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Original study

Ultrasound-guided external oblique intercostal block versus port site infiltration for postoperative analgesia in obese patients: a randomized controlled trial

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Abstract

Background and aim: The postoperative pain in obese patients undergoing laparoscopic cholecystectomy (LC) is challenging due to combination of reduced functional residual capacity, increased oxygen consumption, and higher sensitivity to the respiratory depressant effects of opioids. The primary objective of the study was to compare total consumption of rescue analgesics over 24 hours in obese patients receiving external oblique intercostal fascial plane block (EOIPB) and port-site local anaesthetic (LA) infiltration and the secondary objectives were to compare the total duration of effective analgesia, postoperative pain intensity and the postoperative quality of recovery.

Hypothesis: We hypothesised that EOIPB is superior to port site infiltration for postoperative pain management in patients undergoing LC. The primary outcome was total rescue analgesic consumption in the first 24 hours postoperatively, with secondary outcomes including time to first analgesic request, pain scores, quality of recovery, and opioid-related side effects.

Methods: This prospective randomized controlled study was conducted in 60 adult obese patients randomly allocated to receive port-site LA infiltration in Group L and EOIPB in Group E with 20 ml of 0.25% bupivacaine. Total consumption of rescue analgesics over 24 hours, postoperative pain using the numerical rating scale (NRS) and the quality of recovery (QoR) at first 24 hours after surgery were measured.

Results: Group E had significantly lower total rescue analgesic consumption within the first 24 hours compared to Group L (p = 0.009). The median NRS score was significantly higher in Group L compared to Group E at 0,2,4,6, 8, 12 and 24 hours after surgery. Postoperative quality of recovery was superior in Group E compared to Group L (p = 0.0015).

Conclusion: External oblique intercostal fascial plane block compared to port site LA infiltration results in superior pain relief for a longer duration after LC in obese patients.

Key words: **Cholecystectomy, laparoscopic, obesity, pain, postoperative, analgesia, anesthesia, local, injections, nerve blocks.**

Ethical approval was provided by the Institutional Ethics Committee,MAMC, F.1/IEC/MAMC/MD/MS(108/01/2024/No.57 obtained on 3rd April 2024 . The Chairman of the ethical Committee was Dr. A.K.Agarwal.
The trial was prospectively registered under the Clinical Trials Registry of India (CTRI/2024/05/067781) on 21 May 2024.
The study was conducted between June 2024 and August 2025.

Introduction

Despite its minimally invasive nature, many patients experience moderate to severe postoperative pain in the first 24 hours following laparoscopic cholecystectomy (LC)[1]. The challenge of postoperative pain is further compounded in obese patients, who present unique perioperative challenges, including increased technical difficulty during surgery due to greater tissue depth, longer operative times, and a higher risk of complications such as hypoventilation, atelectasis, and wound infection. From an anaesthetic perspective, obesity increases the complexity of airway management and raises the risk of perioperative hypoxia. These patients have a higher prevalence of obstructive sleep apnoea (OSA), restrictive lung physiology, and impaired respiratory reserve. The combination of reduced functional residual capacity, increased oxygen consumption, and higher sensitivity to the respiratory depressant effects of opioids makes pain management particularly challenging. Pain after upper abdominal surgery may limit deep breathing and effective coughing, leading to shallow respiration, secretion retention, and atelectasis. Insufficient analgesia can increase sympathetic activation, contributing to tachycardia, hypertension, and overall stress response, thereby affecting recovery[2]. Optimizing pain management in obese patients is therefore crucial not only for comfort but also to reduce respiratory morbidity and facilitate early mobilization. Postoperative analgesia after laparoscopic cholecystectomy typically uses a multimodal regimen of paracetamol, NSAIDs, and rescue opioids, with port-site local anaesthetic (LA) infiltration for early incisional pain. While simple and effective, port site infiltration offers only short duration pain relief and addresses somatic but has no effect on visceral or referred pain, necessitating systemic analgesics.

