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Original Research Article

# A Study of the Efficacy of Segmental Spinal Anesthesia in Patients Undergoing Laparoscopic Surgeries

**Neeta Patel[1], Hetal Makwana[2], Anirudhsinh Gadhavi[3], Reena Gadhavi[4]**

[1]Consultant Anesthetist, Sub District Hospital, Vapi/ex resident, C. U. Shah Medical College and Hospital, Surendranagar, Gujarat, India

[2]Assistant Professor, Department of Anesthesia, C. U. Shah Medical College and Hospital, Surendranagar, Gujarat, India

[3]Associate Professor, Department of Anesthesia, C. U. Shah Medical College and Hospital, Surendranagar, Gujarat, India

[4]Professor and Dean, Department of Anesthesia, C. U. Shah Medical College and Hospital, Surendranagar, Gujarat, India

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**Corresponding Author: Dr. Reena Gadhavi**

**Conflict of interest: Nil**

**Abstract:**

**Background and Aim:** Laparoscopic cholecystectomy is usually conducted under general anaesthesia (GA) which has its own limitations and may be associated with certain complications. The primary outcome measure of the present prospective study was to evaluate efficacy of segmental spinal anesthesia in patients undergoing laparoscopic surgery.

**Material and Methods:** Total 100 numbers of patients who are undergoing Laparoscopic surgery with Segmental spinal Anesthesia (SSA) were included in the study fulfilling inclusion criteria. This Patients were received an isobaric Inj. Levobupivacaine (0.5 %) 2.2 ml and Inj. Fentanyl 15 mcg was injected into the T9-T10 / T10-T11 subarachnoid space using 25gauge Quincke spinal needle in sitting position. After ascertaining the establishment of neuraxial block (5-10 min), the patients were submitted to various laparoscopic surgeries. According to the type of surgery give Trendelenburg & reverse Trendelenburg position. The various parameters were onset of sensory blockade, upper and lower level of sensory blockade, motor blockade, perioperative hemodynamic changes, perioperative complications, patient's & surgeon's opinion. The results were analyzed.

**Results:** The onset of analgesia was 3.7± 1 min. upper level of sensory block T2, T3, T4 & T5 was obtained in 1, 9, 89 &1 patients, lower level of sensory block L2, L3, L4 & L5 was obtained in 3, 15, 66, & 16 patients .adequate upper level of sensory block -T4 & Lower level of sensory block -L4. Time taken for the Onset of motor blockade was 7.09±0.8 min. Motor block before surgery by modified bromage grade was 1.33±0.5 min. There is minimal change in mean heart rate in our study. The baseline mean blood pressure was 90.4±5.6 mmHg which decreased after segmental spinal anesthesia to 75.1±5.1mmHg and persisted after $CO_2$ insufflation at a level of 76.5±3.6 mmHg, there was increase in $ETCO_2$ from the baseline 33.7±1.6 cm $H_2O$ to 37.0±1.1 cm $H_2O$ after $CO_2$ insufflation and $ETCO_2$ changes disappeared after deflation 32.9±1.6 cm $H_2O$.

**Conclusion:** Segmental spinal anesthesia can be preferred technique in abdominal laparoscopic surgeries because of greater sensory blockade, less motor blockade, hemodynamically stability, adequate analgesia, minimal side-effects and good patient- surgeon satisfactory score.

**Keywords:** $CO_2$ insufflation, Laparoscopic cholecystectomy, Fentanyl, Levobupivacaine.



## Introduction

In this modern era of surgery, there are many new approaches has been evolved, which target minimal intervention and minimal incision techniques. Laparoscopic technique is nowadays a common daily performed procedure all over the world. Laparoscopic technique replaces many types of open surgical procedure. The use of laparoscopy has revolutionized the surgical field with its advantages of reduced postoperative Pain, shorter stay in the hospital, early return to routine activity, less intra operative blood loss, less metabolic derangement and reduced overall expenditure. Since the first description in 2006 of a laparoscopic cholecystectomy (LC) conducted under the method of combined spinal-epidural anesthesia in a patient with severe chronic obstructive pulmonary disease awaiting lung transplantation, the safety and feasibility of neuraxial anesthesia (NA), ie, spinal,

epidural or combined techniques, in laparoscopic surgeries, have been documented in several reports. [1-6]

General anaesthesia (GA) has usually been considered the gold standard technique for conducting it. The associated set of problems of GA like endotracheal intubation, artificial ventilation, raised blood pressure due to the stress of pneumoperitoneum make cardio-respiratory fitness a mandatory feature. [7] A preliminary study on Thoracic Segmental Spinal Anaesthesia (TSSA) for LC was conducted by Van Zundert et al. and was found successful and effective. 2 TSSA, with a minimal dose of local anesthetic (isobaric), just sufficient to block the dermatomes required for a particular surgery alleviates the drawback of blocking the unwanted spinal segments causing extra sympathetic, motor, and sensory blockade. [8]

