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ORIGINAL ARTICLE

Evaluating the postoperative pain after laparoscopic-assisted bilateral dual Transversus Abdominis Plane (TAP) block in laparoscopic cholecystectomy.

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ABSTRACT… Objective: To evaluate the mean post-operative pain scores of patients undergoing laparoscopic-assisted bilateral dual transversus abdominis plane (TAP) block in laparoscopic cholecystectomy. **Study Design:** Observational study. **Setting:** Department of Surgery, Unit 1, Services Hospital Lahore, Pakistan. **Period:** February 2022 to August 2023. **Methods:** Non-probability consecutive sampling was used to recruit participants. The study included 60 patients aged 18 to 80 years undergoing elective laparoscopic cholecystectomy for symptomatic gallstones. Selection was restricted to those classified as ASA I and II, regardless of gender. Patients who required conversion to open cholecystectomy, had a known allergy to bupivacaine, were diagnosed with "chronic pain syndrome," or were known alcohol or substance abusers within the past six months were excluded from the study. After obtaining informed consent, the patients were randomly assigned to two groups, Group A and Group B, using a random number table. Patients in Group A received a laparoscopic dual TAP block, while those in Group B did not receive any TAP block. Post-operatively all patients received injection paracetamol 1gram intravenously thrice a day as baseline analgesia. Each patient was followed till 24 hours post-operatively at which postoperative VAS score was noted. The data were entered and analyzed using SPSS version 23.0. **Results:** Mean age was 46.45 ± 14.06 years with 13 (21.67%) male and 47 (78.33%) female. The mean BMI of the participants was 29.02 ± 3.12 kg/m^2. The mean duration of surgery was 31.53 ± 5.43 minutes for Group A and 32.63 ± 5.95 minutes for Group B. The mean post-operative VAS score in Group A (laparoscopic dual TAP block) was 1.63 ± 0.85, compared to 4.47 ± 1.07 in Group B (control), with a p-value of 0.001, indicating statistical significance. **Conclusions:** Postoperative pain score was less after laparoscopic-assisted bilateral dual TAP block in laparoscopic cholecystectomy as compared to controls.

Key words: Cholecystectomy, Laparoscopy, Postoperative Pain, Transversus Abdominis Plane (TAP) Block.

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INTRODUCTION

Cholecystectomy, the surgical removal of the gallbladder, is a widely practiced treatment for symptomatic gallstones and various other gallbladder-related issues.[1] Currently the laparoscopic technique is the preferred method. This approach is recognized for its key benefits, including reduced post-operative discomfort and quicker return to normal physical activities.[1,2] However, despite these advantages, a significant number of patients still report post-operative pain following laparoscopic procedures.[3] To manage this pain, several options are utilized, such as non-steroidal anti-inflammatory drugs (NSAIDs), opioids, and local anesthetic injections.[4] Nonetheless, the use of systemic or neuraxial opioids is often linked to common dose-dependent side effects, including nausea, vomiting, itching, drowsiness, respiratory depression, and increased sensitivity to pain.[5] As a result, alternative techniques like peripheral nerve blocks or wound infiltration have been proposed, especially in scenarios where general anesthesia is used or when intrathecal opioids are contraindicated.[3]

Regional anesthesia techniques play a vital role in improving postoperative recovery by providing effective analgesia. Among these, the TAP block is widely used to relieve somatic pain arising from the anterior abdominal wall, including the parietal peritoneum, skin, and musculature. This block is administered within the plane between the internal oblique and transversus abdominis muscles, targeting the thoracolumbar nerves (T6–L1) that course through this region.[3,4]

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There are several approaches for performing TAP blocks, such as the blind double-pop technique[2], ultrasound-guided methods[3], and the more recent laparoscopic-assisted approach.[6] Introduced by Chetwood et al. in 2011 during laparoscopic nephrectomies[7], the laparoscopic technique offers advantages like ease of administration, reduced need for specialized imaging or training, and elimination of intraperitoneal local anesthetic infiltration.[7,8]

Post-operative pain is a prevalent concern following abdominal surgery, which not only affects patients physically but also contributes to significant morbidity. The primary objective of this study is to compare the mean post-operative pain scores between patients undergoing laparoscopic-assisted bilateral dual TAP block and those in the control group following laparoscopic cholecystectomy. Although there are research papers examining the analgesic efficacy of laparoscopic TAP block in minimally invasive surgery, there remains a paucity of studies specifically evaluating its effectiveness within the Pakistani population. This study seeks to address this gap in the existing literature.

