



Global Journal of Clinical Medicine and Medical Research [GJCMMR]

ISSN: 2583-987X (Online)

Abbreviated key title: Glob.J.Clinic.Medici.Medica.Res.

Frequency: Monthly

Published By GSAR Publishers

Journal Homepage Link- <https://gsarpublishers.com/journal-gjcmmr-home/>



Open Cholecystectomy under Thoracic Segmental Spinal: A Case Series

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Article History

Received: 27/07/2024

Accepted: 02/08/2024

Published: 03/08/2024

Vol – 2 Issue – 8

PP: -01-04

Abstract

Background and Aims: The thoracic segmental spinal approach of spinal anaesthesia is a safe and effective method for various surgeries, including open cholecystectomies, laparoscopic cholecystectomies, breast cancer lumpectomies, and abdominal cancer surgery. In this case series, we tried to demonstrate the effectiveness and safety of thoracic segmental spinal anaesthesia in patients underwent open cholecystectomy to 'patients who underwent open cholecystectomy'.

Materials and Methods: For this case series 10 patients who were posted for open cholecystectomy and gave consent were given thoracic segmental spinal anaesthesia with preservative-free 0.5% w/v isobaric levobupivacaine 10 mg with 5 mcg clonidine. The subarachnoid space puncture was performed via a median approach using a 25-gauge Quincke's needle at T8-9 intervertebral space in the sitting position. After the injection patient was positioned supine and the level of the sensory blockade was tested using pinprick tests. Intraoperative hemodynamic changes were noted and postoperative follow-up until discharge was done.

Results: Intraoperative hypotension [mean arterial pressure(MAP)<65 mmHg] was documented only in four cases (40%), with one case (25%) of these requiring two boluses of phenylephrine. Intraoperative bradycardia [heart rate(HR)<60/min] was seen in 2 cases (20%) which required rescue drug with Injection atropine. Mean operative time was 45 mins, while the mean duration of spinal anaesthesia was 150 mins. No neurological complaints or consequences were noted in any case until discharge.

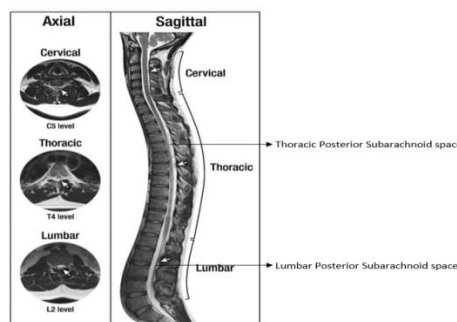
Conclusion: Thoracic segmental spinal anaesthesia is a safe and effective technique for upper abdominal and thoracic surgeries.

Keywords: Thoracic Segmental Spinal, General Anaesthesia, Upper abdominal and thoracic surgeries, Levobupivacaine, Clonidine, Open cholecystectomy

INTRODUCTION

General anesthesia (GA) is the most commonly used approach for open cholecystectomies; however some drawbacks can include higher risk in patients with severe systemic diseases, prolonged post-operative recovery, use of opioids, post-operative nausea, and vomiting, etc.^{1, 2} There is currently renewed attention to use thoracic segmental spinal anaesthesia for several upper abdominal and thoracic surgeries.³ Although traditionally spinal anaesthesia was performed only below the level of L1 in order to avoid injuring the spinal cord, it has been now demonstrated that thoracic segmental spinal approach of spinal anaesthesia is a safe and effective method for various surgeries, including open cholecystectomies, laparoscopic cholecystectomies, breast cancer lumpectomies and abdominal cancer surgery.^{4, 5} MRI images have shown that the mid to lower thoracic segment of the cord lies anteriorly, where there is a CSF-filled space between the dura and the cord. In contrast, the spinal cord and the cauda equina are posteriorly in the lumbar region. This has demonstrated

there is a greater depth of the posterior subarachnoid space in the thoracic spinal cord.⁶ (Picture 1). Giving thoracic spinal anaesthesia may provide another option for these common surgeries due to improved patient safety, reduced post-anesthesia care stay, and better postoperative pain relief.^{7, 8}



Picture 1: T2 weighted MRI of spine



Materials & Methods

This is a single-centre case series involving patients posted for open cholecystectomy in the general surgery OT of MGMMC & LSK Hospital over a period of 2 months (December 2023-January 2024). This study included 10 patients with calculus cholecystitis due for an open cholecystectomy and gave the consent for participation in the study.