Recent reviews document that segmental spinal anaesthesia is equally favorable in laparoscopic surgeries by blocking of the required dermatomes with low dose of local anesthetic agent or drugs - more likely true segmental block. The name segmental spinal is often widely used synonymously with thoracic spinal anaesthesia. But in real sense segmental spinal anaesthesia means "Blocking of the required dermatomes essential for the proposed surgical procedure with very low effective local anesthetic drug dose." This often necessitates dural puncture at high lumber or thoracic levels apart from the conventional spinal below L1. Lower the dose of local anaesthetic drug used more likely it is to produce a true segmental block. [9]

The primary outcome measure of the present prospective study was to evaluate efficacy of segmental spinal anesthesia in patients undergoing laparoscopic surgery.

## Material and Methods

This observational study was conducted over duration of 18 months. It was undertaken from January 2021 to June 2022, in our medical college & tertiary care Hospital.

A study protocol was set before undertaking this study and it was approved by institutional Human Research Ethical Committee. All the participants in the study were explained clearly about the purpose and the nature of the study in the language best understood by them. Their participations were included only after obtaining a written and informed consent.

### Inclusion Criteria:

- All admitted patients in General Surgery, Obstetrics and gynecology ward.
- ASA grade I-II
- Age group-17 to 65 years

Patients with active cholecystitis, choledocholithiasis, electrocardiographic changes like sinus bradycardia and heart block, contra-indications to spinal anaesthesia psychiatric disorders or neurological diseases were excluded from the study.

Total 100 numbers of patients who are undergoing Laparoscopic surgery with Segmental spinal Anesthesia (SSA) were included in the study fulfilling inclusion criteria. This Patients were received an isobaric Inj. Levobupivacaine (0.5%) 2.2 ml and Inj. Fentanyl 15 mcg was injected into the T9-T10 / T10-T11 subarachnoid space using 25gauge Quincke spinal needle in sitting position. Immediately the patient was turned to the supine position. Oxygen at four to five liters/minute was given to the patient by the face mask. Diverting type EtCO2 monitoring system was used.

The pre-anesthetic check-up was done, written informed consent was taken and patients were counseled about the procedure one day prior to surgery. Patients were kept fasting as per standard guidelines. After establishing monitoring (electrocardiogram, pulse oximetry, non-invasive blood pressure, respiratory rate and end-tidal carbon dioxide), baseline vitals were noted and an intravenous line was secured with a 20 gauge cannula.

Pre-loading was started at this juncture with Ringer lactate (10 ml/kg in approximately 15 minutes). Premedication with glycopyrrolate 0.2 mg, ondansetron 4 mg, fentanyl 50 µg and midazolam1 mg was given systemically.

Under all strict aseptic and antiseptic precaution, with patient in sitting position, the back was prepared with 5% povidone iodine solution spirit and area was draped. Skin was infiltrated with 2 ml of 2% lignocaine. Segmental spinal anesthesia was performed with 25G Quincke spinal needle and isobaric Inj. Levobupivacaine (0.5% ) 2.2 ml + inj. Fentanyl 15 mcg is given in T9-T10/T10- T11 subarachnoid space. After completion of procedure, patient was laid down in supine position. Time of subarachnoid injection of drug was noted.

Heart rate (HR), BP, SpO2, ECG monitoring was done before induction, after induction HR, BP, SpO2, ECG, ETCO2 and at regular intervals during intra- op. Pulse, BP, SPO2 and RR were recorded every 0,3,5,10,20,30,40,50 and 60 minutes after giving segmental spinal anaesthesia and then every 30 minutes till 180 minutes in post-operative ward where further monitoring was continued.

Onset of sensory block was assessed every 2 minutes bilaterally (upper and lower levels) in midclavicular line till there was no sensation to pinprick with Hypodermic needle (24 gauge).

Time for regression of sensory block was assessed. Motor block was evaluated according to the modified Bromage scale. Pain scoring was done as per the Visual Analogue Scale (VAS). Time of onset of postoperative pain (at VAS 3) was recorded.

After establishment of adequate level of block Once the desired sensory block (minimum block T4-L4) as assessed by pinprick) was achieved, surgery was commenced., surgery was started and time of beginning of surgery was noted. Surgery was commenced using carbon dioxide (CO2) insufflation at a maximum pressure limit of 12 mmHg and a minimal tilt of the table.

IV fluids were administered depending on the weight of patient and replaced according to loss during surgery. Patients were observed for any intra-operative complications like bradycardia, hypotension, shoulder pain, respiratory discomfort. After completion of surgery, patients were shifted to post-operative care unit (PACU), where Monitors (ECG, NIBP, and SPO2) were attached.

