

Effect of preemptive ultrasound-guided TAP block on intraoperative analgesic requirements in patients undergoing laparoscopic gynecological surgeries under general anesthesia: A prospective, randomized controlled study



Jyoti Petkar¹, Kishore Kumar², Kiran Petkar³, Manasa M⁴, Sudheer R⁵, Rangalakshmi S⁶, Keertana Prasad⁷

¹Associate Professor, Department of Anaesthesiology, Sri Chamundeshwari Medical College and Hospital, Channapatna, ^{2,7}Junior Resident, ⁴Assistant Professor, ⁵Professor, ⁶Professor and Head, Department of Anaesthesiology, Rajarajeswari Medical College and Hospital, Bengaluru, Karnataka, ³Assistant Professor, Department of General Surgery, St. Peter's Medical College, Hospital and Research Institute, Hosur, Tamil Nadu, India

Submission: 13-03-2023

Revision: 02-06-2023

Publication: 01-07-2023

ABSTRACT

Background: Pain could lead to an increased consumption of opioids intraoperatively as well as postoperatively with subsequent side effects and prolonged post-operative recovery. Transverse abdominus plain (TAP) block is commonly used for post-operative analgesia. We wanted to study the effect of TAP block, when given as pre-emptive analgesia.

Aims and Objectives: The study was conducted to ascertain the benefit TAP block when given before surgical incision. The primary objective was to study the intraoperative fentanyl requirement in patients undergoing Laparoscopic gynecological surgeries. The secondary objectives was to analyze the Intra-operative hemodynamic parameters, time needed to extubate the patient, sedation score, visual analog scale (VAS) scores, and the time of first rescue analgesia. **Materials and Methods:** Sixty-two eligible female patients posted for total laproscopic hysterectomy or Laproscopic-assisted Vaginal Hysterectomy coming were divided into two groups. Group A – Standard General Anaesthesia with pre-operative TAP block. Group B- Standard General Anaesthesia. Whenever there was 15% rise in heart rate (HR) or mean blood pressure (MBP) above the baseline, 20 mcg bolus of fentanyl was given. Total intra-operative Fentanyl consumption, intraoperative HR and MBP, time needed to extubate, post-operative sedation, VAS score, and time of first rescue analgesia was noted.

Results: There was no difference in the demographic profile between two groups. The mean intraoperative fentanyl required was significantly higher in Group B (140.33 ± 12.17 mcg) than in Group A (101.33 ± 5.07 mcg). HR and MBP were lower in Group A throughout the procedure. The mean time of extubation was 5.4 min and 15.77 min in Group A and B. The mean sedation score observed was significantly higher up to 30 min in Group B. Mean Time of first rescue analgesia in Group A was 452.90 ± 110.46 min and Group B was 240 ± 89.13 min. **Conclusion:** Pre-operative TAP block given in laparoscopic gynecological surgeries decreases intraoperative fentanyl consumption leading to early extubation and causes less sedation in early post-operative period.

Key words: Transverse abdominus plain block; Laproscopic gynacological surgeries; Pre-emptive analgesia; Pre-operative transverse abdominus plain block

Access this article online

Website:

<http://nepjol.info/index.php/AJMS>

DOI: 10.3126/ajms.v14i7.47123

E-ISSN: 2091-0576

P-ISSN: 2467-9100

Copyright (c) 2023 Asian Journal of Medical Sciences



This work is licensed under a Creative Commons Attribution-NonCommercial 4.0 International License.

Address for Correspondence:

Dr. Jyoti Petkar, Associate Professor, Department of Anaesthesiology, Sri Chamundeshwari Medical College and Hospital, Channapatna, Karnataka, India. **Mobile:** +91-7726899533. **E-mail:** jokiran2009@gmail.com

INTRODUCTION

Total laparoscopic hysterectomy (TLH) and laparoscopic with vaginal hysterectomy (LAVH) have replaced the conventional method of open total abdominal hysterectomy (TAH) and have become norm of the day. Despite the brief recovery time, laparoscopy is certainly not pain free in the acute period and the issue of controlling pain from port-site wounds has been remained challenging.¹

