Original Article
DOI: https://doi.org/10.70749/ijbr.v3i4.1112

INDUS JOURNAL OF BIOSCIENCE RESEARCH
https://induspublishers.com/IJBR
ISSN: 2960-2793/ 2960-2807

Efficacy of Transversus Abdominal Plane (TAP) block vs. Diclofenac Suppository for Management of Post-Operative Pain in Patients Undergoing Laparoscopic Cholecystectomy

Mahnoor Chauhdry[1], Muhammad Lateef[1], Hassan Tariq[2], Hira Iftikhar[3], Fatima Amjad[1], Khizar Masood[4], Jabbar Hussain Bali[1], Shamas Yousaf[1]

[1]Khawaja Muhammad Safdar Medical College, Sialkot, Pakistan.
[2]Indus Hospital, Lahore, Pakistan.
[3]Hafiz Surgical Hospital, Lahore, Pakistan.
[4]Queens Hospital, Romford, United Kingdom.

ARTICLE INFO

Keywords
TAP block, Diclofenac suppository, Post-operative pain, Laparoscopic cholecystectomy.

Corresponding Author: Mahnoor Chauhdry
Khawaja Muhammad Safdar Medical College, Sialkot, Pakistan.
Email: mahnoorch015@gmail.com

Declaration
Authors' Contribution: All authors equally contributed to the study and approved the final manuscript.
Conflict of Interest: No conflict of interest.
Funding: No funding received by the authors.

Article History
Received: 20-01-2025 Revised: 12-03-2025
Accepted: 25-03-2025 Published: 24-04-2025

ABSTRACT

Background: Effective post-operative pain management enhances recovery and patient comfort following laparoscopic cholecystectomy. **Objective:** To evaluate and compare the analgesic efficacy of TAP block versus diclofenac suppository in patients undergoing elective laparoscopic cholecystectomy. **Methods:** This randomized controlled trial was conducted at the Department of General Surgery, Allama Iqbal Memorial Teaching Hospital, Sialkot. A total of 60 patients scheduled for elective laparoscopic cholecystectomy were randomly allocated into two groups: Group A received bilateral TAP block using the landmark technique, and Group B received a 200 mg diclofenac suppository. All patients received 20 mg/kg intravenous paracetamol. Pain was assessed using the Numeric Rating Scale (NRS) at 2 hours post-operatively. **Results:** The mean pain score at 2 hours was significantly lower in the TAP block group (2.4 ± 0.9) compared to the diclofenac group (3.8 ± 0.8) ($p < 0.001$). Rescue analgesia was required in 20% of patients in the TAP block group versus 60% in the diclofenac group ($p = 0.003$). No complications were reported in either group. **Conclusion:** The study concludes that the transversus abdominis plane (TAP) block is more effective than diclofenac rectal suppository in managing early post-operative pain after elective laparoscopic cholecystectomy. Patients receiving the TAP block reported significantly lower pain scores and needed less rescue analgesia within the first two hours post-surgery. Additionally, the TAP block showed a favorable safety profile, making it a reliable option in multimodal analgesia, particularly in settings where reducing systemic analgesic use is preferred for better patient outcomes.

INTRODUCTION

Laparoscopic surgery is a minimally invasive surgical technique that offers many advantages, including small incisions, reduced blood loss, short hospital stays, and fast recovery[1]. However, postoperative pain is still a major concern for patients undergoing laparoscopic surgery. For cholecystectomy, laparoscopic surgery is the technique of choice now a days. Inadequate postoperative pain may result in increased morbidity, mortality and decrease quality of life. Acute post-operative pain is experienced by more than 80% of patients undergoing surgery and majority of those with postoperative pain report the severity as moderate, severe, or extreme. . Ineffective postoperative pain management may result into hemodynamic instability, pneumonia, deep vein thrombosis (DVT), pulmonary embolism (PE), coronary ischemia, myocardial infarction, poor wound healing and insomnia[2].