**Statistical analysis:** The recorded data was compiled and entered in a spread sheet computer program (Microsoft Excel 2007) and then exported to data editor page of SPSS version 15 (SPSS Inc., Chicago, Illinois, USA). Quantitative variables were described as means and standard deviations or median and interquartile range based on their distribution. Qualitative variables were presented as count and percentages. For all tests, confidence level and level of significance were set at 95% and 5% respectively.

## Results

In our observational study all admitted patients in General Surgery, Obstetrics and gynecology ward at C. U. Shah medical college was evaluated. 100 patients who came under the inclusion criteria were selected for segmental spinal anesthesia. Isobaric Inj. Levobupivacaine (0.5% ) 2.2 ml + inj. Fentanyl 15 mcg is given in T9-T10/T10-T11 intervertebral space.

**Table 1: Demographic and Specific Characteristics**

| | **Mean±SD** |
|---|---|
| **Age(yrs.)** | 27±6.9 |
| **Weight(kg)** | 47.21±4.4 |
| **ASA(I/II)** | 70/30 |
| **Sex(F/M)** | 47/50 |

It was observed that, the mean age for male and female was 27.0±7y. The overall average age in our study was 27±6.9 yr. In our study male were 53% and female were 47%. The majority of cases were laparoscopic appendicectomy (74%), diagnostic laparoscopy (9%) and laparoscopic removal of ruptured ectopic (6%), laparoscopic ovarian cyst removal (5%) and total laparoscopic hysterectomy (4%). mean duration of surgery in laparoscopic appendicectomy (74%) patient was 34.2 min, diagnostic laparoscopy (9%) patient takes 44.15 min. and laparoscopic removal of ruptured ectopic (6%) takes 53.9min, laparoscopic ovarian cyst removal (5%) 57.5min and total laparoscopic hysterectomy (4%) takes 71.3 min. mean age of lap. surgeries were 36.7 min.

The overall mean onset of sensory blockade in our study was 3.7±1 min & time for regression of sensory blockade in our study was 154.4±8.6 min.

**Table 2: Upper and Lower level of sensory blockade**

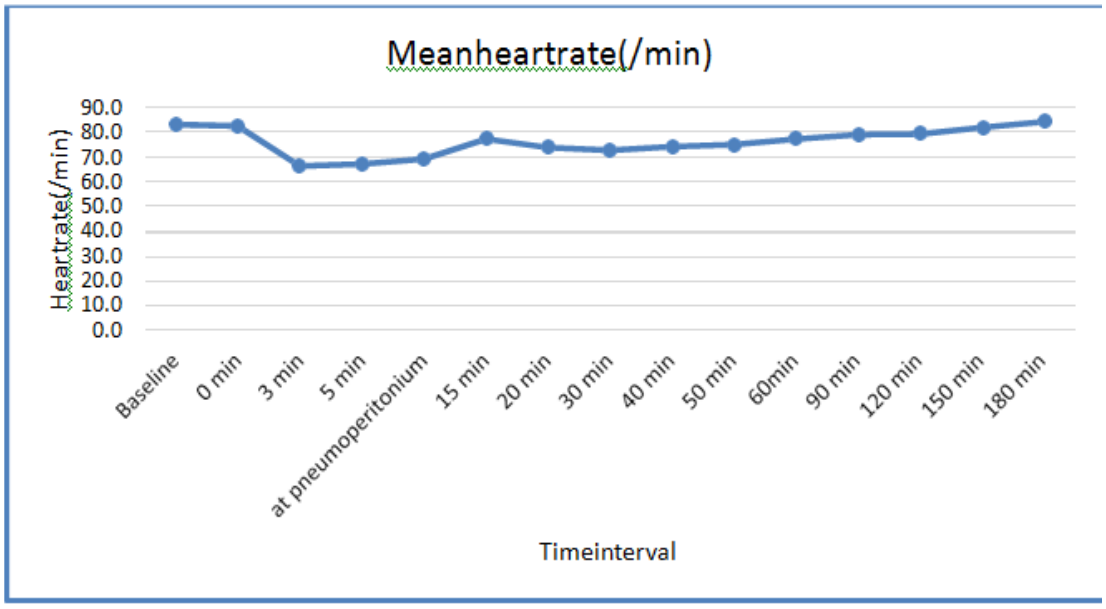
| | **Level** | **Number** | **Percentage (%)** |
|---|---|---|---|
| **Upper level of sensory block** | T2 | 1 | 1.0% |
| | T3 | 9 | 9.0% |
| | T4 | 89 | 89.0% |
| | T5 | 1 | 1.0% |
| **Lower level of sensory block** | L2 | 3 | 3.0% |
| | L3 | 15 | 15% |
| | L4 | 66 | 66.0% |
| | L5 | 16 | 16.0% |

Table 2 show supper level of sensory block T2, T3, T4 & T5 was obtained in 1, 9, 89 & 1 patient, lower level of sensory block L2, L3, L4 & L5 was obtained in 3, 15, 66, & 16 patients. Maximum no. of patients achieved adequate upper level of sensory block -T4 & Lower level of sensory block -L4.the dermatome level of analgesia achieved was satisfactory in all patient.

