International Journal of Life Sciences, Biotechnology and Pharma Research Vol. 14, No. 2, February 2025 Online ISSN: 2250-3137
Print ISSN: 2977-0122

DOI: 10.69605/ijlbpr_14.2.2025.139

ORIGINAL RESEARCH

Comparative study between coeliac plexus block and thoracic epidural in open laparotomy surgery for post operative analgesia using isobaric bupivacaine: A prospective double blind randomised comparative study

[1]Dr. Gohar Hayat, [2]Dr. Rajan Nanda, [3]Dr. Rajni Dhaka

[1,3]3rd year resident, [2]Senior Professor, Department of Anesthesiology, Jhalawar Medical College, Jhalawar, India

Corresponding Author
Dr. Rajni Dhaka
3rd year resident, Department of Anesthesiology, Jhalawar Medical College, Jhalawar, India

Received: 22 January, 2025 Accepted: 15 February, 2025 Published: 26 February, 2025

ABSTRACT

Background: An emergency laparotomy is a common surgical procedure, performed for a wide variety of intra-abdominal pathologies, which has a significant associated morbidity and mortality. Poorly managed pain after a laparotomy is a leading contributor to postoperative complications and mortality. **Objectives:** This study was done with the aim of comparison of postoperative analgesic efficacy of Celiac plexus block versus Thoracic epidural using Isobaric bupivacaine (0.5%) and Fentanyl in patients undergoingopen laparotomy surgery in the post operative period. **Materials and Methods**: In this prospective randomized double blind study, 60 patients aged between 18 – 60 years, of either sex, belonging to ASA class I and II posted for various elective laparotomy surgeries under general anaesthesia at our institute were randomly selected and divided by computer generated numbers into 2 groups with 30 patients in each group. Group C patients received celiac plexus block via direct infiltration technique at the end of surgery. Group T patients received thoracic epidural infusion after the end of surgery up to 48 hours. **Conclusion:** ICPB provide a good means of analgesia, decreases the post-operative stress response, improve gut motility and improve pulmonary function by providing good pain relief. It is also a simple and safe procedure which ensures an accurately placed local anesthetic solution and avoids the need for another invasive procedure for pain relief and hence can be used as an alternative to placing an epidural catheter.

Keywords: Isobaric; Bupivacaine, Celiac plexus block, thoracic epidural.

INTRODUCTION

An emergency laparotomy is a common surgical procedure, performed for a wide variety of intra-abdominal pathologies, which has a significant associated morbidity and mortality. These cases represent a significant challenge to both clinicians and organizations involved with their management.Poorly managed pain after a laparotomy is a leading contributor to postoperative complications and mortality. Inadequate analgesia may lead to distress and an increased risk of postoperative pulmonary complications such as atelectasis and pneumonia; cardiac complications such as myocardial ischaemia; thromboembolic events; and a greater stress response.[1,2]

Opioid-related side-effects and the opioid abuse epidemic emphasize the need for alternative, opioid-minimizing, multimodal analgesic strategies, including neuraxial (epidural/ intrathecal) techniques, truncal nerve blocks, and lidocaine infusions. The preference for minimally invasive surgical techniques has changed anaesthetic and analgesic requirements in abdominal surgery compared with open laparotomy, leading to a decline in popularity of epidural anaesthesia and an increasing interest in intrathecal morphine and truncal nerve blocks.[3,4]

DOI: 10.69605/ijlbpr_14.2.2025.139

Celiac Plexus Block (CPB) was first started in **1914 by Kappis**to block the splanchnic nerves and celiac plexus with local anesthetic for surgical anesthesia percutaneously. In **1921, Braun**performed the intra-operative approach to block the celiac plexus and the splanchnic nerves by gently retracting the stomach and placing a digit between the aorta and the inferior venecava to serve as a guide to the injection of an anesthetic agent over the ventral surface of the first lumbar vertebra.