A. Inclusion Criteria:

1. Patients posted for open cholecystectomy.
2. Patients of both sexes were included.

B. Exclusion Criteria:

1. Patients who did not give the consent for participation in the study.
2. Patients who are allergic to Local Anaesthetics.

Technique

Preloading with 10ml/kg Ringer's Lactate given prior to the procedure. Under a fully aseptic technique with the patient in a sitting position, the correct intervertebral space was marked between T8 and T9 and the skin of the puncture site infiltrated with 3 mL of 2% lidocaine. The puncture was performed via a median approach using a 25-gauge Quincke's needle. (Picture 2). Once clear flow of cerebrospinal fluid was established, preservative-free isobaric 0.5% (w/v) Levo-Bupivacaine 10 mg with 5mcg clonidine was given intrathecally and after the injection patient was positioned supine. The level of the sensory blockade was tested using pinprick tests. When an adequate sensory block was achieved, the surgery was allowed to start. For procedural sedation, intravenous midazolam (0.05 mg/kg) bolus was administered. All patients were spontaneously breathing with O₂ inhalation with nasal prongs @ 2L/min during surgery. Standard ASA monitoring was done. Patients were counselled about informing any intraoperative discomfort, and back up general anaesthesia or analgesia plan had been arranged. Intraoperative hypotension defined as a decrease in mean arterial blood pressure to less than 65 mmHg at any point of time during surgery and that was managed with boluses of Injection Phenylephrine at a dose of 100mcg. Intraoperative bradycardia defined as a decrease in heart rate of less than 60 beats/min was managed by Injection Atropine 0.6 mg IV stat. Injection Pentazocine 0.5mg/kg intravenous dose had been kept in reserve for any intraoperative pain with VAS score 1-4. Instituting general anaesthesia had been kept in reserve in case of inadequate pain relief and inadequate surgical field exposure.



Picture 2: Thoracic spinal puncture through midline approach at T8-T9 level.

Results

Out of 10 patients included in this study, 7 patients were female and 3 patients were male. (figure 1). The age of the patients ranged from 25 years till 76 years (figure 2). Among the patients, 3 patients were of ASA physical status I, 5 patients were of ASA II and 2 patients were of ASA III (figure 3).

Mean time to achieve surgical anaesthesia as checked by pin prick method over right subcostal area is 4 mins with level of sensory block T2-L2 in 60% cases and T3-L3 in 40% cases. Intraoperative hypotension [mean arterial pressure(MAP)<65 mmHg] was documented only in four cases (40%), with one case (25%) of these requiring two boluses of Phenylephrine. Fig 4 showing the percentage change of MAP with time in all individual cases. Intraoperative bradycardia [heart rate(HR)<60/min] was seen in 2 cases (20%) which required rescue drug with Injection atropine. Fig 5 shows the percentage change of heart rate with time in all individual cases. Mean operative time was 45 mins, while the mean duration of SA was 150 mins. During all anesthetic and surgical procedures no major complications and no need of conversion from Thoracic Segmental Spinal to General Anesthesia. Opinion from the Surgical team was that in all cases (100%) the muscular relaxation of the abdominal wall was complete and without interruptions. Postoperative course was uneventful in all cases (100%) with a median length of stay of (range 1–3) days; no patient (0%) needed mechanical ventilation and no episodes of post-operative nausea and vomiting (PONV); post-dural puncture headache were reported. No cases complained of any neurologic consequences like tingling, numbness in legs, urinary retention, abnormal motor or sensory responses in lower limbs related to Spinal Anesthesia (SA) till discharge.

