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A Comparative Study of Safety and Efficacy in Laparoscopic Cholecystectomy Under General Anesthesia Versus Thoracic Segmental Spinal Anesthesia

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ABSTRACT

Background and Aims: Laparoscopic cholecystectomy is conventionally performed under general anesthesia; however, segmental thoracic spinal anesthesia has emerged as a potential alternative offering better postoperative recovery. This study aimed to compare intraoperative hemodynamic stability, postoperative recovery profile, and adverse effects between general anesthesia and segmental thoracic spinal anesthesia in patients undergoing elective laparoscopic cholecystectomy.

Methods: After obtaining approval from the Institutional Ethics Committee and informed consent from all participants, this randomized prospective study was conducted on 60 patients aged 18–60 years at LLR and associated hospitals, GSVM Medical College, Kanpur. Patients were randomly divided into two groups of 30 each. Group A received general anesthesia with fentanyl (2 µg/kg), propofol (2 mg/kg), and vecuronium (0.1 mg/kg), while Group B received segmental thoracic spinal anesthesia using isobaric levobupivacaine (7.5–10 mg; 1.5–2 ml) with an additive (fentanyl or clonidine). Parameters compared included intraoperative heart rate, mean blood pressure, SpO_2, episodes of bradycardia and hypotension, time to first rescue analgesia, ambulation time, postoperative nausea and vomiting (PONV), shoulder pain, and hospital stay.

Results: The time to first rescue analgesia was significantly longer in the segmental spinal anesthesia group compared to general anesthesia. Patients in the spinal group ambulated earlier, while intraoperative hemodynamic parameters were comparable between groups. PONV episodes were more frequent under general anesthesia. Shoulder pain was noted in some spinal anesthesia patients but was effectively managed with intravenous fentanyl. In the study the mean saturation in both groups in different time intervals shows no significant difference with p value >0.05.

Conclusion: Segmental thoracic spinal anesthesia provides effective analgesia, faster recovery, and reduced postoperative nausea and vomiting compared to general anesthesia for laparoscopic cholecystectomy, with stable intraoperative hemodynamics and manageable side effects.

Keywords: Laparoscopic cholecystectomy, general anesthesia, thoracic segmental spinal anesthesia, postoperative recovery, hemodynamic stability.

INTRODUCTION

Soon after the introduction of laparoscopic cholecystectomy, it established as the treatment of choice for symptomatic gallstone diseases [1]. This was due to its obvious advantages of the minimally invasive nature, which is associated with less postoperative pain, reduced hospital stays, and early ambulation [1].

Anaesthetic considerations for laparoscopic cholecystectomy include strict (i) end tidal CO^2 monitoring because CO^2 insufflation may cause absorption of CO^2 via peritonium causing hypercarbia which has risk of causing arrythmias, CO^2 embolism (ii) careful adjustments of ventilatory patterns as increased abdominal pressure decrease functional residual capacities, high peak airway pressure (iii) adequate hydration to prevent hypotension from decrease venous return due to high abdominal pressure and reverse Trendelenburg positioning of patient (iv) placement of naso or orogastric tube intra-operatively to minimise the chances of aspiration due to passive reflux of gastric content, of visceral trauma and for better visualisation and ease of extraction of gall bladder [2]. Laparoscopic cholecystectomy is generally performed under general anaesthesia, but recently regional techniques has also been found beneficial.

In 2006 a study was done on segmental spinal anaesthesia puncturing subarachnoid space at T10 for laparoscopic cholecystectomy in a patient with severe obstructive lung disease since then there has been many studies about segmental spinals exploring its utility in many different surgical procedures like awake thoracoscopic or thoracic surgeries, laparoscopic cholecystectomy and breast surgeries [3].

The term segmental spinal is widely used synonymously with thoracic spinal anaesthesia. But in actual sense segmental spinal anaesthesia means ―Blocking of the required dermatomes essential for the proposed surgical procedure with very low effective local anaesthetic drug dose. This requires puncturing of dura at high lumber or thoracic levels than the conventional spinal below L1. To produce a true segmental block lower dose of local anaesthetic drug used [3].

