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RESEARCH ARTICLE
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COMPARATIVE EVALUATION OF TRANSVERSALIS FASCIA PLANE BLOCK AND EXTERNAL OBLIQUE INTERCOSTAL BLOCK FOR POSTOPERATIVE ANALGESIA IN LAPAROSCOPIC CHOLECYSTECTOMY: A PROSPECTIVE OBSERVATIONAL STUDY

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Abstract

Background and Aims: Postoperative pain following laparoscopic cholecystectomy remains a significant concern. Regional blocks such as Transversalis Fascia Plane (TFP) and External Oblique Intercostal (EOIC) blocks offer opioid-sparing options. This study aimed to compare their analgesic efficacy.

Methods: A prospective observational study was conducted in 60 ASA II–III patients undergoing laparoscopic cholecystectomy. Group TFP (n=30) received bilateral TFP blocks; Group EOIC (n=30) received bilateral EOIC blocks. Pain scores (VAS and dynamic VAS), time to first rescue analgesia, and total tramadol consumption were recorded over 24 hours.

Results: TFP group showed significantly lower pain scores at all time intervals ($p<0.05$), prolonged time to rescue analgesia, and reduced opioid use compared to EOIC. No block-related complications were observed.

Conclusion: Ultrasound-guided TFP block provides superior postoperative analgesia over EOIC block in laparoscopic cholecystectomy.

Keywords: Transversalis fascia plane block, External oblique intercostal block, Laparoscopic cholecystectomy, Postoperative analgesia, Regional anaesthesia, Ultrasound-guided block

Introduction

Laparoscopic cholecystectomy is a standard surgical intervention for gallbladder disease. Despite being minimally invasive, it is often accompanied by significant postoperative pain due to factors including trocar insertion, CO_2 insufflation, and diaphragmatic irritation. Adequate postoperative analgesia is vital for early mobilization, reduced hospital stay, and improved patient satisfaction.Systemic analgesics, particularly opioids, remain the mainstay of pain control but are associated with nausea, vomiting, respiratory depression, and delayed bowel recovery. Regional anesthesia techniques such as fascial plane blocks offer targeted analgesia with minimal systemic side effects. Two such blocks—Transversalis Fascia Plane (TFP) and External Oblique Intercostal Plane (EOIC)— are gaining popularity [1,2].The TFP block involves injecting local anesthetic between the transversus abdominis muscle and transversalis fascia, potentially extending to the thoracolumbar nerves and paravertebral space. EOIC block is performed more superficially, targeting lower intercostal nerves, providing analgesia suitable for upper abdominal surgeries.

This study compares the efficacy of these two blocks in managing postoperative pain in laparoscopic cholecystectomy.

Materials and Methods:

A prospective observational study was conducted at Narayana Medical College, Nellore, from August 2023 to September 2024.Approved by the Institutional Ethics Committee. Written informed consent obtained.Sixty patients were enrolled and divided equally into two groups.

Inclusion Criteria:

- Patients aged 18–40 years
- ASA physical status II or III.
- Elective laparoscopic cholecystectomy

Exclusion Criteria:

- ASA class IV or above
- Bleeding diathesis
- Infection at block site
- Allergy to study medications

Group Allocation:

Group TFP (n=30): Received bilateral TFP block

Group EOIC (n=30): Received bilateral EOIC block.

Consort diagram.