Pain could lead to an increased consumption of opioids intraoperatively as well as postoperatively with subsequent nausea, delayed bowel function, and prolonged post-operative recovery. In an effort to address pain-related complications, various methods of pain control have been attempted.² Transverse abdominus plain (TAP) block is a useful strategy to reduce opioid consumption and support the management of post-operative pain.³

Transmission of pain signals evoked by tissue damage leads to sensitization of the peripheral and central pain pathways.^{4,5} Preemptive analgesia has been defined as an antinociceptive treatment which will be starting before the surgery, which prevents the establishment of altered central afferent input from injuries and its goal is to reduce pain by timing the analgesic peak pharmacodynamic effect with anticipated onset of pain or peak pain response.⁶ Due to this “protective” effect on the nociceptive system, pre-emptive analgesia has the potential to be more effective than a similar analgesic treatment initiated after surgery.⁶

Aims and objectives

There are many studies where TAP block is used for post-operative analgesia after abdominal surgeries. But studies where TAP block is used as pre-operatively are less.⁷⁻⁹ Hence in this study, our effort is to study the effect of TAP block when given before surgical incision.

Primary objective

To determine the effectiveness of preoperative TAP block for Intra-operative analgesia in patients undergoing Laparoscopic gynecological surgeries.

Secondary objectives

To analyse the time required to extubate the patient, intra-operative hemodynamic parameters like NIBP, HR, assess the sedation score up to 2 hours and VAS Scores up to 24 hrs in PACU for postoperative analgesia in both groups and the time of first rescue analgesia.

MATERIALS AND METHODS

This study was conducted in a 1300 bedded Teaching hospital in Obstetrics and Gynecology Operation theater. The Institutional Ethic committee permission was obtained with the number: RRMCH-IEC/26/2022 and study was registered under CTRI number CTRI/2022/10/046247. The study design was a prospective, single-blinded, randomized, and controlled study. Study population included female patients aged between 18 and 60 years, patients belonging to ASA I to II, undergoing elective laparoscopic gynecology surgery- LAVH/TLH. Patients with history of allergy to local anesthetics, history of mental disorders, patients who refused to be the part of this study, patients with morbid obesity, coagulopathy and significant cardiovascular respiratory, renal, hepatic, or metabolic diseases or central nervous system (CNS) disorders, infection at site of procedure, and the surgery more than 3 h duration were excluded from the study. Written informed consent was obtained from all the patients who were included in the study.

Pre-anesthetic evaluation was done and routine investigations noted. Details of the anesthetic technique and study protocol were explained to the patient during pre-operative visit. Randomization was done by computer generated random numbers with opaque sealed envelope method; here, the allocation sequence was concealed by the secondary investigator, who was supposed to assess the outcome variables. We divided the included study population into two groups:

- Group A – Patients were given Bilateral TAP block after induction of general anesthesia and before skin incision with Inj Bupivacaine 0.25% 20 mL
- Group B – Patients were standard general anesthesia and analgesia maintained with conventional methods.

In the pre-operative room, nurse-in charge would look the list if random numbers and attach the corresponding envelope with chit Group A or B before shifting to the operation theatre. In the operating room, Standard ASA monitors were attached, basal vital parameters noted and intravenous fluids started with 18 G I.V cannula. Intervention staff would open the envelope and give standard general anesthesia and ultrasound-guided TAP block according to the group allocated. All patients received standard general anesthesia with Inj Gycopyrolate 0.02 mcg/kg, Inj Propofol 2 mg/kg, Inj Fentanyl 2 mcg/kg, and Inj Vecuronium 0.1 mg/kg. Anesthesia was maintained with oxygen: Nitrous oxide 1:1 and inj Vecuronium 0.02 mg/kg repeated doses as and when needed.