There are 4 main challenges related to spinal at unconventional levels, difficult spinal, risk of neuronal injury, respiratory embarrassment due to extensive thoracic nerve blockade and cephalad spread of local anaesthetic drugs causing high or total block [3]. Anatomically, the inter laminar spaces in the thoracic spine are narrow and difficult to access with a needle due to overlapping vertebral lamina whereas the lamina of the lumbar vertebra do not overlap, and the space between them is larger. Moreover, the spinous processes of the thoracic vertebra point inferiorly in contrast to the lumbar vertebra pointing posteriorly. This angled position of the thoracic spinal processes will change the angle of the needle through midline approach and thus make it difficult for the procedure [4].

Studies done using myelography have showed that the thoracic cord lies anteriorly in theca while lumber spinal cord lies posteriorly. The space between the dura mater and the mid to lower thoracic spinal cord is actually wider than that of epidural space in lumber region because of lumber enlargement. So risk of needle damage is more in lumbar spine.

Some difficulty in forceful expiration and coughing can occur due to paralysis of anterior abdominal wall muscles in case of extensive thoracic nerve blockade. However, use of low dose of drugs preserves the cough reflex by causing minimal motor weakness of expiratory muscles. The diaphragm which is the main inspiratory muscle is usually unaffected and expiration at rest is a passive process. Decrease in heart rate as a result of blockade of cardio accelerator fibers arising from T1 to T4 can be seen in high neuraxial block [3]. There is little caudal spread of the drug meaning there's significantly large portion of body experiencing no vasodilation offering a compensatory buffer to hypotension intra-operatively. The patients have motor control over their legs during the surgery exhibiting a high level of satisfaction with the technique and decreased anxiety [5]. Space between T10 and L1 is usually sufficient for all abdominal procedures, thoracic spinal above T10 is hardly required [3]. The dose of the drug depends patients' hemodynamic profile, co-morbidities, type and duration of surgery. An average a dose of 7.5to 10 mg (1.5 to 2ml) of bupivacaine/levobupivacaine with some additive (fentanyl/clonidine) has an effect for 90 to 120 mins. Amongst the available drugs isobaric drugs like 0.5% bupivacaine/ levobupivacaine, 0.75% ropivacaine or chlorprocaine 1% can be used for segmental spinals [3].

Levobupivacaine is a long-acting amide local anaesthetic used in analgesia and anaesthesia [6]. It is the S (-)- enantiomer of racemic bupivacaine. Randomised, double-blind clinical studies established that the anaesthetic and/or analgesic effects of levobupivacaine is similar to those of bupivacaine at the same dose. Levobupivacaine has longer sensory block than bupivacaine, amounting to a difference of 23 to 45 minutes with epidural administration and approximately 2 hours with peripheral nerve block. The onset of action is < or = 15 minutes with various anaesthetic techniques. In studies done in adults, levobupivacaine provided sensory block for up to 9 hours after epidural administration of < or = 202.5 mg, 6.5 hours after intrathecal 15 mg, and 17 hours after brachial plexus block with 2 mg/kg [7]. Levobupivacaine had a lower risk of cardiovascular and CNS toxicity than bupivacaine, it had less negative inotropic effect and, at intravenous doses >75 mg, and produce less prolongation of the QTc interval than bupivacaine [7].

We have conducted this study to compare feasibility and efficiency of segmental spinal and general anaesthesia in patients undergoing laparoscopic cholecystectomy.

Aim And Objectives

Aim:

The aim of the study is to compare safety and efficacy of segmental spinal anesthesia versus general anesthesia in patient undergoing laparoscopic cholecystectomy.

Primary Objective

- Post-op time taken for first rescue anesthesia.
- Post-op time taken for ambulation.