These complications lead to delayed recovery, extended lengths of stay, readmissions, patient dissatisfaction with medical care and increases cost of treatment. Postoperative pain management continues to be a major challenge despite recent advances in pain management. Opioid analgesics are the mainstay of post-operative pain management, but there are multiple side effects of opioids administration including nausea, vomiting, ileus, constipation, urinary retention, respiratory depression, drowsiness and sedation[3]. For optimal post-operative pain relief multimodal (balanced) analgesic approach, using different analgesic technique including regional block is the currently recommended method[4].

The transversus abdominis plane (TAP) is the fascial plane between the internal oblique and transversus abdominis muscle containing the thoracolumbar nerves

T10 to L1. The introduction of local anaesthetic in this plane blocks these nerves (T10 to L1). Many studies have shown that ultrasonography (USG)-guided TAP block reduces requirement of opioids and provides effective and adequate analgesia[5]. While on the other hand non-steroidal inflammatory drugs have traditionally been used for both intra and post-operative pain control. Diclofenac is a non-steroidal anti-inflammatory drug that works by inhibiting cyclo oxygenase enzyme[6]. It can be administered via oral, intra venous and rectal (suppository) route. Its bioavailability in intra venous and rectal routes are comparable but the rectal route has advantage of long duration of action when compared to intra venous route. In a study conducted by Dayi et al[7], comparison of TAP block and diclofenac rectal suppository was made in patients undergoing cesarean section was made. In patients receiving TAP block mean pain score (2.37 ± 0.89) at 2 hours post operatively was significantly low compared to mean pain score (3.84 ± 0.75) in patients receiving diclofenac rectal suppository. This difference was statistically significant with a p value less than or equal to 0.01

Rationale

After thorough review of literature, we have not found a study published in Pakistan that has determined Efficacy of Transversus abdominal plane (TAP) block vs. Diclofenac suppository for management of post-operative pain in patients undergoing laparoscopic cholecystectomy.

Objective

To compare post-operative, mean pain score between TAP block versus rectal diclofenac rectal suppository in patients undergoing laparoscopic cholecystectomy

Hypothesis

There is a difference in the post-operative mean pain score between TAP block versus rectal diclofenac rectal suppository in patients undergoing laparoscopic cholecystectomy

MATERIALS AND METHODS

This Randomized controlled trial was conducted at the Department of General Surgery, Allama Iqbal Memorial Teaching Hospital, Sialkot from 2 July to 2 January 2025. Data were collected through a Non-probability Consecutive sampling technique.

Sample size

Sample size is calculated on the basis of previous study published by Dayi, et al., At TAP block group mean pain score at 2 hours postoperatively was 2.37 ± 0.89 while mean pain score at 2 hours post operatively in diclofenac rectal suppository group was 3.84 ± 0.75. At 80% power, 95% confidence interval, a total of 60 patients (30 in each group) were included in this study.

Inclusion Criteria

- Age between 18 to 60 years.
- Both Genders
- Elective laparoscopic cholecystectomy.

Exclusion Criteria

- Patients allergic to study drugs (Bupivacaine for TAP block and diclofenac).
- Patients' refusal.
- Patients having a history of chronic pain.
- Patients already using opioids for pain control

Data collection

This study was carried out after approval from the scientific and ethical review committee. Patients who fulfilled the criteria were enrolled in the study. Written and informed consent was obtained from the study participants. Patients were randomly allocated either into Group A (TAP block) or Group B (diclofenac rectal suppository). Patients in Group A were administered bilateral TAP block using the landmark technique after induction of anesthesia and before the surgical incision, while patients in Group B were given diclofenac (200 mg) rectal suppository after induction of anesthesia and before the surgical incision. Both groups of patients received intravenous paracetamol 20 mg/kg (maximum dose 1 gram). At the end of the procedure, patients were shifted to the post-anesthesia care unit and observed for pain. Pain score using the numeric rating scale (NRS) was noted at 2 hours postoperatively. Rescue analgesia, intravenous nalbuphine (0.1 mg/kg), was administered if the pain score was greater than 3. Data were recorded on a score sheet after recording the outcome pain 2 hours postoperatively.

Data Analysis

Data analysis was done using SPSS version 22.0. Mean and standard deviation were calculated for continuous variables (e.g., pain score) and compared using the t-test, taking a p-value less than or equal to 0.05 as significant. Frequency and percentage were calculated for categorical variables (e.g., gender). Data were stratified for age, gender, BMI, and ASA status, and post-stratification t-test was applied, taking a p-value less than or equal to 0.05 as significant.