**Table 3: Characteristics of Motor Blockade**

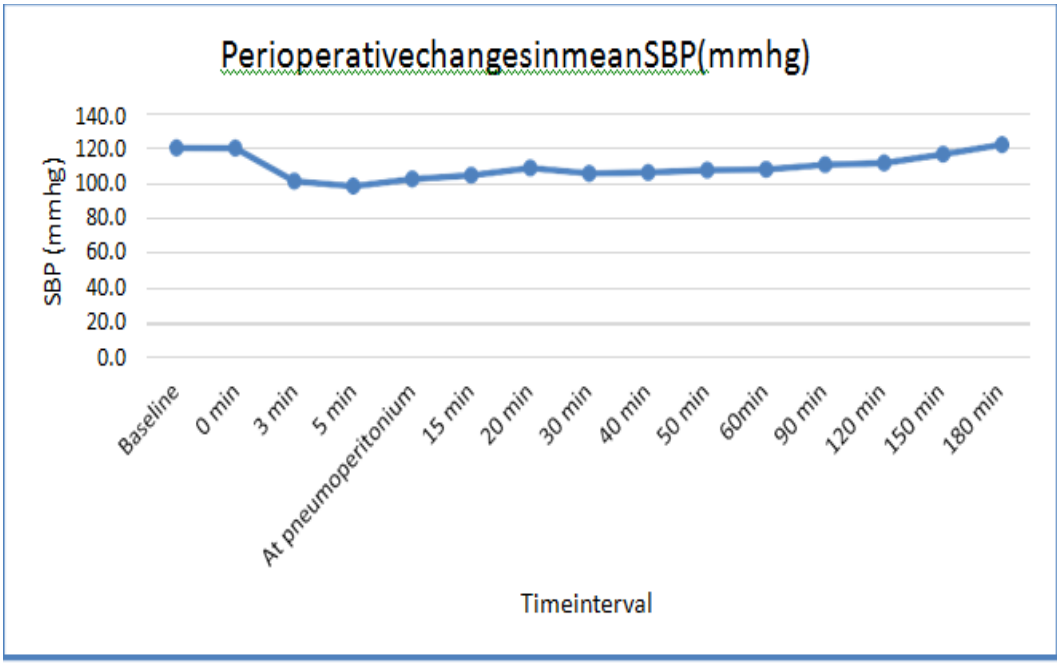
| Motor blockade | Min (MEAN±SD) |
|---|---|
| Onset of motor block (min) | 7.09±0.8 |
| Time for regression of motor blockade (min) | 90.4±9.6 |
| Motor block before surgery (Modified bromage score) | 1.33±0.57 |
| Motor block after surgery (Modified bromage score) | 1.1±0.34 |

Table 3 shows onset of motor blockade 7.09±0.8 min and total duration of motor blockade 90.4±9.6 min. Motor block before surgery (by modified bromage scale )1.33±0.57. Motor block after surgery (by modified bromage scale) was 1.1±0.34.