Over the last two decades, various ultrasound (USG) - guided fascial plane blocks have been introduced and refined to improve analgesia following LC. These include the transversus abdominis plane (TAP) block, erector spinae plane (ESP) block, quadratus lumborum (QL) block, and more recently, modified thoracoabdominal nerve block through perichondral approach (M-TAPA). The external oblique intercostal fascial plane block (EOIPB) is a relatively new regional anaesthetic technique. It involves ultrasound-guided deposition of local anaesthetic between the external oblique and intercostal muscles at the anterior axillary line near the costal margin. This technique targets the anterior and lateral cutaneous branches of the thoracic intercostal nerves (T6 - T10), providing effective analgesia for the upper abdominal wall[3]. EOIPB is particularly advantageous in obese patients as it is a superficial block with easily identifiable sonographic landmarks, feasible even at high body mass index (BMI). It can be performed in the supine position without repositioning, the needle entry is remote from the surgical field minimizing contamination risk, and it allows catheter placement for continuous postoperative analgesia. While port-site infiltration remains common practice, its limited duration and coverage warrant the investigation of alternatives. The EOIPB holds promise in addressing these limitations and could potentially improve postoperative analgesic outcomes in obese patients undergoing LC.

The aim of this study was to compare EOIPB with port-site infiltration in terms of analgesic efficacy in obese patients (BMI 30–40 kg/m²) undergoing LC. We hypothesised that EOIPB is superior to port site infiltration for postoperative pain management in patients undergoing LC. The primary outcome was total rescue analgesic consumption in the first 24 hours postoperatively, with secondary outcomes including time to first analgesic request, pain scores, quality of recovery, and postoperative sedation scores.

Methods

This was a prospective, randomized, double blind, controlled trial. Ethical approval was provided by the Institutional Ethics Committee, Maulana Azad Medical College & Associated Hospitals, Bahadur Shah Zafar Marg, New Delhi-110002, India- (F.1/IEC/MAMC/MD/MS (108/01/2024/No.57) on 3 April 2024 and the trial was prospectively registered under the Clinical Trials Registry of India (CTRI/2024/05/067781) on 21 May 2024. The study was conducted between June 2024 and August 2025. We enrolled adults aged 18–65 years scheduled for elective laparoscopic cholecystectomy under general anaesthesia (GA) who were of American Society of Anaesthesiologists (ASA) physical status I-III and had a body mass index (BMI) of 30-40 $kg \cdot m^{-2}$. Patients were excluded if they were allergic to study medications, had any coagulopathy, were pregnant, or had a history of chronic opioid use affecting pain perception. The trial adheres to the principles of the Declaration of Helsinki. Written and informed consent was obtained from all participants. This manuscript adheres to the Consolidated Standards of Reporting Trials (CONSORT) guidelines for randomized controlled trials. Using a computer-

generated random table with an allocation ratio of 1:1, patients were randomly allocated into one of the two groups: Group L (local infiltration group) or Group E (external oblique intercostal fascial plane block group). This was a double-blind study: both patients and the investigator responsible for postoperative follow- up were unaware of the group allocation. The anaesthesiologist performing the study intervention was not involved in the patient's postoperative assessment or data collection. Randomization was ensured using sequentially numbered, sealed, opaque envelopes which were opened in the operating theatre after patient transfer. In Group E, ultrasound guided external oblique intercostal fascial plane block group (EOIPB) was performed after induction of anesthesia under aseptic precautions. For EOIPB, a linear ultrasound transducer (2–14 MHz) was positioned at the sixth rib level, between the anterior axillary and midclavicular lines. Using an in-plane technique with a 22- gauge, 80- mm block needle, 20 ml of 0.25% bupivacaine was injected into the external oblique intercostal plane on both sides, targeting the lateral and anterior branches of the T6–T10 intercostal nerves. All blocks were performed by an operator with experience of at least 10 successful EOIPBs, under the supervision of a senior anaesthesiologist. Patients in Group L (Port site infiltration group) received infiltration of 20 ml of 0.25% bupivacaine across the four port sites (5 ml per port) after induction of anesthesia.

Patients scheduled for elective LC under GA were screened at the pre-anesthetic check-up (PAC) clinic one or two days before surgery. They were familiarized with the usage of the Numerical Rating Scale (NRS), ranging from 0 ("no pain") to 10 ("worst pain imaginable"), during the PAC visit. Premedication with ranitidine 150 mg and perinorm 10 mg tablets was administered the night before and at 6:00 am on the day of surgery.