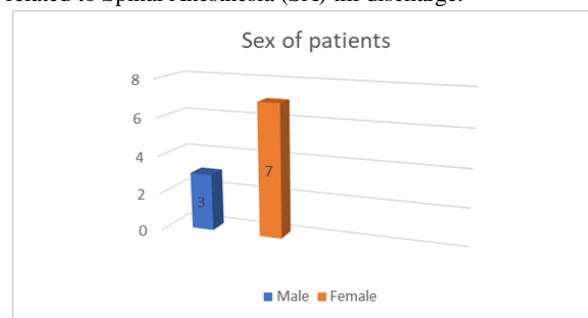


Figure 1: Sex of patients included in case series

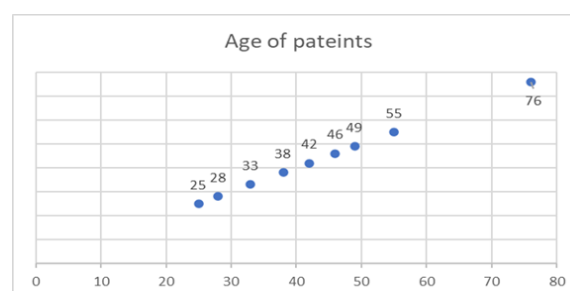


Figure 2: Age of patients included in case series

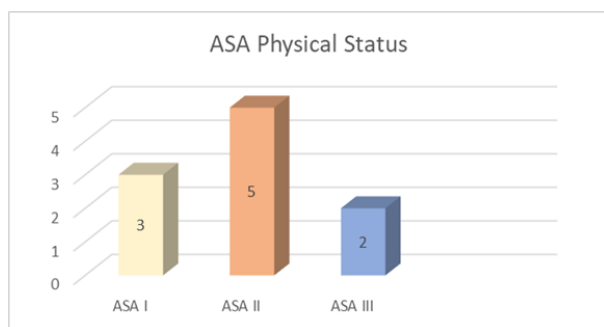


Figure 3: ASA physical status of patients included in case series

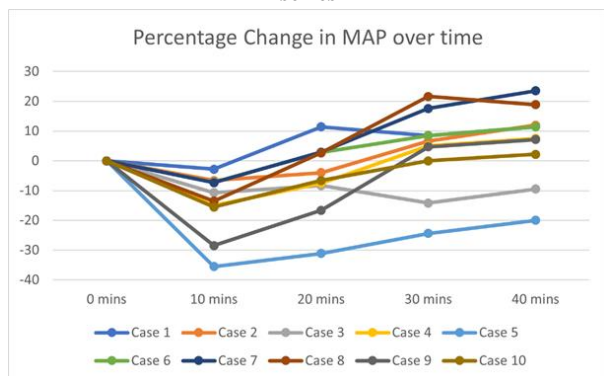


Figure 4: Percentage change in MAP over time

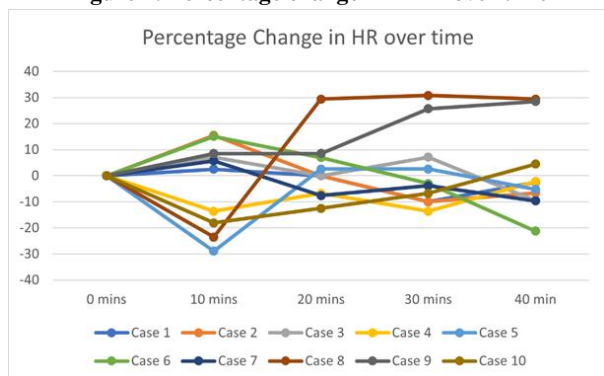


Figure 5: Percentage change in HR over time

Discussion

Our case series shows that Thoracic Segmental Spinal is a safe and reliable anesthesia technique for open cholecystectomy. There are several benefits of spinal anaesthesia (SA) when compared to GA, in terms of lesser chance of post-operative cognitive dysfunction, less use of opioids for intraoperative and postoperative pain relief, less chance of post-operative nausea and vomiting, faster patient recovery, a smoother postoperative course with earlier bowel movements and possible same-day discharge.⁹ Severe direct complications of the technique (e.g. neurological injuries or post dural puncture headache) were not recorded in our cases as well as in our previous works on thoracic segmental spinal validating its security.¹⁰ Some limitations to this study are that the number of patients, in this case, series might bias the outcomes analyzed. In addition, although the data was prospectively collected, the analysis was retrospective in nature and lacks a control group undergoing GA to compare

our findings suggesting the need for prospective studies with a larger number of patients undergoing similar surgeries to validate and confirm these findings.

Conclusion

Thoracic segmental spinal anaesthesia is a safe and effective technique for upper abdominal and thoracic surgeries. Segmental spinal anaesthesia has its benefit over general anaesthesia and should be considered as a modality of providing anaesthesia in appropriate cases.

Source of Funding

None

Conflict of Interest

None

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