Secondary Objective

- **Intra op hemodynamic parameters:** Heart rate, Blood pressure, SPO^2, $ETCO^2$
- **Adverse effects:** Shoulder pain, hypotension, bradycardia, nausea and vomiting
- Post-op 24hrs monitoring of pain.
- Post-op monitoring of HR, SPO^2, BP upto 6 hrs

MATERIALS AND METHODS

This randomized prospective comparative study was conducted in the Department of Anesthesiology, G.S.V.M. Medical College and associated LLRH Hospital. A total of 60 patients belonging to ASA physical status I and II and scheduled for laparoscopic cholecystectomy were enrolled based on predefined inclusion and exclusion criteria. The study protocol was approved by the Institutional Ethics Committee, and written informed consent was obtained from all participants. Patients were randomly allocated into two equal groups of 30 each: Group A, in which surgery was performed under general anesthesia, and Group B, in which surgery was conducted under thoracic segmental spinal anesthesia.

The cases were allocated in the respective groups using "flipping the coin method" of randomisation. Out of 60 cases 30 cases were operated under general anaesthesia using, fentanyl, propofol, and vecuronium (Group A) and remaining 30 cases received segmental Spinal anaesthesia (SA) with Isobaric Levobupivacaine 0.5% (Group B).

A thorough pre anesthetic checkup with detailed history was taken in all the cases. Patients in group B were informed about the possible side effects of segmental anesthesia such as shoulder pain and vomiting and the possibility of conversion into general anesthesia if needed. Preanesthetic management of patients in both the groups was similar patients received tab ranitidine 150mg, tab alprazolam 0.25 mcg on the night before surgery and iv ondansetron was given before induction of patient.

In group A patient was induced with 2mcg/kg fentanyl, 2.0 mg/kg of propofol and 0.1 mg/kg vecuronium. Patients were maintained on controlled ventilation with oxygen, and nitrous oxide. At the end of surgery patients were reversed with neostigmine and glycopyrrolate.

In Group B the patients were placed in position and subarachnoid space puncture was done between T9 and T10 and average dose of 1.5-2ml Isobaric Levobupivacaine 0.5% depending upon surgery and patient profile along with 25 mcg fentanyl was injected. After injection patients were placed in supine position. Anesthetic effect was confirmed by pin prick (sensory). Sedatives like IV midazolam and IV fentanyl were given if needed during surgery. All patients underwent laparoscopic cholecystectomy.

Intra operative vitals heart rate, blood pressure, Saturation, EtCO2, were recorded at 0,5,15,30,45, and 60 minutes. Following surgery patients were shifted to ward. IV fluid were given for 6 hours. For postoperative pain relief IV diclofenac 75 mg was given as first choice Inj. fentanyl 1mcg/kg was repeated if pain was not controlled by diclofenac injections. Postoperative pain was recorded at every hourly up to 24 hrs after surgery using Visual analogue Score and time for first rescue analgesia was recorded. Any adverse effect such as nausea, vomiting, shoulder pain and neurological involvement was noted and compared in both the groups. Patients were discharged 48 hours after surgery unless there was a reason for not doing so. Mean anesthesia time, duration of surgery, intraoperative vitals postoperative pain and complication in both the groups were compared.

Inclusion Criteria

- Patients undergoing laparoscopic cholecystectomy.
- ASA status I or II.
- Patients above 18 and less than 60 years of age.
- Patient who gave written informed consent to be part of the study.

Exclusion Criteria

- Patients who refused to give consent
- Contraindications to spinal anesthesia such as bleeding diathesis or local infection.
- ASA Grade III and IV
- Current psychiatric disorder, history of (h/o) seizures
- Any respiratory disorders.
- Pregnant female.

STATISTICAL ANALYSIS

The statistical analysis was done using SPSS (Statistical Package for Social Sciences) Version 15.0 statistical Analysis Software. The values were represented in number (%) and mean ± SD. Data analysis was performed using t test and statistical significance was considered for p value <0.05.

OBSERVATION AND RESULTS

In our study most patients were in the age group between 26-45 years followed by 46-60 years in both the groups. In this study, majority of patients undergoing laparoscopic cholecystectomy were females (group A: 73.3%, group B: 60%). In this study most of the cases belong to ASA class 1 in both the groups (group A: 83.3% group B: 86.3%).