On the day of surgery, patients were shifted to the operation theatre, and standard monitoring, including heart rate, blood pressure, oxygen saturation, and bispectral index, was instituted. Intravenous access was established in the dorsum of the non-dominant hand, and lactated Ringer's solution was infused at 5–7 ml/kg. Premedication with midazolam1 mg IV was administered, followed by fentanyl and propofol for induction. After loss of verbal response, ventilation was checked, and vecuronium was administered. Doses of propofol (1.5–2.5 mg/kg), fentanyl (2µg /kg), and vecuronium (0.1 mg/kg) were calculated based on lean body weight. Intermittent positive-pressure ventilation with a gaseous mixture of desflurane in oxygen and nitrous oxide (50:50) was performed for three minutes, after which an appropriate airway device was placed and mechanical ventilation initiated.

Patients in both groups received dexamethasone 4 mg IV after induction. Following induction and prior to surgery, patients received either local infiltration at port sites or EOIPB according to group allocation. Anaesthesia was maintained with a gaseous mixture of desflurane in oxygen and nitrous oxide (50:50) to maintain a bispectral index of 40–60. Intermittent boluses of vecuronium were administered as required. Additional fentanyl boluses (0.5 mcg/kg lean body weight) were given if heart rate or mean arterial pressure increased by more than 20% from baseline for over five minutes. The total intraoperative fentanyl dose was recorded. LC was performed using the standard four-port technique, and the peritoneal cavity was thoroughly irrigated with saline before closure. Twenty to thirty minutes before the end of surgery, patients in both groups received paracetamol 1000 mg and ondansetron 8 mg IV.

After extubation, patients were transferred to the post-anaesthesia care unit (PACU), where paracetamol 1000 mg IV was administered every 8 hours. Pain was assessed using the NRS at 0 (arrival in PACU), 2, 4, 6, 12, and 24 hours postoperatively, both at rest and during movement, with patients in the left lateral position. Rescue analgesia with tramadol 50 mg IV was provided if NRS exceeded 3, with a second dose administered after 20–30 minutes if pain persisted. The time to first analgesic request was recorded as the total duration of effective analgesia. Quality of recovery was evaluated 24 hours postoperatively using the QoR-15 survey administered by a trained assessor. Postoperative sedation was monitored at 2, 4, 6, 12, and 24 hours using the Pasero Opioid-Induced Sedation Scale (POISS). Patient satisfaction was assessed at 24 hours using a four-point Likert scale.

The primary outcome of the study was total consumption of rescue analgesics at 24 hours postoperatively. Secondary outcomes included time to first request for rescue analgesia, NRS scores at 2,4,6,12 and 24 hours after surgery (at rest and during movement), quality of recovery at 24 hours post operatively, and postoperative sedation scores (POISS) at 2, 4, 6, 12, and 24 hours after surgery.

Statistical analysis was performed by the Statistical Package for Social Sciences (SPSS) program for Windows, version 25.0 (SPSS Inc, Chicago, Ill, USA). Continuous variables were summarised as mean ± standard deviation (SD) when normally distributed, and as median with interquartile range (IQR) when not normally

distributed. Categorical variables were expressed as frequencies and percentages. Normality of data was assessed prior to analysis.

Continuous variables following a normal distribution were analyzed using the unpaired t-test, while non-normally distributed variables including total rescue analgesic (tramadol) consumption, duration of effective analgesia, postoperative pain scores (NRS) at rest and during movement, and quality of recovery at 24 hours were compared using the Mann–Whitney U test. Categorical variables such as gender distribution, ASA classification, comorbidities, and the proportion of patients requiring rescue analgesia were analysed using either the chi- square test or Fisher's exact test. A p value < 0.05 was considered statistically significant.

Sample size calculation was done on the basis of using G* Power version 3.1, based on mean post operative morphine consumption between EOIPB group and patients receiving multimodal analgesia as reported by Cosarcan et al. in Obesity Surgery journal 4. This paper reported that the standard deviation of the morphine consumption in EOIPB group is 1.7 ($\sigma 1 = 1.7$) and 3.5 ($\sigma 2 = 3.5$) in the multimodal analgesia group. Although the difference in the mean consumption in that study was large, the sample size calculation in the present study was performed detect a difference of at least 2 mg ($\delta = 2$) with the power of 80% at significance level of 5%. This yielded a minimum sample size of 30 patients per group. Given the short follow-up and inpatient setting with minimal anticipated loss to follow-up, no attrition inflation was applied.

