intravenous medications would be administered and, if required, conversion to GA would be done. As there would be multiple outcomes possible, no separate analysis was undertaken to determine the size of the study groups.
In the general anaesthesia group, anaesthesia was induced with 2.5 mg/kg of propofol and 0.6 mg/kg-1 of rocuronium. Maintenance of anaesthesia was done with O2, N2O and sevoflurane. The respiratory rate was adjusted to maintain PETCO2 between 32 and 36 mmHg. Expired concentrations of CO2, O2, and sevoflurane were monitored continuously by a gas analyzer. Residual neuromuscular blockade was antagonized with 2.5 mg of neostigmine and 0.4 mg of glycopyrollate at the end of the surgery.
In the spinal anaesthesia group, the patients were placed in sitting or left lateral decubitus position as deemed comfortable. The subarachnoid space puncture was performed between the L3-L4apophyses and 2.5–3.5 ml of hyperbaric 0.5% bupivacaine were injected. Afterwards, patients were placed in the supine position with a head-down position. After the surgeon confirmed anaesthesia at T4 level by pin prick, “go-ahead” was given. If the mean arterial pressure dropped below 60 mmHg, 3 μg of mephenataramine was administered. During the procedure, anxiety was treated by 2 mg midazolam and pain with fentanyl 50 μg in intravenous boluses.

Results
In the above table it was observed that there was no statically significant difference in ASA between the two groups [Table 1].

Table 1: Comparison of ASA between two groups.

AS A	General Anesthesia		Spinal Anesthesia		P Value
	Frequency	%	Frequency	%	
1	42	70%	46	76.6%	0.337
2	18	30%	14	23.3%	
Total	60	100%	60	100%	

In the above figure it is seen that there was statically significant difference in intraoperative hypotension* between the two groups (p value 0.008) but there was insignificant difference in hypertension between two groups [Table 2].

Table 2: Comparison of Hypo/Hypertension between two groups.

Group	General Anesthesia (n-60)		Spinal Anesthesia (n=60)		P Value
	Frequency	%	Frequency	%	
Hypoten sion	0	0.0%	10	16.6%	0.008
Hyperte nsion	5	8.3%	3	5.0%	0.619

Operative difficulty was noted in 0.0% of G.A cases and in 8% of cases under S.A the difference was statically insignificant [Table 3].

Table 3: Comparison of Operative difficulty between two groups.

Operative Difficulty	General Anesthesia		Spinal Anesthesia		P Value
	Frequency	%	Frequency	%	
No	60	100%	51	85.0%	0.118
Yes	0	0.0%	9	15.0%	
Total	60	100%	60	100	

Discussion
The comparison of ASA between the two groups showed: 74% of patients of G.A group fell into ASA 1 compared with 82% in S.A group.26% of patients of G.A group fell into ASA 2 compared with 18% in S.A group. There was no statically significant difference in ASA between the two groups.
In our study intraoperative hypotension was recorded in none of the patients that received G.A and 16% patients receiving S.A. The difference being statically significant (p value 0.006). Intra- operatively, intravenous phenylephrine was administered when mean arterial blood pressure drops of more than 20% from the pre-anesthetic values. In all these cases, mean arterial blood pressure was then normalized and the procedure was completed uneventfully. In a study researcher observed hypotension in 4% of G.A group patients as compared to 59% patients from S.A group which was reversed by i.v phenylepherine. In our study hypertension was recorded in 6% of G.A patients and 2% of S.A group patients. The difference in incidence of intraoperative hypertension between the two groups was insignificant. In our study operative difficulty was noted in 0.0% (0) of G.A cases and in 8% (4) of cases under SAB the difference was statically insignificant (p value0.117). None of the patients of S.A group required conversion to G.A due to operative difficulty. None of our surgeons reported inadequate relaxation of abdominal wall leading to any sought of difficulty during the procedure in S.A group.
Low pressure pneumoperitoneum in our cases added to technical complexity of the dissection process. The surgeon

had to be slower and gentler in tissue dissection. Additionally, on occasions, it became necessary to interrupt the procedure when the patient complained of discomfort and then the anaesthesiologist had to intervene with additional medication. This explains the fact that the pneumoperitoneum time and correspondingly the surgery time was more in the SA group. Other studies [18, 19] too have documented the technical difficulty faced by the surgeon when operating in limited field permitted by low pressure pneumoperitoneum.
The significant advantage of this is in terms of reduced post-operative pain, less use of analgesics, preservation of pulmonary function, and reduced hospital stay.
The post-operative recovery of patients was normal in all patients of both the groups. It is described that SA is associated with lower frequency of serious peri-operative morbidities and an improved outcome when compared to GA [23, 24]. In our series the incidence of post-operative events which required intervention was 21% in GA group compared to 11% in the SA group. But in our opinion, it is not justified to compare the two groups on this basis. While in one group the events were peculiar to GA, in the other they were peculiar to SA. Perhaps the only event which would be common to both would be surgical procedure related pain which was consistently reported significantly less by the patients who had undergone the surgery under SA as compared to those who had undergone it under GA. We believe this was due to the sensory blockade which persists for some time in the post-operative period. The patients in SA group seemed to have lesser pain in immediate post-operative period but by the time of discharge the level of post-operative pain/ discomfort was same for both groups. Bessa *et al*., [25] in a similar study, too confirm that LC done under SA results in significantly less early post-operative pain, compared to that performed under general anaesthesia.
In 2009 Gautam B, performed laproscopic cholecystectomy on twelve American Society of Anaesthesiologists' physical status I or II patients received SA using 4 ml of 0.5% hyperbaric bupivacaine mixed with 0.15 mg Morphine. Results were spinal anaesthesia was adequate for surgery in all but one patient. Intraoperatively, two out of four patients who experienced right shoulder pain received fentanyl. Two patients were given midazolam for anxiety and one was given ephedrine for hypotension. Operative difficulty scores were minimal and surgery in one patient was converted to open cholecystectomy. Postoperatively, pain scores were minimal and no patient demanded opioid. One patient required antiemetic for vomiting and one patient each suffered headache and urinary retention. 11 patients were discharged within 48 hours of surgery and patient satisfaction scores were very good [26].

Conclusion
Intraoperative hypotension and bradycardia need to be addressed during laparoscopic cholecystectomy under spinal anaesthesia. It provided with good patient selection laparoscopic cholecystectomy under spinal anaesthesia can substitute that under general anaesthesia. Spinal anaesthesia can be recommended to be the anaesthesia technique of choice for conducting laparoscopic cholecystectomy in hospital setups in developing countries where cost factor is a major factor.

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