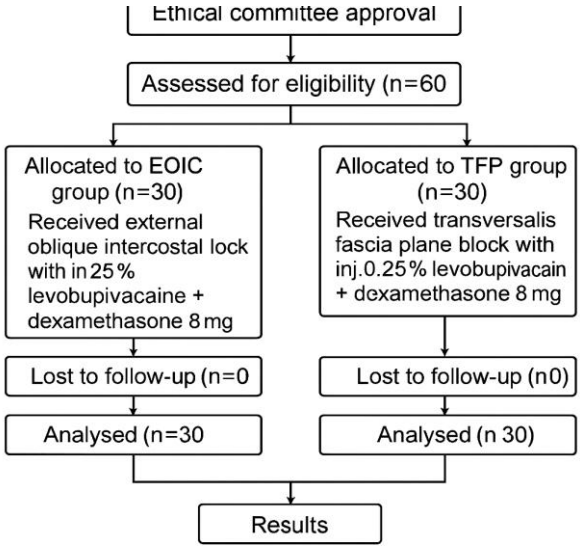

Figure:1

On day of surgery, Patients were kept on Nil per oral and shifted to OT.All ASA Standard monitors were connected.Preoxygenation done with 100% oxygen for 3min, Inj.Glycopyrrolate 10 ug/kg, Inj Midazolam 0.05mg /kg were given.Induction & Intubation was done with Inj Propofol 2 mg/kg and inj Cisatracurium 0.2 mg/kg and maintenance was with O2,air, Sevoflurane and muscle relaxant.
Block Techniques:
TFP Block: With the patient supine, the skin was disinfected and transducer placed between the iliac crest and the costal margin, three abdominal muscle layers identified, from medial to lateral direction trace till transverse abdominis join internal oblique, needle has to be in-plane, Inj.0.25% levobupivacaine + 8 mg dexamethasone 30 ml on each side were given.

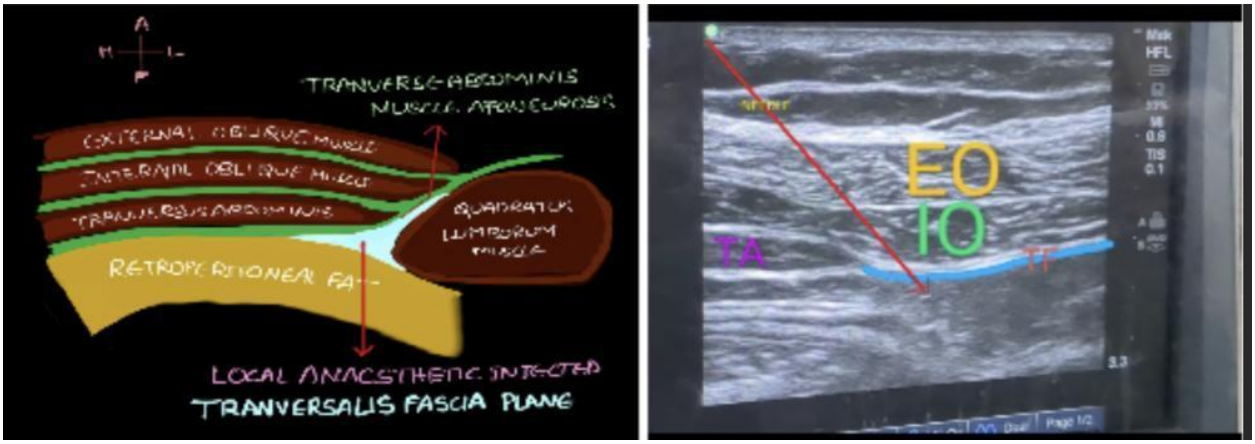

Figure 2

EOIC Block: Performed by placing the ultrasound probe in paramedian sagittal orientation at T6–T7 level and on visualizing the external oblique muscle and intercostal muscles local anesthetic is injected with same drug and volume.