The most common cause for patient undergoing laparoscopic cholecystectomy was cholelithiasis (group A: 66.6%; group B: 70%) followed by cholecystitis (group A: 26.6%; group B: 26.6%).
The analysis of the cases on the basis of presence of co-morbid conditions showed that in group A the common co-morbid conditions were hypertension (H) (6.6%%), hypertension with diabetes mellitus (H+D) (10%%). In group B hypertension (6.6%), diabetes (3%) and hypothyroidism (3%).
The analysis of the study showed that in group A 4 out of 30 patients had hypotension (14.3%) and 2 patients had bradycardia (6.6%) while in group B 3 out of 30 patients had hypotension (10%) and 4 patients had bradycardia (14.3%). The difference in the episodes of intraoperative hypotension and bradycardia between the groups is not significant.

Table 1. Post-Operative Effects

Post Operative Effects	Group A		Group B		p value
	Yes	No	Yes	No	
Shoulder Pain	0	30	2	28	0.4720
Nausea/Vomiting	9	21	2	28	0.0453

The analysis of post operative side effects in the study showed that no patients in group A complained of shoulder pain in comparison to 2 patients in group B. This difference is insignificant. In group A more patients (30%) complain of nausea/vomiting post operatively than group (6.6%). The difference in episodes of nausea/vomiting between the two groups is significant (p = 0.045).

Table 2. Time for First Rescue Analgesia

Time for first Rescue Analgesia (in Min.)	Group A		Group B	
	No.	%	No.	%
< 30	17	56.67	0	0
31 - 50	13	43.33	0	0
51 - 70	0	0	2	6.66
71 - 90	0	0	6	20
91 - 110	0	0	5	16.67
111 - 130	0	0	5	16.67
131 - 150	0	0	9	30
151 - 170	0	0	3	10
Total	**30**	**100**	**30**	**100**
Mean ± SD	32.00 ± 9.965		118.33 ± 29.283	
p value	< 0.0001			

Table 3. Time Taken for Ambulation

Time Taken for Ambulation (in Hrs.)	Group A		Group B	
	No.	%	No.	%
< 3	0	0	0	0
3 - 5	0	0	23	76.67
6 - 8	18	60	7	23.33
> 8	12	40	0	0
Total	**30**	**100**	**30**	**100**
Mean ± SD	8.1 ± 1.110		4.88 ± 0.6909	
p value	< 0.0001			

The analysis of the study showed that in group A the mean time of first analgesia need after surgery was <30 mins while the in-group B the mean timing was between 90-130 mins. The difference in mean timing of first rescue analgesia was found to be highly significant (p<0.0001).

The analysis of the patients on the basis of duration for surgery showed that the mean surgery time in group A was 52.5 ±5.981 whereas in group B the mean time for surgery was 47.17 ± 11.347. The duration of surgery was found to be less in Group B as compared to group A and the difference was found to be statistically significant (P = 0.02).

The analysis of the study showed that the mean time for ambulation was less in Group B between 3-5hrs (76.6%) post-surgery than Group A where, the maximum patients have taken 6 or more (60%) hours to ambulate post-surgery. The difference in mean time taken for ambulation between both groups is highly significant (p<.0001).

The analysis of the study showed that all the patients in group B was discharged on 2nd post operation day (100) as compared to group A where majority of patients were discharged ideally on postop day 4(76.7%). Two patients of group A were discharged on post op day 5 due to respiratory complications. The difference in the mean duration of hospital stay is highly significant (p<0.0001)

Table 4. Intra Operative (Hr) (Mean±SD)