METHODS

This observational study was conducted at the Department of Surgery, Unit 1, Services Hospital Lahore, Pakistan from February 2022 to August 2023. The sample size was calculated to be 60 participants, with 30 cases in each group, based on a 95% confidence level and 80% power of the study and taking the mean post-operative Visual Analog Scale (VAS) score at 24 hours to be 2.43 ± 0.56 in the laparoscopic transversus abdominis plane (TAP) block group with 0.25% bupivacaine, and 3.26 ± 0.44 in the control group.[9] Non-probability consecutive sampling was used to recruit participants. The study included all patients aged 18 to 80 years undergoing elective laparoscopic cholecystectomy for symptomatic gallstones, as per the operational definition. Selection was restricted to those classified as ASA I and II, regardless of gender. Patients who required conversion to open cholecystectomy, had a known allergy to bupivacaine, were diagnosed with "chronic pain syndrome," or were known alcohol or substance abusers within the past six months were excluded from the study.

Following ethical approval from the hospital's ethical committee (certificate number: IRB/2020/709/SIMS) 60 patients who met the inclusion and exclusion criteria were recruited from the outpatient department. After obtaining informed consent, the patients were randomly assigned to two groups, Group A and Group B, using a random number table. The surgeries in both groups were performed by consultant surgeons with a minimum of three years of post-fellowship experience. Patients in Group A received a laparoscopic dual transversus abdominis plane (TAP) block, while those in Group B did not receive any TAP block.

A dual TAP block was administered by delivering local anesthetic using a 22G blunt needle at two anatomical landmarks: the lateral approach, located anterior to the midaxillary line, and the subcostal approach, positioned just below the subcostal margin, on both sides of the abdominal wall within the transversus abdominis plane. Digital pressure was applied to help accurately identify the injection sites. The needle was advanced at these points until it approached the transversalis fascia, with slight tenting of the tissue observed via laparoscopic visualization. Before administering the anesthetic, the plunger was gently withdrawn to ensure the needle was not intravascular. Once proper positioning was confirmed, a predetermined volume of local anesthetic was injected. The injection site was then inspected from inside the abdominal cavity using the laparoscope, and the appearance of a localized internal bulge was considered confirmation of successful delivery. Fixed dose of Bupivacaine 50 mg (25ml of 0.5% for the intervention group A) was used while 25ml of 0.9% normal saline was injected in same planes bilaterally in control group B. Post-operatively all patients received injection paracetamol 1gram intravenously thrice a day as baseline analgesia. Each patient was followed till 24 hours post-operatively at which postoperative VAS score (as per-operational definition) was noted.

The results of both Group A and Group B were compared, and all data were recorded using a specially designed questionnaire. The data were entered and analyzed using SPSS version 22.0. Continuous variables such as age, duration of surgery, BMI, and VAS score were presented as

means with standard deviations, while categorical variables, including gender and ASA class (I/II), were presented as frequencies and percentages. The mean post-operative VAS scores between the two groups were compared using an independent t-test, with a p-value of ≤ 0.05 considered statistically significant. Stratification was performed based on age, gender, BMI, ASA class (I/II), and duration of surgery. Post-stratification, an independent t-test was applied, and a p-value of ≤ 0.05 was regarded as significant.

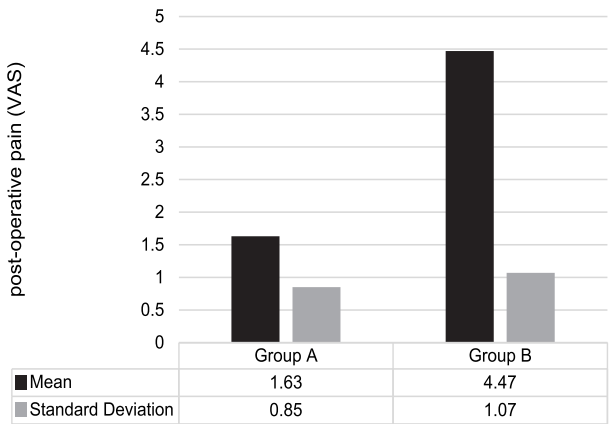
RESULTS

The age range of participants in this study was from 18 to 80 years, with a mean age of 46.45 ± 14.06 years. The majority of patients, 34 (56.67%), were between 51 and 80 years of age. Of the 60 patients included, 13 (21.67%) were male, and 47 (78.33%) were female. The mean BMI of the participants was 29.02 ± 3.12 kg/m^2. The mean duration of surgery was 31.53 ± 5.43 minutes for Group A and 32.63 ± 5.95 minutes for Group B. A detailed breakdown of these characteristics, along with the distribution of patients according to their ASA status, is presented in Table-I.