Historically, thoracic epidural analgesia has the strongest evidence base for open abdominal surgery. There are many published benefits including mitigation of the surgical stress response, in particular neuroendocrine (sympathetic and pituitary) and metabolic (hyperglycaemia and protein catabolism) effects, reduced pulmonary complications (hypoxia, atelectasis, infection, thromboembolism) and some evidence of reduced incidence of myocardialinfarction (MI) and acute kidney injury.So this study was done with the aim of comparison of postoperative analgesic efficacy of Celiac plexus block versus Thoracic epidural using Isobaric bupivacaine (0.5%) and Fentanyl in patients undergoingopen laparotomy surgery in the post operative period.

MATERIALS AND METHODS

Stydy source

After obtaining institutional ethical committee approval, this study was done from 5 Dec 2023 till 30 December 2024, in Department of Anaesthesia, Jhalawar Medical College and Associated Hospital, Jhalawar after written and informed consent from the patients and their relative before starting the study.

Inclusion criteria: Patients undergoing elective and emergency abdominal surgery, Adults more than 18 years and less than 60 years of age, Patients of ASA GRADE I, II, III.

Exclusion criteria: Patients Refusal, Patients belonging to ASA grade IV, V, Bowel obstruction and intra abdominal infection,Patients on anticoagulation therapy or with bleeding disorders, Patients with hypersensitivity to the study drugs, Pregnant and lactating mothers, Patients with chronic co morbidities.

Study design: Prospective, Randomized, Double – blind, Comparative Study

Sample size and randomisation: The sample size was calculated to be 30 in each group with an α error of 0.05 and power of 90%. The study was conducted in 60 patients, divided into 2 groups with 30 patients in each group. Standard protocol followed for general anaesthesia in both groups.

Allocation to different regimens

Group T: After completion of surgery, the patient will be placed in lateral decubitus position. Under all aseptic precautions, T7-T8 intervertebral space will be chosen to perform the epidural block with 18G Tuohy epidural 22 needle. The epidural space will be identified by loss of resistance (LOR) syringe and epidural catheter will be placed. Patient will be made to lie supine, then epidural infusion of 0.125% isobaric bupivacaine 3 ml per hour will be started for 2 days.

Group C: After completion of surgery before closing the peritoneal layer, celiac plexus block (CPB) will be performed for postoperative analgesia. During direct vision (anterior) block, first upper edge of the pancreas will be exposed, the abdominal aorta will be palpated, and the pulsation of the common hepatic artery and splenic artery at the level of the abdominal trunk will be palpated. By using a 22G 15 cm puncture needle with an extension line and a syringe pumped back by an assistant to form a negative pressure, then the needle will be inserted into the fat on both sides of the abdominal aorta .After confirming that there is no blood or fluid outflow, slowly 12ml of 0.25% Isobaric bupivacaine will be injected in left side and 8 ml of 0.25% Isobaric bupivacaine will be injected in right side. After pulling out the needle any damage and bleeding will be noted.

OBSERVATIONS

Monitoring of vital parameters like pulse, BP and oxygen saturation will be done throughout procedure. Post operatively monitoring of BP, return of bowel movements, duration of analgesia will be done.Pain in post-operative period was assessed using a standard 10 cm visual analogue scale (VAS). Time for the first request of postoperative analgesic when VAS >3 (duration of analgesia) was noted and rescue analgesic intramuscular inj. Tramadol 50mg or inj. Diclofenac 75mg was given.