Patients belonging to Group A were given bilateral TAP block. The skin was prepared with 2% chlorhexidine solution, and a high frequency (6–13 MHz, HFL 38) Ultrasound probe (SonoSite Fujifilm M-Turbo, Inc.) was

placed transversely between iliac crest and subcostal margin. The three muscles (external oblique, internal oblique, and transverse abdominis) of the anterior abdominal wall were identified. After identifying the fascial plane between the internal oblique and transverse abdominis muscle, a 23 G Quinke-Babcock spinal needle was introduced by in-plane technique of the US beam. When the needle reached the neurofascial plane between internal oblique and transverse abdominis muscle, 20 mL of 0.25% Bupivacaine was injected after negative aspiration. We could see the solution spreading as dark oval shaped like a fish-mouth appearance. The procedure was repeated on the contralateral side. Patient's belonging to Group B received standard general anesthesia.

HR and mean blood pressure (MBP) were noted every 15 min till the end of the surgery. Whenever, there was 15% rise in HR Inj. Fentanyl 20 mcg boluses given until HR comes to baseline. Patient was extubated at the end of the procedure. Time needed to extubate the patient was noted, that is, Time from the end of surgery till removal of ET tube was noted. Total intraoperative fentanyl consumption was noted. After extubation VAS score was measured in post-operative recovery room at 0, 2, 4, 6, 8, and 24 h and time of first rescue analgesia noted when VAS was >4. Rescue analgesia was given – inj. Tramadol 50 mg iv as per patient demand and later 50 mg 8th hourly.

Second investigator was blinded to the treatment allocation assessed the sedation score up to 2 h and VAS score up to 24 h and administered rescue analgesics up to 24 h after surgery. Although treatment allocation was unblinded to the interventional staff, it was kept blinded to the second investigator and participants.

Sample size was estimated using the difference in mean time of first rescue analgesic used between Group I and Group II from the study by Amr et al.,⁹ as 135±18 min and 120±16 min. Using these values at 95% Confidence limit and 90% power sample size of 28 was obtained in each group using the below mentioned formula and Med calc sample size software. With 10% non-response sample size of 28+2.8≈31, cases were included in each group.

RESULTS

Total of 62 patients were included the study. Two patients were excluded, One from each group as the procedure was more than 3 h. Total of 60 patients were included in statistical analysis. Group A was subjected for TAP block and Group B was administered with conventional analgesic therapy.

Data were entered into Microsoft excel data sheet and were analyzed using SPSS 22 version software. Categorical

data were represented in the form of frequencies and proportions. Chi-square test or Fischer's exact test (for 2×2 tables only) was used as test of significance for qualitative data and the P-value (Probability that the result is true) of <0.05 was considered as statistically significant after assuming all the rules of statistical tests.

In our study, there was no significant difference observed among the basic demographic details of the study participants in both groups (Table 1). On calculating the intraoperative Fentanyl consumption between the groups, we observed that, Group A patients who were given pre-operative TAP block required significantly less fentanyl than Group B (Figure 1). There was also significantly less sedation in pre-operative TAP group after extubation (Table 2). On analyzing the vitals throughout the procedure, there was a significant difference in Mean HR, Average Systolic blood pressure, diastolic blood pressure and hence the MAP (Figures 2 and 3). This was found to be significantly higher among the patients in Group B. Hence, we found that TAP has better control over the hemodynamic variations throughout the surgery and maintains near baseline.

Group A patients who received pre-operative TAP block had lower VAS score up to 24 h with significant difference at 2, 4, and 24 h postoperatively (Table 3). The mean time of extubation was 5.4 min and 15.77 min in Group A and B. We observed that the time required was significantly lesser

Table 1: Distribution of the baseline demographic details

Variables	Group A	Group B	P
Average age (years)	52.53	51.0	0.174
ASA			
1	13	16	
2	17	14	
Average weight (kg)	56.47	59.53	0.034
Average height (cm)	162.63	162.63	1.000
Duration of surgery (minimum)	179.35	178.07	0.308
TLH cases	18	17	0.13
LAVH cases	12	13	

TLH: Total laparoscopic hysterectomy, LAVH: Laparoscopic with vaginal hysterectomy, ASA: American Society of Anesthesiologists

Table 2: Comparison of the Mean sedation score between the two groups

Time in Minutes	Group				P value
	Group A		Group B		
	Mean	SD	Mean	SD	
0 Min	1.13	.35	1.97	0.18	< 0.001*
30 Mins	1.00	0.00	1.23	0.43	0.004*
60 Mins	1.00	0.00	1.00	0.00	-
90 Mins	1.00	0.00	1.00	0.00	-
120 Mins	1.00	0.00	1.00	0.00	-