RESULTS

Data were collected from 60 patients. The mean age of patients was 38.6 ± 10.2 years in the TAP block group and 37.1 ± 9.7 years in the diclofenac group (p = 0.54). Gender distribution was similar, with a slightly higher number of females in both groups. Mean BMI was nearly the same in both groups (26.2 ± 3.4 vs. 25.9 ± 3.6; p = 0.71).

At two hours post-operatively, the mean pain score in the TAP block group was significantly lower (2.4 ± 0.9) compared to the diclofenac group (3.8 ± 0.8), with a p-

value of <0.001. This indicates a statistically significant difference, demonstrating that the TAP block provided superior early post-operative analgesia compared to the diclofenac suppository.

Table 1

Demographic and Baseline Characteristics of Participants (n = 60)

Variable	TAP Block Group (n = 30)	Diclofenac Group (n = 30)	p-value
Age (years)	38.6 ± 10.2	37.1 ± 9.7	0.54
Gender			
Male	12 (40%)	11 (36.7%)	0.79
Female	18 (60%)	19 (63.3%)	
BMI (kg/m²)	26.2 ± 3.4	25.9 ± 3.6	0.71
ASA Physical Status			
ASA I	20 (66.7%)	19 (63.3%)	0.65
ASA II	10 (33.3%)	11 (36.7%)	
Duration of Surgery (minutes)	45.8 ± 6.3	46.4 ± 5.9	0.68

Figure 1

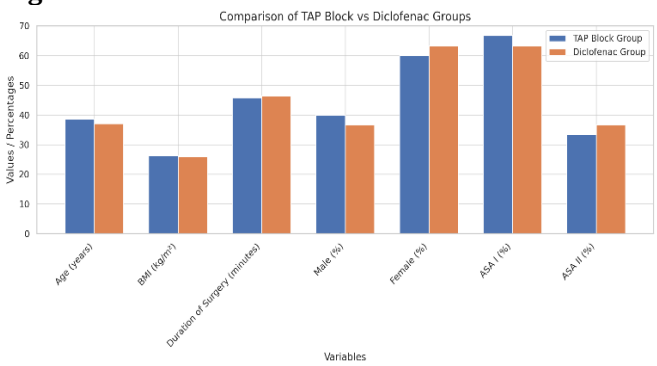


Table 2

Post-operative Pain Scores at 2 Hours (NRS Scale)

Group	Mean Pain Score ± SD	p-value
TAP Block (Group A)	2.4 ± 0.9	<0.001
Diclofenac (Group B)	3.8 ± 0.8	

Only 6 patients (20%) in Group A needed additional pain relief, while 18 patients (60%) in Group B required rescue analgesia. This difference was statistically significant with a p-value of 0.003, further supporting the greater analgesic efficacy of the TAP block in the immediate post-operative period.

Table 3

Frequency of Rescue Analgesia (IV Nalbuphine) Use

Group	Patients Requiring Rescue Analgesia	Percentage	p-value
TAP Block (Group A)	6	20%	0.003
Diclofenac (Group B)	18	60%	

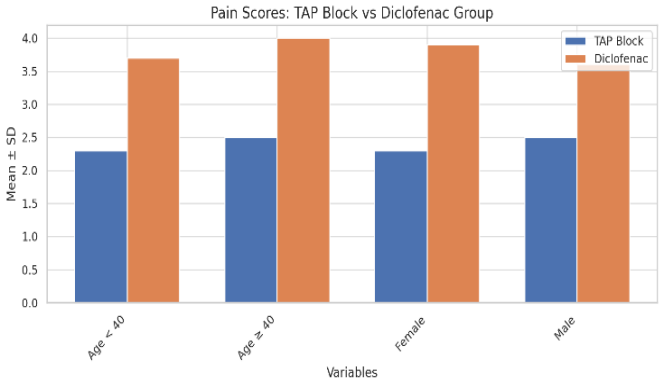
Among patients aged below 40 years, the mean pain score was 2.3 ± 0.8 in the TAP group versus 3.7 ± 0.7 in the diclofenac group (p = 0.001), while in patients aged 40 and above, scores were 2.5 ± 1.0 and 4.0 ± 0.9 respectively (p < 0.001). Similarly, females in the TAP group reported a mean pain score of 2.3 ± 0.9 compared to 3.9 ± 0.8 in the diclofenac group (p < 0.001), and among males, the scores were 2.5 ± 0.8 versus 3.6 ± 0.7 (p = 0.002). These results indicate consistent effectiveness of the TAP block across different age and gender subgroups.