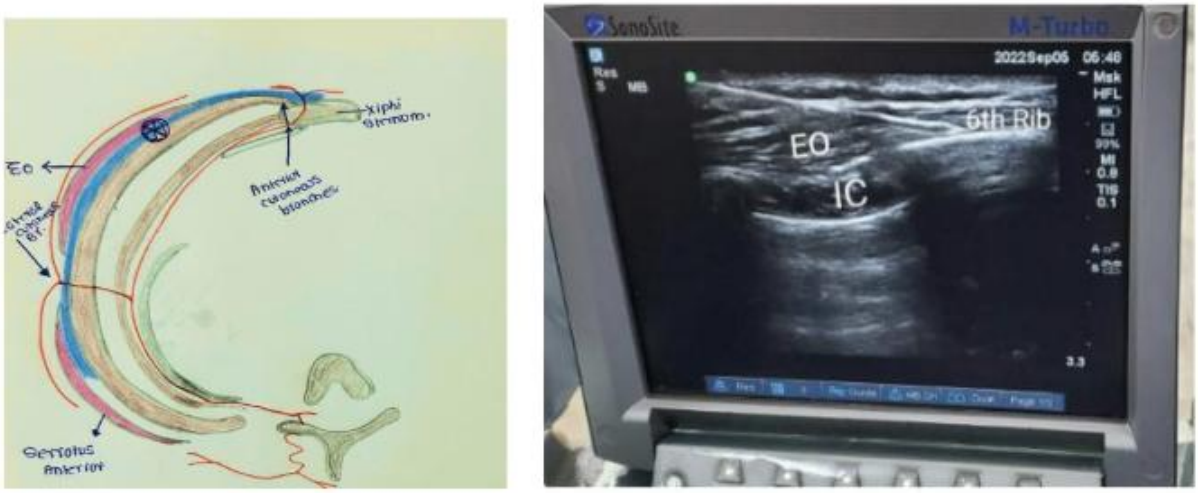

Figure - 3

After reversing with Inj Neostigmine 0.005 mg/Kg + Inj. Glycopyrolate 0.5 mg , patients were extubated and in Postoperatively VAS and dynamic VAS at 0, 2, 4, 6, 12, and 24 hours,Time to first rescue analgesia,Total tramadol requirement in 24 hours were assessed and notes.

Statistical Analysis:
SPSS v25.0 used. Mean ± SD for continuous data. T-tests and Chi-square tests applied. $p < 0.05$ considered statistically significant.

Results:
Demographic data (age, sex, ASA status) were comparable between groups ($p > 0.05$).
Pain Scores:

Table 1- Visual analogue scale (VÀS)

VAS	EOIC(n=30)		TFP(n=30)		P-value
	Mean	SD	Mean	SD	
VAS_2	0.42	0.49	0.26	0.39	0.16
VAS_4	0.60	0.50	0.33	0.48	0.03
VAS_6	3.87	0.45	0.68	0.51	0.0001
VAS_12	3.95	0.61	2.80	0.71	0.0001
VAS_24	5.20	0.87	3.60	0.67	0.0001

Table 2 Dynamic visual analogue scale(D-VAS)

DVAS	EOIC(n=30)		TFP(n=30)		P-value
	Mean	SD	Mean	SD	
DVAS_2	0.67	0.48	0.43	0.50	0.06
DVAS_4	0.87	0.52	0.73	0.41	0.25
DVAS_6	4.45	0.68	0.98	0.62	0.0001
DVAS_12	4.98	0.75	2.90	0.70	0.0001
DVAS_24	5.93	0.56	3.83	0.73	0.0001

●Mean VAS at rest and movement at 2,4,6,12 and 24 h was significantly lower in TFP group.

Table 3 -Time to First Rescue Analgesia and Total Tramadol Consumption:

	EOIC(n=30)		TFP(n=30)		P-value
	Mean	SD	Mean	SD	
Time for first rescue analgesic dose(Hours)	4.6	0.6	7.3	0.7	0.0001
Total number of analgesic doses in first 24 Hours	176.3	53	133	31	0.0001

Mean Time to first rescue analgesia in TFP Group was 7.8 ± 2.3 hours compared to 5.1 ± 1.9 hours in EOIC group shows significant difference ($p < 0.001$)
Mean Total Tramadol Consumption was less (80 ± 15 mg) in TFP Group compared to 120 ± 20 mg in EOIC Group shows significant difference ($p < 0.001$)

Complications:
None reported any complications in either group.