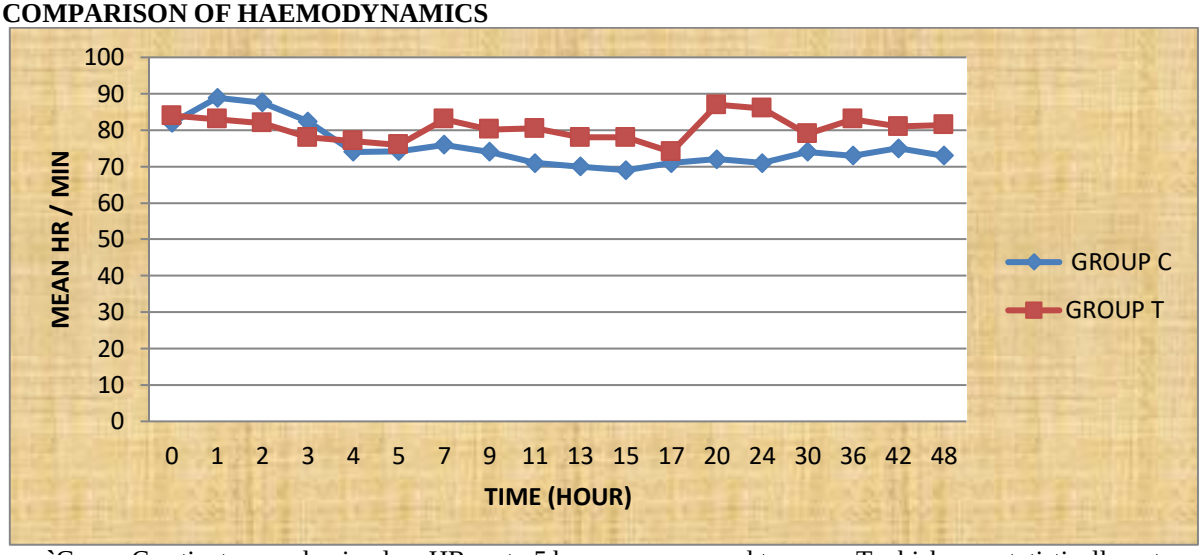
Statistical calculations were carried out using Microsoft Office Excel 2010 and Graph Pad Prism 6.05 (quickcale) Software (Graph pad software Inc. La Jalla CA USA). Chi square test and student t-test were used appropriately to test the statistical significance of the parameters.

RESULTS

The demographic profile of the patients comparing age, sex, weight, height and also type of surgeries show no statistically significant difference and were comparable in both groups of our study. All base line vital parameters were similar in both groups.

DOI: 10.69605/ijlbpr_14.2.2025.139

COMPARISON OF HAEMODYNAMICS



`Group C patients were having low HR up to 5 hours as compared to group T which was statistically not significant. (P > 0.05). After 5 hours it was statistically significant. (P < 0.05).

CHANGES IN MEAN SBP, DBP and MBP

In between 1 to 13 hour time interval, Group C patients were having low SBP as compared to group T which was statistically significant. (P > 0.05). From 15 to 24 hour, Group C patients were having low SBP as compared to group T which was not statistically significant. (P > 0.05).