Results

Seventy-two patients were screened for participation in the study. Ten patients did not meet the inclusion criteria, and two patients declined consent (Fig. 1). Data from 60 patients were analysed. The baseline characteristics of the participants are presented in Table I.

The total tramadol consumed in the first 24 hours was significantly lower in Group E – (median 50.00 mg, IQR 50–50) compared to Group L (median 100.00 mg, IQR 50–100) (mean difference −30.77 mg; 95% CI −49.08 to −12.46; p = 0.009) (Table II). There was a significant difference in the number of patients requiring rescue analgesics between the groups, with a greater proportion of patients in

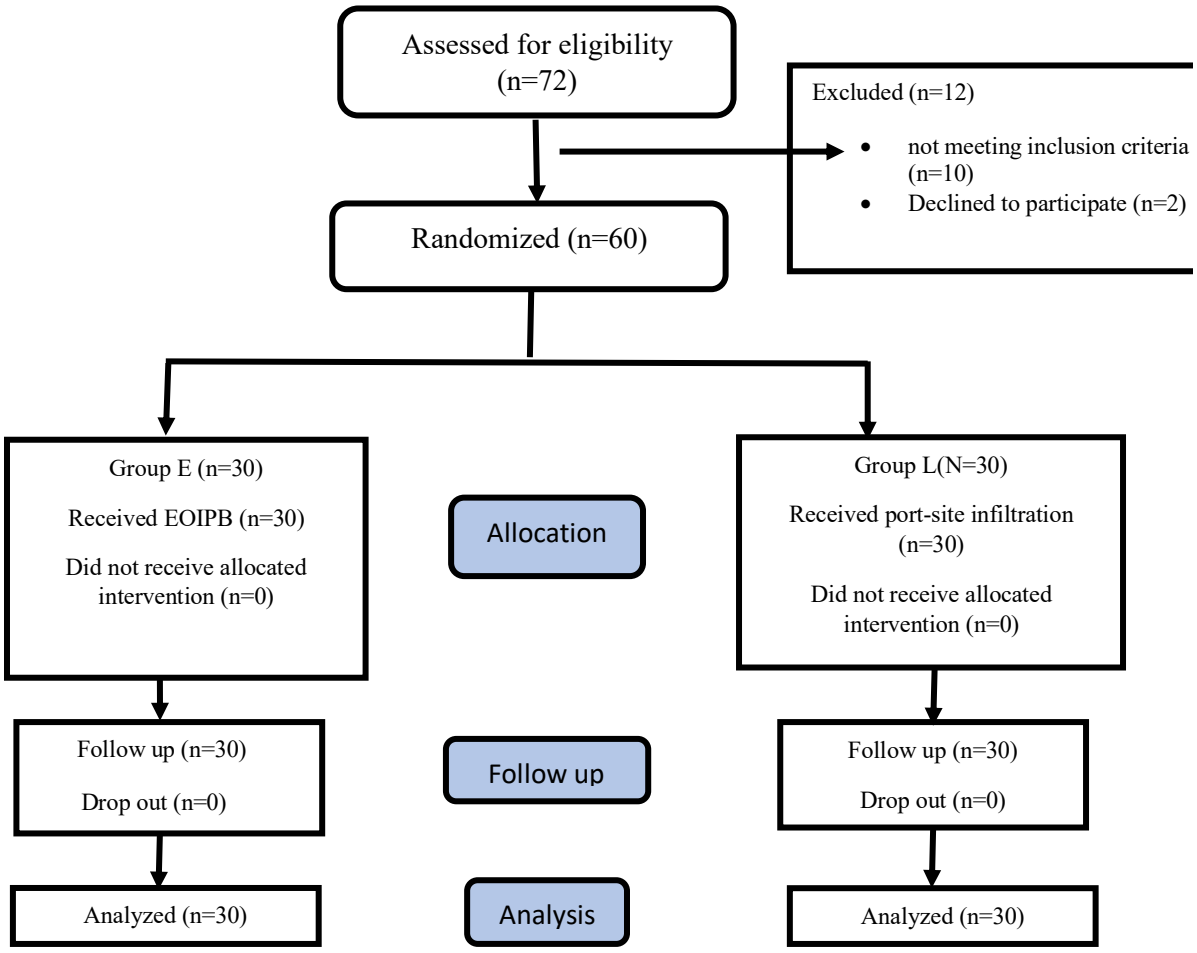

Fig. 1 — The Consolidated Standard of Reporting Trails (CONSORT) flow diagram for enrolment, group allocation, follow-up and analysis.