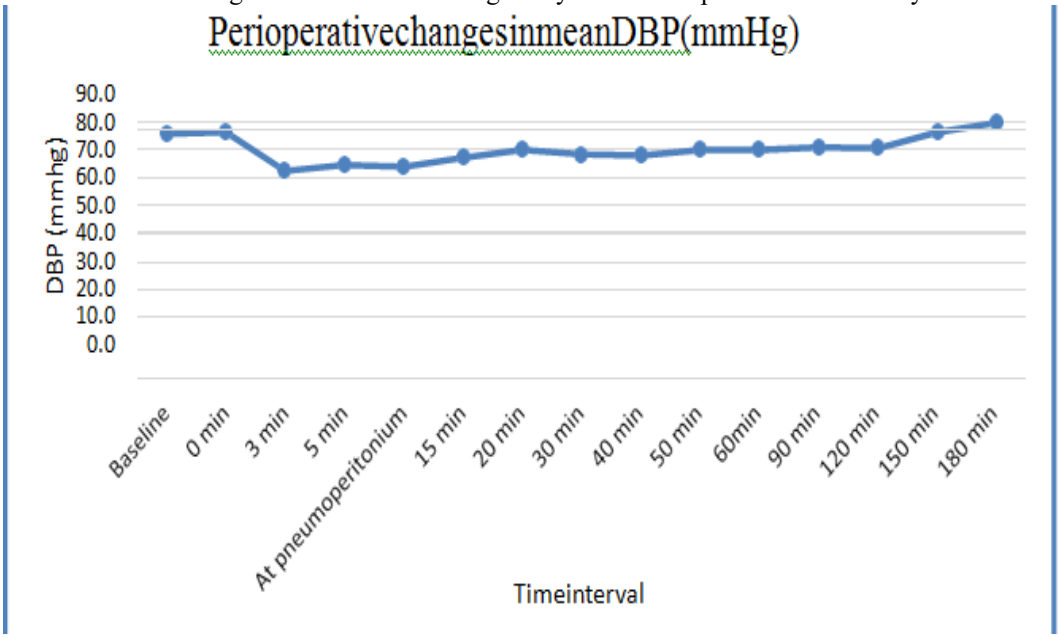

**Graph 1: Perioperative changes in heart rate (Per Min)**

Graph 1 shows intraoperative changes in mean heart rate at different time interval. There is decrease in heart rate 66.2±5.7 (/min) after segmental spinal anesthesia & 67.0±3.5 (/min) after CO2 insufflations from the mean baseline heart rate of 83.0±7.8 min which was increased again after deflation. There is minimal change in mean heart rate in our study.



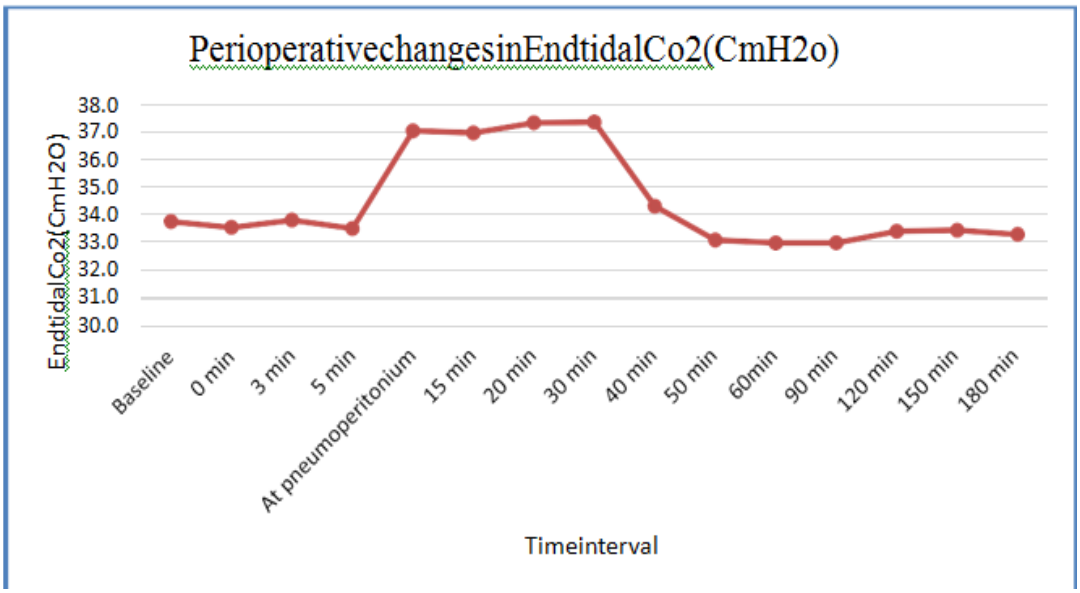

**Graph 2: Perioperative Changes in Mean Systolic Blood Pressure (Mm hg)**

Graph 2 shows Perioperative changes in mean SBP±SD (mm hg). Intra operative systolic pressure shows a decline to 98.8±2.8 mmhg from baseline 120.7±8.5 mm hg after segmental spinal anesthesia & after co2 insufflations 102.9±5.1mmhg. there is minimal change in systolic blood pressure in our study.




**Graph3: Perioperative Changes in Mean Diastolic Blood Pressure (MMHG)**

Graph 3 shows the intra operative mean diastolic pressure changes. The baseline diastolic blood pressure was 75.7±5.5 mmHg which was decreased after segmental Spinal anesthesia to 62.3±4.6 mmHg and persisted afterCO2 insufflation at a level of 63.8±4.0 mmHg. There is minimal change in diastolic blood pressure in our study.




**Graph 4: Perioperative Changes In Mean ENDTIDALCO2 (ETCo2) (CMH2O)**

Graph 4 shows perioperative changes in mean end tidal Co2 after CO2 insufflation, there was increase in ETCO2 from the baseline 33.7±1.6 cm H2o to 37.0±1.1 cm H2o and ETCO2 changes disappeared after deflation 32.9±1.6 cm H2o there is minimal changes in mean ETCO2 in our study.