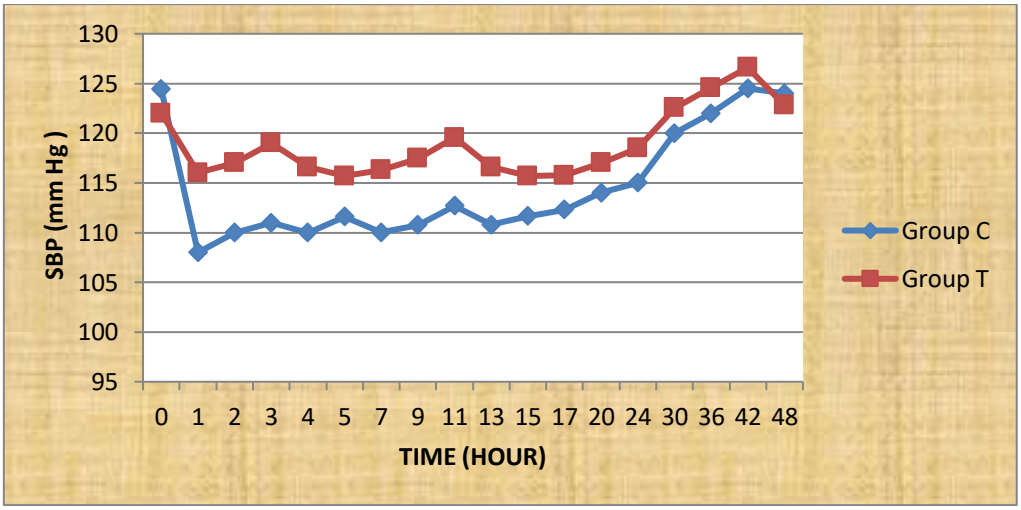


TABLE 1: Comparison of POSTOPERATIVE VAS Score

Time	Group C	Group T	P value
AFTER BLOCK	2.56 ± 0.97	3.10 ± 0.77	0.020
1 HOUR	1.26 ± 0.98	3.46 ± 0.77	<0.001(S)
2 HOUR	1.66 ± 0.97	2.83 ± 0.79	<0.001(S)
3 HOUR	2.06 ± 0.78	3.46 ± 0.77	<0.001(S)
4 HOUR	2.20 ± 0.76	4.00 ± 1.17	<0.001(S)
5 HOUR	2.83 ± 0.79	4.16 ± 0.87	<0.001(S)
7 HOUR	2.70 ± 0.98	3.63 ± 0.96	0.003 (S)
9 HOUR	2.53 ± 0.86	3.46 ± 0.89	0.001 (S)
11 HOUR	2.46 ± 0.97	3.30 ± 1.41	0.008 (S)
13 HOUR	2.86 ± 0.86	4.03 ± 0.92	<0.001
15 HOUR	2.46 ± 0.97	3.30 ± 1.41	0.008 (S)
17 HOUR	2.46 ± 0.89	4.03 ± 0.99	<0.001(S)
20 HOUR	2.40 ± 0.97	4.30 ± 1.05	<0.001(S)
24 HOUR	2.56 ± 0.97	4.23 ± 1.07	<0.001(S)

DOI: 10.69605/ijlbpr_14.2.2025.139

30 HOUR	2.60 ± 0.77	4.36 ± 0.85	<0.001(S)
36 HOUR	2.56 ± 0.97	4.20 ± 1.03	<0.001(S)
42 HOUR	2.70 ± 0.79	4.13 ± 1.27	<0.001(S)
48 HOUR	2.60 ± 0.77	4.26 ± 1.14	<0.001(S)

VAS score was found lower in Group C patients at all points of observation as compared to group T and the difference was statistically highly significant. (P < 0.001).