Table I. — Demographic data.

Parameter	Group E (n=30)	Group L (n=30)	p-value
Age (years)	40.77±11.138	38.83± 11.234	0.574
Gender (M/F)	6/24	7/23	0.754
Weight (kg)	77.43 ±6.49	78.40 ± 5.89	0.548
Height (cm)	158.13 ± 5.12	159.73 ± 4.79	0.217
BMI (kg/m²)	30.91 ± 1.05	30.68± 0.74	0.330
ASA Grade I/II	13/17	15/15	0.605

Data is expressed as mean ± standard deviation.
BMI = Body Mass Index; ASA = American Society of Anaesthesiologists physical status classification. Group E – EOIPB, Group L – Port site infiltration.

Table II. — Postoperative Tramadol Use within First 24 Hours.

Outcome	Group E (n = 30)	Group L (n = 30)	p-value*
Patients who required tramadol [n (%)]	12 (40.0%)	26 (86.7%)	<0.001#
Patients who did not require tramadol [n (%)]	18 (60.0%)	4 (13.3%)	
Total tramadol used in 24 hours (mg)	50.00 [50.00 – 50.00]	100.00 [50.00 – 100.00]	0.009*
Mean tramadol used in 24 hours (mg), mean ± SD	50.0 ± 32.7	80.8 ± 24.8	0.002†
Mean difference (95% CI)	−30.77 mg (−49.08 to− 12.46)		

#Data expressed as number (%). p-value calculated using Chi-square test.
*Data expressed as median [interquartile range]. p-value calculated using Mann–Whitney U test. †Data expressed as mean ± standard deviation (SD). p-value calculated using Independent-samples t-test; mean difference calculated as Group E − Group L.

Table III. — Comparison of the distribution of patients based on NRS scores at various time intervals.

Postoperative Pain	Group E Median (IQR)	Group L Median (IQR)	p-value*
NRS at rest (0 hrs)	0.0 (0.0–0.0)	0.5 (0.0–2.0)	0.001
NRS on movement (0 hrs)	0.0 (0.0–0.0)	0.5 (0.0–2.0)	0.000
NRS at rest (2 hrs)	0.0 (0.0–2.0)	3.5 (1.75–5.25)	0.000
NRS on movement (2 hrs)	0.0 (0.0–2.0)	4.0 (2.0–7.0)	0.000
NRS at rest (4 hrs)	2.0 (0.0–2.0)	3.5 (2.0–4.0)	0.000
NRS on movement (4 hrs)	2.0 (0.0–3.0)	4.0 (3.0–5.0)	0.000
NRS at rest (6 hrs)	2.0 (1.0–3.0)	3.0 (2.0–4.0)	0.001
NRS on movement (6 hrs)	2.0 (1.0–3.0)	3.5 (3.0–4.0)	0.003
NRS at rest (8 hrs)	2.0 (1.75–3.25)	4.0 (3.0–6.0)	0.000
NRS on movement (8 hrs)	2.5 (1.0–3.25)	5.0 (3.0–7.25)	0.000
NRS at rest (12 hrs)	2.0 (1.75–3.0)	3.0 (3.0–4.0)	0.001
NRS on movement (12 hrs)	2.5 (2.5–3.25)	4.0 (3.0–4.25)	0.001
NRS at rest (24 hrs)	2.5 (2.0–3.0)	3.0 (3.0–4.0)	0.000
NRS on movement (24 hrs)	3.0 (2.0–3.0)	4.0 (3.0–5.0)	0.000

Data is expressed as Median [IQR]*Mann–Whitney U test was applied.
Group E – EOIPB, Group L – Port site infiltration .

Group L requiring rescue analgesics for pain relief (p=0.001).