**Table 4: Peri-Operative & Post-Operative Complications**

| Complications | Number |
|---|---|
| **Bradycardia** | 6 |
| **Hypotension** | 2 |
| **Shoulder tip pain** | 11 |
| **Nausea /vomiting** | Nil |
| **Respiratory depression** | Nil |

In our study 2% of patients had hypotension and were treated with inj. Mephentermine 6 mg and of 6% of patients had bradycardia and were treated with inj. Atropine 0.6 mg IV.11% of patients had shoulder tip pain and were treated with Inj. Dexmedetomidine (0.5 mcg/kg/hr. -maintenance dose) with or without ketamine (0.5 mg/kg) was administered intravenously. Rest of them did not have any complaints.

**Table 5: Visual Analogue Scale**

| Time duration (hr.) | Visual analogue scale (Mean±SD) |
|---|---|
| **1 hr.** | 1±0 |
| **2 hr.** | 1.30±0.49 |
| **4 hr.** | 2.32±0.77 |
| **6 hr.** | 3.06±0.8 |
| **12 hr.** | 1.35±0.5 |

Table 5 shows postoperative pain score was 1.30±0.492 hr. after the completion of surgery, 2.32±0.77 at 4hr, 3.06±0.8 at 6 hr. and 1.35±0.5 at 12 hr.

**Discussion**

Recent reviews document that segmental spinal anesthesia is equally favorable in laparoscopic surgeries by blocking of the required dermatomes with low dose of local anesthetic drug. Lower the dose - more likely true segmental block. Continues segmental spinal anesthesia used for long duration surgeries. Amount of CSF less at thoracic level & thoracic nerve roots - slight and thin is favouring its efficient blockage, so no differences in onset of isobaric & hyperbaric drugs at thoracic level.

Advantages of Segmental spinal anesthesia can include higher level of block achieved with low dose, profound muscle relaxation, an awake and spontaneously breathing patient intraoperatively, minimal nausea and vomiting, minimal hemodynamic fluctuations, effective postoperative analgesia, and early ambulation and recovery.

In the present study, with inj. Levobupivacaine 0.5 % (2.2 ml) + inj. fentanyl 15 mcg given at T9-T10/T10-T11 Interspace shows greater no. of patients mean onset time of sensory analgesia was 3.7± 1 min. The drug used was Levobupivacaine (0.5 %) 2.2 ml + inj. fentanyl 15 mcg has fast onset of action can be explained by the lower amount of CSF in the thoracic segment compared to the lumbar segment. Loveleen Kour, Madan Lal Katoch et al [10] 2019 found the mean onset time of sensory blockade was 2.03 min.with 2ml of 0.5% isobaric levobupivacaine and 25 µg (0.5ml) fentanyl given in T9-T10/T10-T11 interspace and, in Another study Imbelloni LE et al 2014 [11] found the mean time of sensory blockade was 03:11 min.

The peak block height achieved was (T2-T3) with levobupivacaine. Lowest segment blocked ranged from L4-L5 in group Levobupivacaine. The thoracic approach allows deposition of the drug close to the target dermatomes. A lesser dose of the drug is needed to produce the necessary effect. Also, because drugs are isobaric; they show a segmental blockade with block centered on upper thoracic and upper lumbar dermatomes which are close to site of drug deposition.

In the present study, with, inj. Levobupivacaine 0.5 % (2.2 ml) + inj. fentanyl 15 mcg given at T9-T10/T10-T11 Interspace shows, upper level of sensory block T2,T3,T4 & T5 was obtained in 1, 9, 89 &1 patients ,lower level of sensory block L2,L3,L4 &L5 was obtained in 3, 15, 66,& 16 patients. Maximum no. of patients achieved adequate upper level of sensory block -T4 & Lower level of sensory block -L4.the dermatome level of analgesia achieved was satisfactory in all patients. Ahmed Abdelaal Ahmed Mahmoud et al (2021) [12] with 5 mg of plain bupivacaine 0.5% and 0.3 ml of fentanyl 50 µg/ml (15 µg fentanyl) given at T4-T5 interspace. Sensory levels recorded at 15 min and before commencement of surgery were: upper level at T1 (T1–T2) and lower level at T11 (T11–T12).

In our study with inj. Levobupivacaine 0.5 % (2.2 ml) + inj. fentanyl 15 mcg given at T9-T10/T10-T11 Intervertebral space shows, over all mean time for regression of sensory blockade in our study was 154.4±8.6 min. Mohamed Ellakany et al (2013) [13] The mean time to full sensory block regression was 160.9 min. with segmental (T10-11 injection) thoracic spinal anesthesia (through combined spinal epidural) using 1 ml of plain bupivacaine 0.5% (5 mg) in addition to 25 mcg fentanyl.