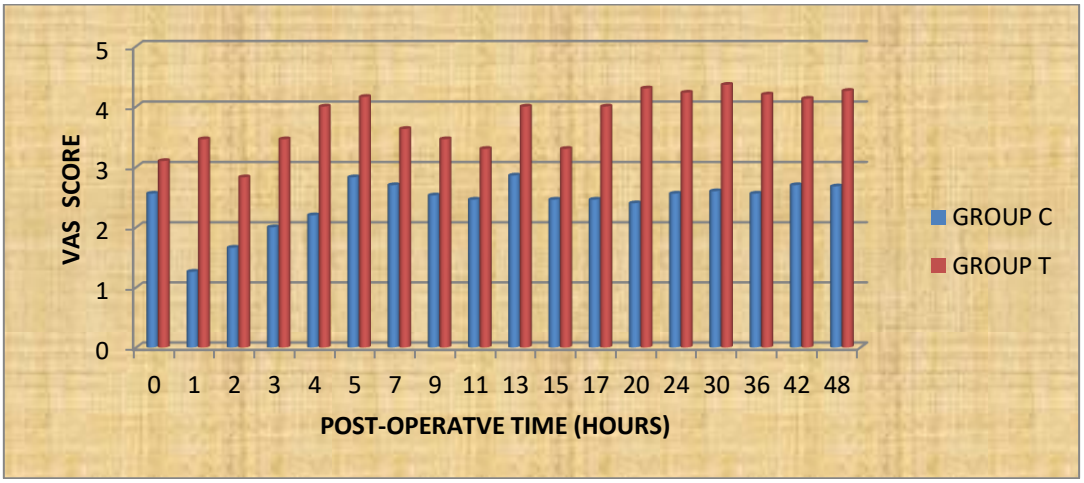


Table 2: Return of bowel movements and total analgesic consumption

VARIABLE	GROUP C	GROUP T	P VALUE
Time to return of bowel movements (Hours)	10.00±1.66	19.10±2.90	< 0.0001
Tramadol (IV) in mg	0(30)	0 (30)	0.00
Diclofenac (IM) in mg	2 (75)	20 (75)	<0.05

Return of bowel movements (assessed with time to pass first flatus) was earlier in group C patients as compared to group T patients which is statistically highly significant (P < 0.001). Total analgesic consumption was higher in group T compared to group C which is statistically significant (P < 0.05). Pain was of moderate intensity in group T patients, managed with inj. Diclofenac only. None patient from both groups required opioid analgesics.

DISCUSSION

Major abdominal surgery encompasses a broad range of surgical procedures in heterogenous patient populations, with resultant wide-ranging pain and analgesia requirements. Hence, analgesic strategies should consider patient factors and the surgical procedure. Higher levels of postoperative pain and pain distress are associated with increased morbidity, poorer functional recovery, and reduced quality of life. Furthermore, suboptimal postoperative analgesia is a risk factor for ongoing opioid use, opioid dependence, and persistent post-surgical pain.

To avoid the complications and failure of epidural analgesia there are many other non-neuraxial techniques available to the anesthetists for such surgeries and intra operative blockade of the celiac plexus is one of the most valuable tools for providing pain relief and decreasing stress response, but unfortunately, this block is not fully exploited.

Both groups were comparable with respect to age, sex and weight,diagnosis made for open laparotomy, anaesthetic drugs used for general anaesthesia, duration of surgery, duration of anaesthesia. Any patients which were not fulfilling our inclusion criteria, having longer duration of surgery (i.e. > 160 min), having delayed emergence from general anaesthesia were excluded from the study.Postoperative HR, SBP, DBP MBP and SpO2 were lower in celiac plexus group as compared to thoracic epidural group and were statistically significant as at different time intervals.Sympathetic activation associated with surgery and postoperative pain manifests as tachycardia, hypertension and increased contractility, all of which serve to increase myocardial oxygen consumption. Provision of a selective sympathectomy using thoracic anaesthesia in patients at risk of perioperative ischaemia has the potential to dilate constricted coronary vessels, reduce heart rate and improve cardiac function by reducing preload and after load and optimizing myocardial oxygen delivery.CPB is observed to cause significant reduction in blood glucose and serum cortisol level and a combination of somatic and sympathetic blockade is further more effective in reducing stress response.

Postoperative pain score was assessed using visual analogue scale and we found that both techniques provide a good pain relief. No additional doses of opioids required in both groups. Moderate pain was managed with Inj Diclofenac only.VAS score was

DOI: 10.69605/ijlbpr_14.2.2025.139

lower in celiac plexus block group as compared to thoracic epidural and was statistically significant. Overall findings suggest that the combination of local anaesthetic and opioid provides best analgesia on movement, has less hypotension than with local anaesthetic alone and halves the duration of ileus compared with epidural opioid alone or patient-controlled analgesia (PCA). Addition of opioid increasesthe time to first analgesic rescue.

A study by **Rapsang AG(2014)[9]** in UAS, in addition to ICPB the author also gave wound infiltration as the combination of somatic and visceral nerve blockade provide excellent pain relief and modifying the stress response effectively. In the study, the author used 10 ml - 15 ml of 0.25% bupivacaine with 1 in 2 lakh adrenaline. The study confirmed that ICPB with bupivacaine provides excellent post operative analgesia. The patients who received the block were also more alert than the control group because of the less consumption of post-operative opioids.