The median (IQR) NRS scores at rest and movement were significantly lower in Group E as compared to Group L at all assessed time points. The trend of significantly lower pain scores in Group E persisted at 6, 8, 12, and 24 hours, both at rest and on movement, with all comparisons showing statistically significant differences ($p < 0.05$) (Table III).

The total QoR-15 score was higher in Group E [median (IQR): 119.5 (119.0–121.75)] compared to Group L [117.5 (113.0–120.0)] (p = 0.0015). On the QoR-15 scale for pain, Group E reported higher scores for both moderate pain (9.70 ± 0.65 vs. 8.83 ± 1.55) and severe pain (9.57 ± 1.10 vs. 8.93 ± 1.53). Nausea or vomiting scores were also slightly better in Group E (9.93 ± 0.25) compared to Group L (9.70 ± 0.47) (p= 0.021). Other domains of QoR-15, that were significantly better in Group

E included the ability to enjoy food and quality of sleep compared to Group L (p= 0.001 and p=0.050 respectively). There was no significant difference in the remaining QoR-15 components between the two groups (Table IV).

POISS scores at 6, 12, and 24 hours were comparable between the two groups (Table5). Overall satisfaction scores at 24 hours, as measured by the Likert scale, were significantly higher in Group E (Table V).

Discussion

The present study found that EOIPB reduced overall tramadol consumption compared to LA infiltration in obese patients undergoing LC during the first 24 hours. Significantly more patients in Group L required rescue analgesics, while Group E demonstrated significantly lower NRS scores at rest and during movement across all time intervals during first 24 hours. Our findings are consistent with a prior study investigating the role of EOIPB in LC among non-obese patients[5]. Lower opioid use reduces the risk of adverse effects such as nausea, vomiting, sedation, and respiratory depression, thereby improving patient comfort and recovery. In our study, patients in Group E reported significantly higher median scores in QoR-15 Score for parameters like "Been able to enjoy food", "Moderate pain", "Severe pain" and "Nausea or vomiting" compared to Group L (Table IV). This can be attributed to better pain control and reduced tramadol consumption in group E.

Most EOIPB studies for LC have been conducted in non-obese population. Bariatric surgery data in obese patients suggests EOIPB is feasible and opioid sparing, but these studies are retrospective or involve different surgical contexts (sleeve gastrectomy, gastric bypass), rather than laparoscopic cholecystectomy[6]. Gall stone disease has high prevalence in obese population; hence, it is worthwhile to evaluate the analgesic benefit of USG guided EOIPB in obese population and compare it with the standard technique such as port- site infiltration.

According to the PROSPECT guideline, port-site local anaesthetic infiltration (PSI) is recommended as part of multimodal analgesia following LC[7]. Regional nerve blocks are reserved for selected scenarios, such as redo surgeries or patients with chronic pain. Port-site infiltration is a simple, rapid, and cost-effective technique that provides postoperative analgesia by blocking nociceptive transmission via Aδ and C fibres. A meta-analysis by Boddy et al. demonstrated that intraperitoneal infiltration of LA agents was associated with greater reductions in postoperative pain and opioid consumption[8]. However, the analgesic effect is short-lived, typically lasting only 2–3 hours. In our study patients in Group L (LA infiltration) had median NRS score was ≥4 right from 2 hours onwards following surgery, and the median time to request rescue analgesia was approximately 2 hours as compared to 5 hours in Group E (EOIPB). Our findings were consistent with those of Korkusuz et al. who compared EOIPB with multimodal

Table IV. — Comparison of Quality of Recovery Score at 24 hours.