The mean post-operative VAS score in Group A (laparoscopic dual TAP block) was 1.63 ± 0.85, compared to 4.47 ± 1.07 in Group B (control), with a p-value of 0.0001, indicating statistical significance as shown in Figure 1. Stratification of post-operative pain in relation to age, gender, BMI, ASA class, and duration of surgery is presented in Table-II.

FIGURE-1

Mean post-operative pain in both groups (p-value = 0.001 which is statistically significant)



DISCUSSION

Despite the minimally invasive nature of laparoscopic abdominal surgeries, post-operative pain remains a concern. Various methods, including the transversus abdominis plane (TAP) block, first reported by Rafi et al.[10], have been used to manage this pain. The open surgical approach to administering a TAP block was initially described by Owen et al.[11] Later, in 2011, a fully laparoscopic technique was introduced, enabling the block to be performed under direct visualization during surgical procedures. The transversus abdominis plane, situated between the internal oblique and transversus abdominis muscles, is the target site for the anesthetic injection. This bolus blocks sensory input from the T7–T11 intercostal nerves, the T12 subcostal nerve, as well as the ilioinguinal, iliohypogastric, and lateral cutaneous branches of the L1–L3 nerves.[12,13]

This study compared the mean postoperative pain scores between laparoscopic-assisted bilateral dual TAP block and a control group in laparoscopic cholecystectomy. The VAS score for Group A (laparoscopic dual TAP block) was 1.63 ± 0.85, while for Group B (control) it was 4.47 ± 1.07, with a statistically significant p-value of 0.001. A previous study reported a 24-hour postoperative VAS score of 2.43 ± 0.56 for the TAP block group, compared to 3.26 ± 0.44 in the control group.[9] McDonnell et al.[13] were among the first to assess TAP block efficacy, showing reduced postoperative pain at all time points, particularly at the 24th hour. Unlike our study, they also measured postoperative sedation scores, which were lower at 4 and 6 hours. However, our findings reaffirm the TAP block's effectiveness, especially at the 24-hour mark. Similarly, Niraj et al.[14] reported reduced morphine consumption and lower pain scores, both at rest and during coughing, in the TAP block group compared to the standard pain care group.

El-Dawlatly et al.[15] demonstrated reduced intraoperative opioid consumption (8.6 µg vs 23 µg; $p < 0.01$) and lower morphine use within 24 hours (10.5 mg vs 22.8 mg; $p < 0.05$) in patients receiving TAP block during laparoscopic cholecystectomy.

TABLE-I

Age, gender, BMI and ASA status distribution of the patients

Age distribution for both groups:

Age (Years)	Group A (n=30)		Group B (n=30)		Total (n=60)	
	No. of Patients	%Age	No. of Patients	%Age	No. of Patients	%Age
18-50	14	46.67	12	40.0	26	43.33
51-80	16	53.33	18	60.0	34	56.67
Mean ± SD	46.13 ± 15.94		46.67 ± 13.61		46.45 ± 14.06	

Distribution of gender for both groups:

Gender	Group A (n=30)		Group B (n=30)		Total (n=60)	
	No. of Patients	%Age	No. of Patients	%Age	No. of Patients	%Age
Male	07	23.33	06	20.0	13	21.67
Female	23	76.67	24	80.0	47	78.33

Distribution of patients according to BMI:

BMI (kg/m²)	Group A (n=30)		Group B (n=30)		Total (n=60)	
	No. of Patients	%Age	No. of Patients	%Age	No. of Patients	%Age
≤30	15	50.0	14	46.67	29	48.33
>30	15	50.0	16	53.33	31	51.67
Mean ± SD	28.83 ± 2.53		29.27 ± 3.42		29.02 ± 3.12	