Return of bowel movements (assessed with time to pass first flatus) was earlier in group C patients as compared to group T patients which is statistically highly significant ($P< 0.001$). Total analgesic consumption was higher in group T compared to group C which is statistically significant ($P < 0.05$). Pain was of moderate intensity in group T patients, managed with inj. Diclofenac only.

The complications of ICPB are hypotension and diarrhea (due to unopposed parasympathetic activity and increase peristalsis). Diarrhea is usually self limiting and hypotension is orthostatic in nature and can be easily treated with intra-venous fluids and abdominal binders, and usually resolve within 48 h. In another study by **Hamid SK et al[5]**, the effects of continuous ICPB (using bupivacaine) with wound infiltration was assessed on post-operative analgesia, stress response and pulmonary function in UAS. They found that pain relief was poor and they attributed this poor relief of pain to poor somatic afferent block afforded by wound infiltration by the local anesthetic.

CONCLUSION

The results obtained in various studies and our study showed that ICPB provide a good means of analgesia, decreases the post-operative stress response, improve gut motility and improve pulmonary function by providing good pain relief. It is also a simple and safe procedure which ensures an accurately placed local anesthetic solution and avoids the need for another invasive procedure for pain relief. This block is an invaluable tool for emergency procedures, where time constraint is there and hence can be used as an alternative to placing an epidural catheter.

REFERENCES

1. Khuri SF, Henderson WG, DePalma RG. Determinants of long-term survival after major surgery and the adverse effect of postoperative complications. Ann Surg 2005;242:326-41.
2. Kehlet H, Dahl JB. The value of “multimodal” or “balanced analgesia” in postpone- ergative pain treatment. AnesthAnalg1993;77:1048-56.
3. Hughes MJ, Ventham NT, McNally S. Analgesia After Open Abdominal Surgery in the Setting of Enhanced Recovery Surgery. A Systematic Review and Meta-analysis. JAMA Surg 2014;149:1224-30.
4. Pöpping DM, Elia N, Van Aken HK. Impact of epidural analgesia on mortality and morbidity after surgery: systematic review and meta-analysis of randomized controlled trials. Ann Surg 2014;259:1056-67.
5. Hamid SK, Scott NB, Sutcliffe NP, Tighe SQ, Anderson JR, Cruikshank AM. Continuous Celiac Plexus Blockade Plus Intermittent Wound Infiltration With Bupivacaine Following Upper Abdominal Surgery: A Double Blind Randomized Study. Acta Anaesthesiol Scand. 1992;36(6):534-9.
6. Fugère F, Lewis G. Coeliac plexus block for chronic pain syn dromes. Can J Anaesth 1993;40(10):954–963.
7. Gerhard Brodner, Hugo Van Ake, Lothar Hertle,: Multimodal Perioperative Management Combining Thoracic Epidural Analgesia, Forced Mobilization, and Oral Nutrition Reduces Hormonal and Metabolic Stress and Improves Convalescence After Major Urologic Surgery. (AnesthAnalg2001;92:1594-1600).
8. Susan M Nimmo, Lorraine S Harrington: What is the role of epidural analgesia in abdominal surgery? Continuing Education in Anaesthesia, Critical Care & Pain j Volume 14 Number 5 2014.
9. Rapsang AG. Evaluation of the Efficacy of Intra-Operative Celiac Plexus Block on Post-Operative Analgesia, Stress Response, Gut Motility and Pulmonary Function in Upper Abdominal Surgery: A Double-Blind Randomized Study. AnalgResusc Curr Res. 2014;3(4):4.
10. Kunda Dhule, Abhijeet Kabade & PannagBhusanDasmohapatra :Thoracic Epidural Anaesthesia for Exploratory Laprotomy: A Case Report. International Journal of Current Medical And Applied Sciences, 2016,April, 10(2),67-69.