QOR-15 Item	Group E Median (IQR)	Group L Median (IQR)	p-value*
1. Able to breathe easily	10.0 (10.0–10.0)	10.0 (10.0–10.0)	1.000
2. Been able to enjoy food	1.0 (1.0–2.0)	1.0 (1.0–1.0)	0.001
3. Feeling rested	10.0 (10.0–10.0)	10.0 (8.0–10.0)	0.146
4. Have had a good sleep	10.0 (10.0–10.0)	10.0 (9.0–10.0)	0.050
5. Able to look after personal toilet and hygiene unaided	0.0 (0.0–1.0)	0.0 (0.0–0.0)	0.326
6. Able to communicate with family and friends	10.0 (10.0–10.0)	10.0 (10.0–10.0)	0.730
7. Getting support from hospital doctors and nurses	10.0 (10.0–10.0)	10.0 (10.0–10.0)	1.000
8. Able to return to work or usual home activities	0.0 (0.0–0.0)	0.0 (0.0–0.0)	0.154
9. Feeling comfortable and in control	10.0 (10.0–10.0)	10.0 (10.0–10.0)	1.000
10. Having a feeling of general wellbeing	10.0 (10.0–10.0)	10.0 (9.0–10.0)	0.370
11. Moderate pain	10.0 (10.0–10.0)	10.0 (8.0–10.0)	0.014
12. Severe pain	10.0 (10.0–10.0)	10.0 (8.0–10.0)	0.034
13. Nausea or vomiting	10.0 (10.0–10.0)	10.0 (9.0–10.0)	0.021
14. Feeling worried or anxious	10.0 (9.0–10.0)	10.0 (9.0–10.0)	0.321
15. Feeling sad or depressed	10.0 (10.0–10.0)	10.0 (10.0–10.0)	1.000
Data is expressed as Median [IQR]*Mann–Whitney U test was applied. Group E – EOIPB, Group L – Port site infiltration.			

Table V. — Comparison of Likert Scale at 24 hours and POISS at various time intervals.

Outcome	Group E Median [IQR]	Group L Median [IQR]	p-value*
Likert Scale Score at 24 hrs (1–4)	3.0 [3.0 – 4.0]	2.0 [2.0 – 3.0]	0.000
POISS at 6 hrs	2.0 (1.0–2.0)	2.0 (1.0–2.0)	0.232
POISS at 12 hrs	0.0 (0.0–0.0)	0.0 (0.0–0.0)	0.661
POISS at 24 hrs	1.0 (1.0–1.0)	1.0 (1.0–1.0)	0.317

Data is expressed as Median [IQR]*Mann- Whitney U test was applied
Group E – EOIPB, Group L – Port site infiltration, POISS - Postoperative Opioid-Induced Sedation Scale.

analgesia in LC. They excluded patients with BMI > 35 but found tramadol consumption to be significantly lower in EOIPB group, with NRS values also significantly lower at all time intervals in first 24 hours[5].

Longer duration of analgesia has been reported in literature with the use of adjuvants like dexamethasone and dexmedetomidine in peripheral nerve blocks[9]. No adjuvants were used in EOIPB in our study; however, all the patients received dexamethasone 8mg IVy. Intravenous dexamethasone has also been shown to augment and prolong the analgesic effect of fascial plane blocks[10].

Doymus et al. also demonstrated prolonged analgesia in the EOIPB group compared to PSI in bariatric sleeve gastrectomy patients. With 30 ml of 0.25% bupivacaine bilaterally, they observed significantly longer mean duration of analgesia in the EOIPB group versus PSI6. Kavakli et al. reported similar findings in laparoscopic sleeve gastrectomy, with postoperative NRS scores at rest significantly lower in the EOIPB group than in controls at 1, 6, and 12 hours. Considering the significantly lower postoperative morphine consumption in the EOIPB group, these differences in pain scores can be attributed to the effectiveness of the EOIPB[11]. The results are comparable to those in our study, strengthening the reproducibility of findings across both bariatric and biliary laparoscopic procedures. Taken together, across multiple studies, the requirement for rescue analgesics, whether tramadol, morphine or fentanyl, is consistently lower with EOIPB compared to port site infiltration or no block. While the absolute values vary depending on the surgical procedure, opioid type, and patient-controlled analgesia (PCA) regimen, the direction of effect remains uniform.

In obese patients, deeper blocks (e.g., TAP, ESP) can be technically challenging due to increased depth, poor needle visualization, and attenuation of ultrasound beams. There are limited studies comparing EOIPB with other fascial plane blocks. Recently, Ciftci et al. conducted a prospective randomized trial comparing the modified thoracoabdominal nerve block through the perichondrial approach (M TAPA) with the EOIPB for postoperative analgesia in LC. Pain scores of the two groups were similar, with the exception of the first 2 hours postoperatively, when M-TAPA was associated with lower VAS scores. The primary outcome of the study was the global quality of recovery score, which was similar in both groups[12]. However, data regarding, analgesic efficacy and safety of M-TAPA in obese patients are lacking.