Discussion
Effective postoperative pain management remains a cornerstone of enhanced recovery after surgery (ERAS) protocols, especially in minimally invasive abdominal procedures like laparoscopic cholecystectomy. Fascial plane blocks have emerged as valuable regional anesthesia tools, offering opioid-sparing analgesia and improved patient outcomes. In this randomized comparative study, we evaluated the postoperative analgesic efficacy of the Transversalis Fascia Plane (TFP) block versus the External Oblique Intercostal (EOIC) block in 60 patients undergoing Elective laparoscopic cholecystectomy. Our results indicate that the TFP block provides significantly superior analgesia, reflected by longer time to first rescue analgesia, lower total analgesic consumption, and better VAS scores compared to the EOIC block.
Elsharkawy et al. (2017) [1] were among the first to delineate the anatomical basis and efficacy of deeper fascial plane blocks such as the quadratus lumborum and TFP blocks. They reported enhanced visceral and somatic analgesia due to the potential for local anesthetic spread into the thoracolumbar fascia and paravertebral space—an effect likely responsible for the prolonged analgesia observed in our TFP group.
Aydin et al. (2018) [2] extended this evidence by demonstrating that TFP blocks were effective in cesarean sections, a procedure known for its significant visceral pain component. The authors emphasized the benefit of deep plane blocks for managing mixed somatic-visceral pain, which aligns closely with our findings in laparoscopic cholecystectomy, another surgery involving both components.
Priya et al. (2020) [3] compared EOIC blocks to TAP and TFP blocks for upper abdominal surgeries. They found that while EOIC blocks are easier to perform, their analgesic coverage is predominantly somatic, limiting their effectiveness for visceral pain. In our study, this limitation was evident through the earlier need for rescue analgesics and higher opioid use in the EOIC group compared to the TFP group.

Further reinforcing this concept, Kheshti et al. (2021) [5] compared the efficacy of TFP and quadratus lumborum (QL) blocks in abdominal hysterectomy. Their findings showed that the TFP block provided better pain relief in the early postoperative period—consistent with the analgesic profile we observed in our TFP group. Their study also suggested that the more anterior approach of TFP may allow for better spread to the iliohypogastric and ilioinguinal nerves, contributing to broader analgesic coverage.

In our study, patients in the TFP group had significantly lower VAS scores at 2, 4, 6, and 12 hours postoperatively ($p < 0.05$) and required their first dose of rescue analgesia later than those in the EOIC group (mean 7.4 ± 1.2 hours vs. 4.2 ± 0.8 hours, respectively). Total tramadol consumption in 24 hours was also significantly lower in the TFP group (mean 75 mg vs. 130 mg), highlighting its opioid-sparing potential. These clinical findings validate the deeper anatomical reach of the TFP block and its effectiveness in controlling both somatic and visceral pain.

Bellamy et al. (2022) [7] explored the integration of various regional anesthesia techniques into ERAS protocols for abdominal surgeries. They emphasized that deeper blocks like TFP not only reduce opioid requirements but also facilitate earlier mobilization and discharge, outcomes that are highly

desirable in day-care laparoscopic procedures such as cholecystectomy. Although our study did not formally assess discharge readiness, the prolonged analgesia in the TFP group suggests an indirect advantage in early recovery metrics.

Despite its benefits, the EOIC block retains value in certain contexts. It is technically easier to perform, requires less anatomical depth, and poses lower risks of deep structure injury. For short-duration procedures or in patients with relative contraindications to deep blocks, the EOIC may still be appropriate. However, in surgeries where visceral pain predominates, such as laparoscopic cholecystectomy, the EOIC block may not provide adequate coverage, as demonstrated in our comparative analysis.

Strengths:
- Ultrasound-guided technique ensured accuracy
- Comparative design filled existing literature gap

Limitations:
- Observational design
- Single-center study.
- No long-term pain or functional assessments.
- Further randomized trials are recommended.

Conclusion

Ultrasound-guided Transversalis Fascia Plane block provides superior postoperative analgesia compared to External Oblique Intercostal block following laparoscopic cholecystectomy, evidenced by lower pain scores, delayed need for rescue analgesia, and reduced opioid consumption.

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