Table 4

Stratified Analysis of Pain Scores by Age and Gender

Variable	TAP Block (Mean ± SD)	Diclofenac (Mean ± SD)	p-value
Age < 40	2.3 ± 0.8	3.7 ± 0.7	0.001
Age ≥ 40	2.5 ± 1.0	4.0 ± 0.9	<0.001
Female	2.3 ± 0.9	3.9 ± 0.8	<0.001
Male	2.5 ± 0.8	3.6 ± 0.7	0.002

Figure 2



DISCUSSION

This randomized controlled trial compared the effectiveness of the transversus abdominis plane (TAP) block with diclofenac rectal suppository for managing post-operative pain in patients undergoing elective laparoscopic cholecystectomy. The results demonstrated that patients who received TAP block experienced significantly lower pain scores at two hours post-operatively compared to those who received diclofenac suppositories. Additionally, the frequency of rescue analgesia administration was markedly lower in the TAP block group[8]. The lower pain scores in the TAP block group can be attributed to the blockade of thoracolumbar nerves supplying the anterior abdominal wall, which are the primary sources of somatic pain after laparoscopic cholecystectomy[9]. The TAP block provided effective analgesia in the early postoperative period, suggesting that this technique can reduce the need for systemic analgesics. On the other hand, diclofenac suppositories, while commonly used, primarily address inflammation and have limited effect on somatic pain, which may explain the higher pain scores observed in that group[10]. This study also found that TAP block was safe, with no complications reported during administration. The landmark-based technique was used for the block, making it feasible in settings where ultrasound guidance is not available[11]. This adds to its utility, particularly in resource-constrained environments. Demographic variables such as age, gender, BMI, ASA classification, and duration of surgery were evenly distributed across both groups, minimizing potential confounders.

Stratified analysis further reinforced the consistency of TAP block efficacy across subgroups[12]. There are several strengths of this study, including a randomized design, standardized anesthesia and analgesia protocols, and the use of an objective pain assessment scale[13-14]. However, there are limitations as well. The sample size was relatively small, which may limit generalizability. Pain was only assessed at a single time point (2 hours post-operatively), and long-term outcomes such as total analgesic consumption or patient satisfaction were not evaluated. Despite these limitations, the findings suggest that TAP block is more effective than diclofenac suppository for early postoperative pain relief following laparoscopic cholecystectomy. It may serve as a valuable addition to multimodal analgesia protocols aimed at improving postoperative recovery and reducing opioid use.

CONCLUSION

It is concluded that the transversus abdominis plane (TAP) block is significantly more effective than the diclofenac rectal suppository in managing early post-operative pain in patients undergoing elective laparoscopic cholecystectomy. Patients who received TAP block reported lower pain scores and required less rescue analgesia within the first two hours after surgery. The TAP block also demonstrated a favorable safety profile and can be considered a reliable component of multimodal analgesia, especially in settings where minimizing systemic analgesics is desired.