Huicong Hu et al. compared bilateral EOIPB with standard multimodal analgesia in major upper abdominal laparoscopic surgeries like hepatectomy, Whipple's procedure, partial gastrectomy and distal pancreatectomy. They found that post operative tramadol consumption and sufentanyl consumption via PCA was significantly higher in the control group than in the EOIPB group 13. They also evaluated visual analogue pain scores (VAS) (incisional, visceral, shoulder) at 1, 4, 8, 24 hours after surgery and found that at 1 hour postoperatively, incisional pain lower in EOIPB group (median VAS 1 [0–2]) compared to control group (median VAS 2 [1–4] , p = 0.005). However, no significant differences were observed in visceral or shoulder pain at any time point. They concluded that EOIPB reduces early postoperative incisional pain. One of the limitations of the EOIPB, similar to other fascial plane blocks, is the lack of visceral analgesic coverage[6].

In the present study, quality of recovery was assessed at 24 hours postoperatively using the QoR-15 scale. Patients who received the EOIPB demonstrated superior recovery compared to those who received port- site infiltration, particularly in domains related to pain control, nausea/vomiting, and ability to enjoy food. This improvement can be attributed to better analgesic profiles in the Group E, including lower pain scores, prolonged effective analgesia, and reduced requirement for rescue analgesics. Together, these factors facilitated earlier ambulation, improved participation in respiratory physiotherapy, and

greater postoperative comfort. These findings align with published evidence. TAP, ESP, and quadratus lumborum blocks have also been shown to significantly improve QoR-15 scores in LC compared to infiltration or systemic opioids[11,14,15]. Elsharkawy et al. further emphasized that fascial plane blocks enhance multidimensional recovery by reducing opioid-related side effects, thereby improving patient-reported outcomes[3]. Although the total QoR-15 score was significantly higher in Group E compared to Group L, the absolute difference was approximately 2 points. Given that the minimal clinically important difference (MCID) for the QoR-15 has been estimated at around 8 points[16], this change is unlikely to represent a clinically meaningful improvement in overall recovery. Nevertheless, specific domains such as pain, sleep quality, and enjoyment of food showed consistent improvements, which may still contribute to enhanced patient comfort and satisfaction.

Sedation in the postoperative period is a critical parameter in obese patients due to the additive risks of obstructive sleep apnoea, and opioid-related respiratory depression[2,17]. In the present study, sedation was evaluated using the Pasero Opioid-Induced Sedation Scale (POISS) at 6, 12, and 24 hours after surgery. Sedation levels were comparable across all postoperative time points between the EOIPB group and the port site infiltration group. Absence of excessive sedation in either group reinforces the safety of both techniques in the obese population.

Limitations

We acknowledge certain limitations of the present study. It was a single-center study conducted in a tertiary care hospital. The assessment of dermatomes blocked by EOIPB was not performed. Various techniques of port-site LA infiltration have been described for postoperative analgesia, such as infiltration of the rectus sheath in the infraumbilical incision, use of a continuous catheter, or liposomal bupivacaine. In this study we infiltrated the skin and subcutaneous tissues at the port sites prior to surgical incision with LA agents; it is plausible that other infiltration techniques could yield different results. Additionally, we included only patients who underwent LC with the four-port technique; the utility of EOIPB in patients undergoing surgery via other newer techniques may require further evaluation. While port-site infiltration is a valid comparator, newer truncal blocks (such as M-TAPA or ESP) were not included in the study. Hence, the relative efficacy of EOIPB compared to other advanced regional anaesthesia techniques remains unanswered.

Conclusion

The results of our study suggest that in obese patients undergoing LC, EOIPB compared to port-site LA infiltration reduces postoperative analgesics requirements, provides superior pain relief, prolongs the time to first rescue analgesia, and improves the quality of recovery. This is particularly relevant given the challenges of pain management in one of the most commonly performed surgery in obese individuals, where increased opioid requirements may predispose patients to respiratory depression, basal atelectasis, poor respiratory outcomes and delayed recovery. Therefore, EOIPB may be considered as a part of a postoperative multimodal analgesic regimen after LC in obese patients.

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