*Statistically significant

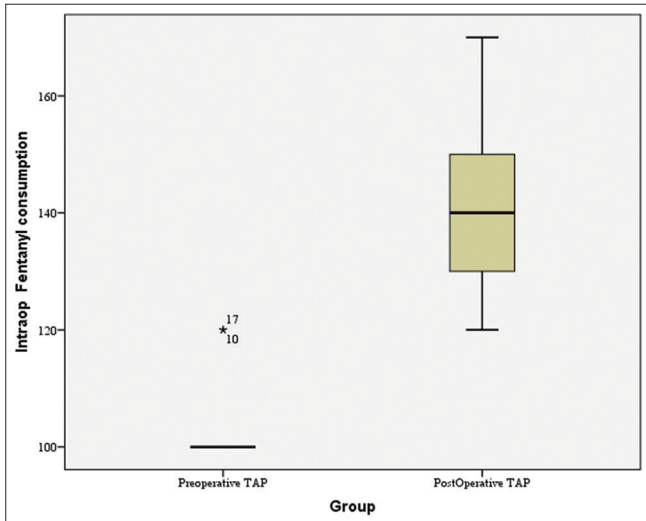


Figure 1: Box plot showing comparison of intraoperative fentanyl consumption between two groups

Table 3: Mean VAS comparison between two groups at different intervals of follow up

Time in Hours	Group				P value
	Group A		Group B		
	Mean	SD	Mean	SD	
0 hour	1.26	.44	1.23	.50	0.840
2 hour	1.13	.34	2.13	1.78	0.003*
4 hour	1.71	1.22	3.50	2.24	0.001*
6 hour	3.52	2.32	2.77	2.14	0.196
8 hour	3.52	2.46	2.57	2.10	0.111
24 hour	2.35	1.44	3.93	2.02	0.005*

*Statistically significant

in Group A. Mean time of rescue analgesia in pre-operative TAP group was 452.90 ± 110.46 min and in post-operative TAP was 240 ± 89.13 min. There was a significant difference in mean time of rescue analgesia in minutes comparison between two groups.

DISCUSSION

We have evaluated the effect of TAP block given as pre-emptive analgesia for laparoscopic gynecological surgeries in our study. Pain signals from damaged tissue are not transmitted to the CNS through “hard-wired” pathways. In contrast, nociceptive signals, once initiated, will launch a cascade of alterations in the somatosensory system, including an increase in the responsiveness of both peripheral and central neurons. These alterations will increase the response to subsequent stimuli and thus amplify pain.⁶

Pre-emptive analgesia is a treatment that is initiated before and is operational during the surgical procedure to reduce the physiological consequences of nociceptive transmission provoked by the procedure.⁷

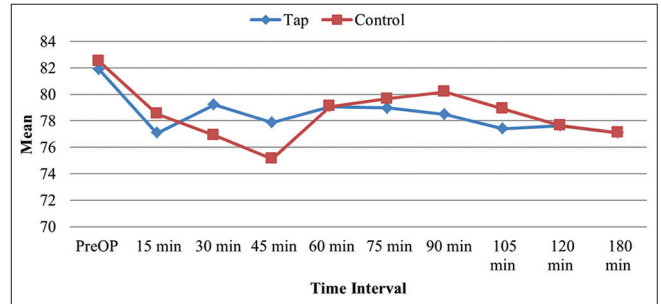


Figure 2: Distribution of the mean heart rate (HR) between two groups. *There was a significant difference in mean HR comparison between two groups from 15 to 180 min