Distribution of patients according to duration of surgery:

Duration (Minutes)	Group A (n=30)		Group B (n=30)		Total (n=60)	
	No. of Patients	%Age	No. of Patients	%Age	No. of Patients	%Age
≤30	12	40.0	10	33.33	22	36.67
>30	18	60.0	20	66.67	28	63.33
Mean ± SD	31.53 ± 5.43		32.63 ± 5.95		32.08 ± 5.68	

Distribution of patients according to ASA status:

ASA	Group A (n=30)		Group B (n=30)		Total (n=60)	
	No. of Patients	%Age	No. of Patients	%Age	No. of Patients	%Age
I	09	30.70	11	36.67	20	33.33
II	21	33.33	19	63.33	40	66.67

In a study by Hosgood et al.[16] a single-site TAP block with bupivacaine reduced early morphine use (P = 0.015), though it did not affect overall morphine consumption (P = 0.771). This method resulted in significantly lower pain on postoperative days 1 (P = 0.003) and 2 (P = 0.031). These findings are consistent with our results. Magee et al.[17] also reported positive outcomes with laparoscopic TAP block in laparoscopic cholecystectomy, noting significant postoperative pain relief. Zaghiyan et al.[18] emphasized the superiority of laparoscopic TAP block over ultrasound-guided methods. Furthermore when stratification was done in our study the pain relief was significant across all groups examined.

Ortiz et al.[19] reported no significant difference in overall postoperative pain when comparing TAP block to local anesthetic infiltration at trocar insertion sites in patients undergoing laparoscopic cholecystectomy. Similarly, McMorrow et al.[20] concluded that TAP block provided no added analgesic advantage over spinal morphine in patients after cesarean section. These findings differ from the results of our study. Our study had a few limitations. It is a single center study with a small sample size. However it very clearly shows that double TAP block is associated with significantly reduced post operative pain.

TABLE-II

Stratification of post-operative pain with respect to age, gender, BMI, ASA class and duration of surgery

Patient Variables		Group A (n=30)		Group B (n=30)		P-Value
		Pain		Pain		
		Mean	SD	Mean	SD	
Age (years)	18-40	1.86	0.86	4.58	1.08	0.034
	41-60	1.44	0.81	4.39	1.09	0.021
Gender	Male	1.86	0.38	4.67	0.82	0.010
	Female	1.57	0.95	3.42	1.14	<0.001
Duration (minutes)	≤30	1.75	0.75	4.60	1.08	0.010
	>30	1.56	0.92	4.40	1.10	0.048
BMI (kg/m^2)	≤30	1.87	0.92	4.71	1.20	0.023
	>30	1.40	0.74	4.25	0.93	0.020
ASA	I	1.44	0.88	4.45	1.13	0.005
	II	1.71	0.85	4.47	1.07	0.013

CONCLUSION

This study concluded that the postoperative pain score is less after laparoscopic-assisted bilateral dual transversus abdominis plane (TAP) block in laparoscopic cholecystectomy as compared to controls. So, we recommend that laparoscopic-assisted bilateral dual transversus abdominis plane (TAP) block should be used preferably in preventing post-operative pain in laparoscopic cholecystectomy in order to reduce the patient's morbidity.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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REFERENCES