In Our study with inj. Levobupivacaine 0.5 % (2.2 ml) + inj. fentanyl 15 mcg given at T9-T10/T10-

T11 Interspace shows, onset of motor blockade 7.09±0.8 min and time for regression of motor blockade 90.4±9.6 min. Motor block before surgery by modified bromage scale 1.33±0.57. Motor block after surgery by modified bromage scale 1.1±0.34. Ahmed Abdelaal Ahmed Mahmoud et al (2021)12 with 5 mg of plain bupivacaine 0.5% and 0.3 ml of fentanyl 50 µg/ml (15 µg fentanyl) given at T4-T5 interspace. There was no significant lower limb motor block in any of the patients, and a Bromage scale of 0 was recorded in all patients whether before or after surgery. Go-Woon Jun et al (2014) [14] with (hyperbaric bupivacaine 0.5% with fentanyl 10 mcg given at L4-L5. A modified Bromage scale score of 3, 2, and 1 was obtained in 16, 9, and 1 patient, respectively.

In our study, mean duration of analgesia was 154.4±8.6 min. Loveleen Kour et al (2019) [10] with 2ml of 0.5% isobaric levobupivacaine and 25 µg (0.5ml) fentanyl given in T9-T10/T10-T11 interspace. Duration of analgesia is longer (180 min) with levobupivacaine; author concluded that levobupivacaine is better than bupivacaine in thoracic spinal anaesthesia for laparoscopic cholecystectomies.

In our study, inj. Levobupivacaine 0.5 % (2.2 ml) + inj. fentanyl 15 mcg given at T9- T10 /T10-T11 Interspace, there is decrease in heart rate 66.2±5.7 (/min) after segmental spinal anesthesia and 67.0±3.5 (/min) after CO2 insufflation from the mean baseline heart rate of 83.0±7.8 min which was increased again after deflation. There is minimal change in mean heart rate in our study. Intra operative systolic blood pressure shows a decline to 98.8±2.8 mm hg from baseline 120.7±8.5 mm hg after segmental spinal anesthesia &after co2 insufflation 102.9±5.1mm hg.

There is minimal change in systolic blood pressure in our study. The baseline diastolic blood pressure was 75.7±5.5 mmHg which decreased after segmental Spinal anesthesia to 62.3±4.6mmHg and persisted after CO2 insufflation at a level of 63.8±4.0 mmHg. There is minimal change in diastolic blood pressure in our study. the baseline mean blood pressure was 90.4±5.6 mmHg which decreased after segmental spinal anesthesia to 75.1±5.1mmHg.

There is minimal change in mean blood pressure in our study. After CO2 insufflation, there were increase in ETCO2 from the baseline 33.7±1.6 cmH2o to 37.0±1.1 cmH2o and ETCO2 changes disappeared after deflation 32.9±1.6 cmH2o.there is minimal changes in mean ETCO2 in our study. Go-Woon Jun et al (2014) [14] with (hyperbaric bupivacaine 0.5% with fentanyl 10 mcg given at L4-L5. Hypotension occurred in three patients, two of whom received 15 mg of ephedrine; one received 10 mg. Bradycardia occurred in seven patients, and all were corrected by 0.5 mg of atropine. Combined spinal epidural was placed at the 10th thoracic interspace using 16 gauges Tuohy needle and a paramedian approach, 1 ml of plain bupivacaine 0.5%, i.e., 5 mg in addition to 25 mcg fentanyl was injected. The systolic and diastolic blood pressure showed significant decrease in the early-operative and postoperative period. In our study, inj. Levobupivacaine 0.5 % (2.2 ml) + inj. fentanyl 15 mcg given at T9- T10 /T10-T11 Interspace. 2% of patients had hypotension and were treated with inj. Mephentermine 6 mg and of 6% of patients had bradycardia and were treated with inj. Atropine 0.6 mg IV. 11% of patients had shoulder tip pain and were treated with Inj. Dexmedetomidine (0.5 mcg/kg/hr -maintenance dose) with or without ketamine (0.5 mg/kg) was administered IV. Rest of them did not have any complaints.

There are no post-operative complications in our study. Loveleen Kour et al (2019) [10], with 2ml of 0.5% isobaric levobupivacaine and 25 µg (0.5ml) fentanyl given in T9-T10/T10-T11 interspace, 3 patients had bradycardia which responded to a single dose of atropine & 3 patients developed hypotension. All of them responded to fluid bolus and none required mephenteramine. Naresh Wamanrao Paliwal et al (2020) [9] with 2ml Isobaric Levobupivacaine 0.5% with 25 mcg fentanyl was injected in T9-T10 space. 1 (3.33 %) and 2 (6.66%) Patients undergoing laparoscopic cholecystectomy under segmental spinal were found to have episodes of hypotension and bradycardia. Shoulder pain was experienced by 2 (6.66 %) patients. Nausea and vomiting were present in 2 (6.66%) patients.