Time Duration (in Min.)	Group A	Group B	p value
Base Line	82.27 ± 0.123	85.6 ± 11.598	0.8133
0	88.73 ± 12.817	80.47 ± 13.382	0.0176
5	82.10 ± 11.619	74.6 ± 11.737	0.0158
15	88.43 ± 14.729	74.57 ± 10.061	< 0.0001
30	91.57 ± 16.986	74.33 ± 8.806	< 0.0001
45	89.83 ± 10.869	75.93 ± 8.606	< 0.0001
60	87 ± 9.559	76.6 ± 8.080	< 0.0001
Mean ± SD	87.13 ± 3.656	77.44 ± 4.178	
p value	0.0006		

In this study when heart rate is compared over the period of 60 mins (at different time interval) intraoperatively, the group B shows declining trend in heart rate as compared to group A with p value <0.0001 which is statistically highly significant.

In this study when heart rate is monitored postoperatively over the period of 6 hrs (at different time interval) the group A and B had shown no statistically significant difference p value >0.05.

Table 5. Intra Operative (BP) (Mean±SD)

Time Duration (in Min.)	Group A	Group B	p value
Base Line	91.33 ± 10.347	93.6 ± 7.152	0.3277
0	90.73 ± 11.480	91.73 ± 7.584	0.6920
5	94.2 ± 12.505	85.27 ± 9.516	0.0029
15	88.63 ± 13.880	86.53 ± 7.628	0.4706
30	94.03 ± 10.122	85.83 ± 7.339	0.0007
45	91.83 ± 8.643	86.97 ± 6.931	0.0193
60	95.07 ± 19.554	88.4 ± 6.452	0.0814

In the study the analysis of intraoperative mean blood pressures has shown declining trend in group B when compared with group A with p value<0.05 which is statistically significant.

In this study when mean blood pressure is monitored post-operatively over the period of 6 hrs (at different time interval) the group A and B had shown no statistically significant difference p value > 0.05. In the study the mean saturation in both groups in different time intervals shows no significant difference with p value >0.05.

DISCUSSION

The use of laparoscopic techniques in general surgery has gained popularity. The small, limited incisions are well accepted by patients and there is benefit of a faster recovery as compared to open laparotomy. Health care cost may be decreased by diminishing length of post operative hospital stay and by reducing the need for postoperative analgesia. Additionally, indirect savings to society may be generated by shortening the recovery period between the operative procedures and return to gainful employment.

Laparoscopic cholecystectomy is often carried out while the patient is under general anaesthesia, but local methods, including low thoracic epidural1 and lumbar spinal-2, have been employed, typically in order to manage individuals with serious medical issues.

Therefore, avoiding general anaesthesia has been the main goal rather than providing the advantages of regional, even though Hamad and Ibrahim El-Khattary [8]. came to the conclusion that spinal anaesthesia does seem better suited to laparoscopic cholecystectomy, citing reduced sequelae as the main reason.

Since Bier's invention of spinal anaesthesia in 1898, it has been customary to puncture the subarachnoid space (SAS) at a level much beyond the spinal cord's termination in order to prevent neuronal damage [9]. In order to perform thoracic and abdominal procedures, he additionally pierced the SAS at the mid- and lower-thoracic levels. In 2006 the new era of studies on segmental spinal anaesthesia puncturing SAS at T [9] for laparoscopic cholecystectomy started when J Van Zundert used this technique to anaesthetize a patient with severe obstructive lung disease [3]. He used segmental spinal anesthesia in a patient who had chronic obstructive pulmonary disease with severe emphysema. Encouraged by both that finding and our experience using segmental spinal anaesthesia on a patient who had advanced respiratory disease [3], we made the decision to research the viability of using a segmental approach for everyday surgery.

This study was done to compare the safety and efficacy in laparoscopic cholecystectomy under general anaesthesia versus thoracic segmental spinal anesthesia. All groups were comparable with respect to demographic datas (age, sex, height, weight, BMI etc.) In this study, we used thoracic segmental spinal anaesthesia.