REFERENCES

1. Honda M, Kumamaru H, Etoh T, Miyata H, Yamashita Y, Yoshida K, et al. Surgical risk and benefits of laparoscopic surgery for elderly patients with gastric cancer: a multicenter prospective cohort study. Gastric Cancer. 2018 Dec 11;22(4):845–52. https://doi.org/10.1007/s10120-018-0898-7
2. Small C, Laycock H. Acute postoperative pain management. British Journal of Surgery [Internet]. 2020 Jan 5;107(2). https://bjssjournals.onlinelibrary.wiley.com/doi/10.1002/bjs.11477
3. Oderda GM, Senagore AJ, Morland K, Iqbal SU, Kugel M, Liu S, et al. Opioid-related respiratory and gastrointestinal adverse events in patients with acute postoperative pain: prevalence, predictors, and burden. Journal of Pain & Palliative Care Pharmacotherapy. 2019 Oct 2;33(3-4):82–97. https://doi.org/10.1080/15360288.2019.1668902
4. Chen Y -Y. K, Boden KA, Schreiber KL. The role of regional anaesthesia and multimodal analgesia in the prevention of chronic postoperative pain: a narrative review. Anaesthesia. 2021 Jan;76(S1):8–17. https://doi.org/10.1111/anae.15256
5. Ismail S. Multimodal analgesia for cesarean section: Evolving role of transversus abdominis plane block. J Obstet Anaesth Crit Care. 2012;2:67–8 https://doi.org/10.4103/2249-4472.104729
6. Calderon-Ospina CA, Nava-Mesa MO, Arbeláez Ariza CE. Effect of Combined Diclofenac and B Vitamins (Thiamine, Pyridoxine, and Cyanocobalamin) for Low Back Pain Management: Systematic Review and Meta-analysis. Pain Medicine. 2019 Sep 16; https://doi.org/10.1093/pm/pnz216
7. Dayi JO, Fyneface-Ogan S, Johnson UU. A Comparative Study of the Analgesic Efficacy of Transversus Abdominis Plane Block Alone Versus Transversus Abdominis Plane Block and Diclofenac Suppository in the Management of Post Caesarean Section Pain. African Journal of Anaesthesia and Intensive Care [Internet]. 2020;20(2):19–25. https://www.ajol.info/index.php/ajaic/article/view/229047
8. Tekeli AE, Eker E, Bartin MK, Öner MÖ. The efficacy of transversus abdominis plane block for postoperative analgesia in laparoscopic cholecystectomy cases: a retrospective evaluation of 515 patients. J Int Med Res. 2020 Aug;48(8):300060520944058. PMID: 32787595; PMCID: PMC7543107. https://doi.org/10.1177/0300060520944058.
9. Ismail, S., Mistry, A. A., Siddiqui, A. S., Aziz, A., Zuberi, N. (2023). The analgesic efficacy of ultrasound guided transversus abdominis plane block vs. local anesthetic infiltration technique in major gynecologic surgery: A randomized controlled trial. Journal of Anaesthesiology Clinical Pharmacology, 39(4), 557-564. https://doi.org/10.4103/joacp.joacp_78_22
10. Houben AM, Moreau AJ, Detry OM, Kaba A, Joris JL. Bilateral subcostal transversus abdominis plane block does not improve the postoperative analgesia provided by multimodal analgesia after laparoscopic cholecystectomy: A randomised placebo-controlled trial. Eur J Anaesthesiol 2019;36:772-7. https://doi.org/10.1097/eja.0000000000001028
11. Cai Q, Gao ML, Chen GY, Pan LH. Transversus abdominis plane block versus wound infiltration with conventional local anesthetics in adult patients

underwent surgery: A systematic review and meta-analysis of randomized controlled trials. Biomed Res Int 2020;2020:8914953. https://doi.org/10.1155/2020/8914953

12. Zhou H, Ma X, Pan J, Shuai H, Liu S, Luo X, et al. Effects of transversus abdominis plane blocks after hysterectomy: A meta-analysis of randomized controlled trials. J Pain Res 2018;11:2477-89. https://doi.org/10.2147/jpr.s172828
13. Dai L, Ling X, Qian Y. Effect of Ultrasound-Guided Transversus Abdominis Plane Block Combined with Patient-Controlled Intravenous Analgesia on Postoperative Analgesia After Laparoscopic Cholecystectomy: a Double-Blind, Randomized Controlled Trial. J Gastrointest Surg. 2022 Dec;26(12):2542-2550. Epub 2022 Sep 13. PMID: 36100826; PMCID: PMC9674727. https://doi.org/10.1007/s11605-022-05450-6.
14. Zhao T, Shen Z, Sheng S. The efficacy and safety of nefopam for pain relief during laparoscopic cholecystectomy: A meta-analysis. Medicine (Baltimore) 2018;97(10):e0089. https://doi.org/10.1097/MD.0000000000010089.