In our study, inj. Levobupivacaine 0.5 % (2.2 ml) + inj. fentanyl 15 mcg given at T9- T10 /T10-T11 Interspace. Post-operative pain score was 1.30±0.49 2 hr. after the completion of surgery, 2.32±0.77 at 4hr, 3.06±0.8 at 6 hr. and 1.35±0.5 at 12 hr. there is no need of analgesic. Go-Woon Jun et al (2014) [14] the postoperative pain score was 1.5 ± 1.5 (range, 0.0-5.0) 2 hr after completion of the operation, 3.1 ± 2.2 (range, 0.0-8.0) at 6 h, 2.5 ± 1.7 (range, 0.0-8.0) at 12 h, and 1.6 ± 1.2 (range, 0.0- 6.0) at 24 hr. Besides the small sample size, limitations of our study included the fact that a fixed dose of local anesthetic was used in all patients.

## Conclusion

Segmental spinal anesthesia can be preferred technique in abdominal laparoscopic surgeries because of greater sensory blockade, less motor blockade, hemodynamically stability, adequate analgesia, minimal side-effects and good patient-surgeon satisfactory score.

## References


1. Zundert A, Stultiens G, Jakimowicz JJ, van den Borne B, van der Ham W. Segmental spinal anaesthesia for cholecystectomy in a patient with severe lung disease. Br J Anaesth. 2006; 96(4):464–6.
2. Hobaika ABS. Thoracic spinal anesthesia for gastrostomy in a patient with severe lung disease. Acta Anaesthesiol Scand. 2007; 51:783.
3. Ellakany M. Comparative study between general and thoracic spinal anesthesia for laparoscopic cholecystectomy. Egypt J Anaesth. 2013; 29(4):375–81.
4. Paliwal NW, Ingle J, Lawhale S, Dhakulkar A. Segmental spinal vs general anaesthesia in patients undergoing laparoscopic cholecystectomy: A comparative study. MedPulse Int J Anesthesiol. 2020; 14:77–81.
5. Zundert AAV, Stultiens G, Jakimowicz JJ, Peek D, Ham W, Korsten HHM, et al. Laparoscopic cholecystectomy under segmental thoracic spinal anaesthesia: a feasibility study. Br J Anaesth. 2007; 98(5):682– 6.
6. Imbelloni LE, Gouveia MA. Low Incidence of neurologic complications during thoracic epidurals: anatomic explanation. AJNR Am J Neuroradiol. 2010; 31(10):E84.
7. Bayrak M, Altintas Y. Comparing laparoscopic cholecystectomy in patients with chronic obstructive pulmonary disease under spinal anesthesia and general anesthesia. BMC Surg. 2018; 18:1.
8. Imbelloni LE, Fornasari M, Fialho JC, Sant'Anna R, Cordeiro JA. General anesthesia versus spinal anesthesia for laparoscopic cholecystectomy. Rev Bras Anestesiol. 2010; 60(3):217–227.
9. Naresh Wamanrao Paliwal, Jayesh Ingle, Sunil Lawhale, Amol Dhakulkar. Segmental spinal vs general anaesthesia in patients undergoing laparoscopic cholecystectomy: A comparative study. MedPulse International Journal of References 76 Anesthesiology.June2020; 14(3):77-83.
10. Loveleen Kour, Madan Lal Katoch. Comparison of levobupivacaine vs bupivacaine in thoracic spinal anaesthesia for laparoscopic cholecystectomies. Int J Res Med Sci 2019; 7:4568-72.
11. Imbelloni LE. Spinal Anesthesia for Laparoscopic Cholecystectomy. Glob J Anesthesiol 2014; 1(1): 001-008.
12. Ahmed Abdelaal Ahmed Mahmouda, Hazem Abdelwahab Husseina, Karim Girgisb , Ahmed Mostafa Kamalb , Hesham Ahmed Nafady, The novel use of spinal anesthesia at the mid-thoracic level: a feasibility study. The Egyptian Journal of Cardiothoracic Anesthesia 2014, 8:21–26.
13. Mohamed Ellakany. Comparative study between general and thoracic spinal anesthesia for laparoscopic cholecystectomy, Egyptian Journal of Anaesthesia 2013; 29:4, 375-381,
14. 14. Go-Woon Jun1, Laparoscopic appendectomy under spinal anesthesia with dexmedetomidine infusion. Korean J Anesthesiol 2014 October 67(4): 246-251.