Imbelloni LE et al [1] in 2011 did a comparative study in patients undergoing laparoscopic cholecystectomy with low pressure CO^2 pneumoperitoneum under spinal anesthesia using either conventional lumbar spinal anesthesia (hyperbaric bupivacaine 15 mg and fentanyl 20 mg) or lowdose thoracic spinal anesthesia (hyperbaric bupivacaine 7.5 mg and fentanyl 20 μg). Parameters like Intra-operative vitals, postoperative pain, complications, recovery time, and patient satisfaction were compared between the two groups. The study showed that laparoscopic cholecystectomy can be performed successfully under low-dose thoracic strategy, hyperbaric bupivacaine 7.5 mg and fentanyl 20 μg may have an advantage in ambulatory patients because of the earlier recovery of motor and sensory function and less hospital stay.

In our study patients’ benefits were same as described in above study with respect to thoracic versus lumbar spinal anesthesia. In the current study we used isobaric levobupivacaine in place of bupivacaine heavy as isobaric levobupivacaine provide an advantage of low risk of cephalad spread of drug. Sathitkarnmanee T et al [10] in 2011 done a study to compare efficacy between levobupivacaine and racemic bupivacaine. The results of the study showed that 15 mg of isobaric racemic bupivacaine and levobupivacaine for spinal anesthesia had equivalent peak block height and showed equally effective efficacy regarding to both the onset time and duration of motor and sensory blockade. Foster RH et al [7] in 2000 done a research study between levobupivacaine and bupivacaine and has found that Levobupivacaine is a long-acting local anaesthetic with a clinical profile very similar to that of bupivacaine. However, according to current preclinical safety and toxicity data levobupivacaine show an advantage over bupivacaine. Hence, in our study levobupivacaine was preferred over bupivacaine as drug of choice.

In our study when heart rate is compared over the period of 60 mins (at different time interval) intraoperatively, the group B shows declining trend in heart rate as compared to group A with p value <0.0001 which is statistically highly significant. In the study the analysis of mean blood pressures has shown declining trend in group B when compared with group A with p value<0.05 which is statistically significant. Though in group B the blood pressure shows a decreasing trend but the stable blood pressure in group A may be due to the use of inj. nitroglycerine in the range of 0.5-300g/kg/min in majority (66.6%) of cases. (titrated dose). [11] In our study the mean saturation between the two groups were comparable and difference was in significant.

Elakany MH et al [5] in 2013 did a study which compared thoracic spinal anaesthesia with general anaesthesia in breast cancer surgeries. Intra-operative hypertension (20%) was more in group (G), while hypotension and bradycardia (15%) were more frequent in the segmental thoracic spinal (S) group. Ellakany MH et al [12] in 2014 did study to compare discharge time and patient satisfaction between patients going for open abdominal surgeries for malignancies divided into two groups first with segmental thoracic spinal n second with general anesthesia. Parameters like Intraoperative monitoring of vitals, postoperative pain, adverse effects, recovery time, and patient satisfaction at follow-up were recorded and compared between the two groups. In this study 6 patients required phenylephrine and atropine for hypotension and bradycardia, recovery was uneventful.

Kisa A et al [13] in 2019 did a similar study to compared the efficacy and risks of SA and (GA) in patients undergoing laparoscopic surgery (LC), as well as the impact of preemptive analgesia on the onset of shoulder discomfort, the switch to general anaesthesia, and postoperative analgesia. Five patients in Group SA had hypotension, four had bradycardia that required atropine injection, and nine had peri-operative shoulder pain, but none of them needed general anaesthesia. One patient in Group GA had the onset of hypotension.

During our study, in group B, 2 patients out of study were converted to general anaesthesia due to severe right shoulder pain. In group B routine use of iv sedation was not done and some discomfort and shoulder pain was relieved by the use of iv sedation with inj. fentanyl 2mcg/kg. In our study in group B 13 out of 30 patients required iv sedation.