1. Ishaque S, Masud S, Khan RA, Butt NI. **Efficacy of laparoscopic-assisted subcostal transversus abdominis plane (TAP) block: a double-blind, randomized controlled trial.** JBUMDC. 2024; 14(04):246-50.
2. Tsai HC, Yoshida T, Chuang TY, Yang SF, Chang CC, Yao HY, et al. **Transversus Abdominis plane block: an updated review of anatomy and techniques.** Biomed Res Int. 2017; 2017:8284363.
3. Diyaolu M, Taylor J, Austin J, Gibson M, Ramamurthi RJ, Tsui B, et al. **Laparoscopic versus ultrasound-guided visualization of transversus abdominis plane blocks.** J Pediatr Surg. 2021; 56(6):1190-95.
4. Ayaz F, Arafah O, Almashooq H, Alrashid A, Alshibi L, Abdul Kareem S. **Comparing pudendal nerve blocks and caudal blocks for pediatric urological surgeries: A systematic review and meta-analysis.** Cureus. 2025; 17(8):e90078.
5. Grape S, Kariem El-Boghdadly, Albrecht E. **Management of adverse effects of intrathecal opioids in acute pain.** Best Practice & Research Clinical Anaesthesiology. 2023 Jun 1; 37(2):199-207.
6. Molfino S, Botteri E, Baggi P, Totaro L, Huscher M, Baiocchi GL, et al. **Pain control in laparoscopic surgery: a case–control study between transversus abdominis plane-block and trocar-site anesthesia.** Updates in Surgery. 2019 Dec; 71(4):717-22.
7. Chetwood A, Agrawal S, Hrouda D. **Laparoscopic assisted transversus abdominis plane block: A novel insertion technique during laparoscopic nephrectomy.** Anaesthesia. 2011; 66:317-18.
8. Naim N, Reza MS, Umar A. **Comparative effectiveness of transversus abdominis plane (TAP) block and epidural analgesia in abdominal surgery: A Meta-Analysis of Randomized Controlled Trials.** Cureus. 2025; 17(7):e87167.
9. Khoja HR, Kumar DK, Joshi PK. **Efficacy of laparoscopic guided transversus abdominis plane block in post-operative analgesia requirement in elective laparoscopic cholecystectomy.** Int Surg J. 2021; 8:925-9.
10. Rafi AN. **Abdominal field block: A new approach via the lumbar triangle.** Anaesthesia. 2001; 56:1024-26.
11. Owen DJ, Harrod I, Ford J, Luckas M, Gudimetla V. **The surgical transversus abdominis plane block - a novel approach for performing an established technique.** BJOG. 2011; 118(1):24-7.
12. Hebbard P. **Subcostal transversus abdominis plane block under ultrasound guidance.** Anesth Analg. 2008; 106:674-675.

13. McDonnell JG, O'Donnell B, Curley G, Heffernan A, Power C, Laffey JG. **The analgesic efficacy of transversus abdominis plane block after abdominal surgery: A prospective randomized controlled trial.** Anesth Analg. 2007; 104(1):193-7.
14. Niraj G, Searle A, Mathews M, Misra V, Baban M, Kiani S, et al. **Analgesic efficacy of ultrasound-guided transversus abdominis plane block in patients undergoing open appendicectomy.** Br J Anaesth. 2009; 103(4):601-5.
15. El-Dawlatly AA, Turkistani A, Kettner SC, Machata AM, Delvi MB, Thallaj A, et al. **Ultrasound-guided transversus abdominis plane block: description of a new technique and comparison with conventional systemic analgesia during laparoscopic cholecystectomy.** Br J Anaesth. 2009; 102:763-67.
16. Hosgood SA, Thiyagarajan UM, Nicholson HF, Jeyapalan I, Nicholson ML. **Randomized clinical trial of transversus abdominis plane block versus placebo control in live-donor nephrectomy.** Transplantation. 2012; 94(5):520-5.
17. Magee C, Clarke C, Lewis A. **Laparoscopic TAP block for laparoscopic cholecystectomy: description of a novel technique.** Surgeon. 2011; 9(6):352-53.
18. Zaghiyan KN, Mendelson BJ, Eng MR. **Randomized clinical trial comparing laparoscopic versus ultrasound-guided transversus abdominis plane block in minimally invasive colorectal surgery.** Dis Colon Rectum. 2019; 62(2):203-10.
19. Ortiz J, Suliburk JW, Wu K, Bailard NS, Mason C, Minard CG, et al. **Bilateral transversus abdominis plane block does not decrease postoperative pain after laparoscopic cholecystectomy when compared with local anesthetic infiltration of trocar insertion sites.** Reg Anesth Pain Med. 2012; 37(2):188-92.
20. McMorrow RC, Ni Mhuircheartaigh RJ, Ahmed KA, Aslani A, Ng SC, Conrick-Martin I, et al. **Comparison of transversus abdominis plane block vs spinal morphine for pain relief after Caesarean section.** Br J Anaesth. 2011; 106(5):706-12.

AUTHORSHIP AND CONTRIBUTION DECLARATION	
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3	**Usman Ismat Butt:** Data collection.
4	**Hamza Sahi:** Literature search.
5	**Roshan Butt:** Manuscript writing.
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7	**Nauman Ismat Butt:** Data analysis.