Yuksek YN et al [14] in 2008, the goal of this study was to assess LC while it was under spinal anaesthesia. Between April 2005 and January 2006, 29 patients had spinal anaesthesia for LC surgery at the Ankara Numune Education and Research Hospital's 4th Department of Surgery. All patients received thorough information about spinal anaesthesia. 26 patients underwent the procedure laparoscopically, but 3 required general anaesthesia because of excruciating right shoulder pain. Kar M, Kar JK et al [15] in 2011 did a study comparing efficacy between spinal and general anesthesia in laparoscopic cholecystectomy. In this study due to excruciating shoulder pain, two patients had their spinal anaesthetic changed to general anaesthesia.

The analysis of the study showed that in group A the mean time of first analgesia need after surgery was <30 mins while the in-group B the mean timing was between 90-130 mins. The difference in mean timing of first rescue analgesia was found to be highly significant (p<0.0001). the post operative pain coverage in Group B is better than group A. Sinha R et al [16] in 2008 in this study 4645 people had given spinal anaesthesia, over the past 11 years. 2992 patients got laparoscopic cholecystectomy, while the remaining patients underwent additional laparoscopic procedures. Results were contrasted with those of 421 individuals who underwent general anaesthesia for laparoscopic surgery. Within 2 hours of surgery, 1672 patients (35.59%)

required injectable diclofenac for abdominal pain, and 2936 (63.21%) required oral analgesics within the first 24 hours. However, injectable analgesics were needed in the early postoperative period for 90.02% of patients who underwent surgery while under general anaesthesia.

Kisa A et al [13] in 2019 did a study, where he compared the efficacy and risks of SA and (GA) in patients undergoing laparoscopic surgery (LC), In Group SA, the postoperative VAS scores at 0, 1st, and 4th hours were considerably lower. Paliwal, Naresh et al [3] compared segmental spinal anaesthesia and general anaesthesia for laparoscopic cholecystectomy. The mean pain score was statistically insignificant between both groups at all-time intervals of the study up to 24 h postoperative period (P > 0.05). No statistically significant difference in mean number of analgesic doses in group A and B (P=0.5081). The analysis of the study showed that the mean time for ambulation was less in Group B between 3-5hrs (76.6%) post-surgery than Group A where, the maximum patients have taken 6 or more (60%) hours to ambulate post-surgery. The difference in mean time taken for ambulation between both groups is highly significant (p<.0001). The analysis of post operative side effects in the study showed that no patients in group A complained of shoulder pain in comparison to 2 patients in group B. This difference is insignificant. In group A more patients (30%) complain of nausea/vomiting post operatively than group (6.6%). The difference in episodes of nausea/vomiting between the two groups is significant (p 0.045).

Thus, in our study the patients undergoing laparoscopic cholecystectomy in general anesthesia experienced post op nausea vomiting more than the patients in segmental spinal. This may be due to the side effects of anesthetic drugs used in general anesthesia or may be due to the relaxation of esophageal sphincters in general anesthesia. Sinha R et al. [16] in 2008 showed that vomiting occurred after surgery in 2.09% (97) of patients in spinal as opposed to 29.22% (123 patients) of patients who received general anaesthesia. Wang XX et al. [17] in 2016 showed decrease in the postoperative nausea and vomiting in spinal anesthesia group were significant when compared with general anesthesia group (odds ratios: 0.38, 95% confidence interval: 0.19-0.76; P=0.006) with heterogeneity accepted (I (2) = 13%; P=0.33).

Recommendation

Large sample size with multicentric studies is needed to validate the findings. The thoracic segmental spinal should be given under the guidance of expert.

CONCLUSION

It was concluded that the time to first rescue analgesia was significantly longer in patients who received segmental thoracic spinal anesthesia compared to those who underwent general anesthesia, indicating superior postoperative analgesic duration with the former technique. The time to ambulation was also shorter in the segmental spinal anesthesia group, reflecting faster postoperative recovery. Intraoperative hemodynamic parameters, including heart rate and mean blood pressure, were comparable between the two groups, with no statistically significant differences observed. However, episodes of postoperative nausea and vomiting were more frequent among patients receiving general anesthesia. Some patients in the segmental spinal anesthesia group experienced shoulder pain, which was effectively managed with intravenous fentanyl sedation.

Declaration by Authors

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