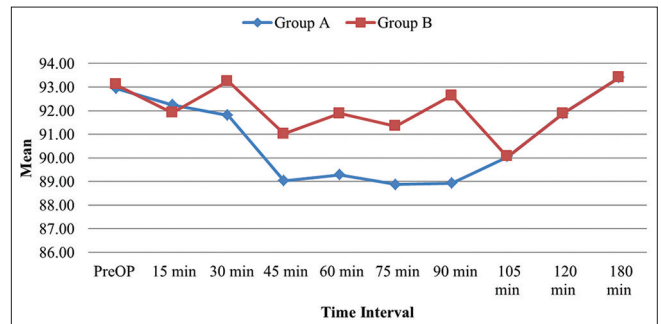


Figure 3: Distribution of the mean arterial pressure (MAP) between two groups. *There was a significant difference in mean MAP comparison between two groups from 60 to 90 min but not after that. The MAP in Group A was comparatively lower, yet maintained at the baseline than Group B throughout the surgery

In our study, we observed that patients who received TAP block before skin incision required less fentanyl than the patients who were given standard analgesia technique and values were statistically significant. These finding can be attributed to pre-emptive effect of TAP block which must have prevented sensitization of the nociceptive system by blocking the pain signal originating from the surgical wound from the time of incision.

Similar observations were observed with Chen et al.,⁸ but their values were not statistically significant. Similar to our findings Amr and Amin⁹ in his comparative study between pre- versus post-incisional TAP block on acute and chronic pain in abdominal hysterectomy patients observed that patients who received pre-incisional TAP block had a significant decrease in the fentanyl requirement in the operating room.

In contrast to our study, Vrsajkov et al.,¹⁰ studied pre-operative TAP block with standard analgesia technique in patients undergoing laparoscopic cholecystectomy and he observed no difference in intraoperative fentanyl consumption in both the groups. This difference in the fentanyl consumption may be because that Vrsajkov et al.,¹⁰ have used 3 mcg/kg Fentanyl during induction of general

anesthesia, whereas in our study, we have used 2 mcg/kg Fentanyl and given 20 mcg bolus whenever MBP raised above 20% of the baseline values.

Similar to our study Basaran et al.,¹¹ in his study compared pre-operative TAP block with standard analgesia technique and concluded that patients who received pre-operative TAP block received less fentanyl in the intraoperative period than the control group but was not statistically significant. They also studied the spirometric variables for assessing post-operative respiratory functions and observed that patients who received TAP block pre-incision had higher post-operative FEV1 values at 2 and 24 h compared to those with the control group. This observation in their study may be due to use of non-opioid technique like TAP block used pre-emptively before skin incision which causes less respiratory depression and better preservation of respiratory function. However, we did not do any measurements to assess post-operative respiratory function.

Chen et al.,⁸ in his study comparing analgesic efficacy between oblique subcostal transversus abdominis plane (OSTAP) block given after induction and intravenous morphine for laparoscopic cholecystectomy, observed that, morphine group required additional doses of fentanyl intraoperatively as compared to the OSTAP block but the difference was not statistically significant. They concluded that as TAP block given before skin incision as an important role as a part of balanced anesthesia. We also observed that in our study TAP block given preoperatively provides adequate analgesia intraoperatively and also opioid requirement is less.

Even another RCT by El-Dawlatly et al.,¹² also had demonstrated that the classical posterior TAP block significantly reduced the intra-operative Sufentanyl and post-operative morphine consumption compared to the control group.

In our study, one group received TAP block before skin incision and other group received standard protocol. We observed that HR and MBP were throughout lower in pre-operative TAP group as compared to the other group and the difference was statistically significant. Ruqaya M Elsayed Goda et al.,¹³ did a comparative study between ultrasound-guided TAP block and paravertebral block in upper abdominal surgeries where blocks were given before skin incision and they observed that vital parameters were stable throughout the procedure but difference was not statistically significant. They also studied serum interleukin and serum cortisol assay measurement preoperatively and at 6th h and found that, both groups attenuate increase in post-operative stress hormone with no significant difference. This observation may be because both the groups have

received block before skin incision. This pre-emptive block given may have caused no increase in stress hormones after surgery. However, in our study, we did not do any hormone assay to measure the stress response to surgery, but by observing the vital parameters, we can conclude that pre-emptive TAP block has kept intraoperative vitals stable thus decreasing the stress response as observed by decreased opioid consumption in the intraoperative period. In contrast to our study Jeong et al.,¹⁴ who studied rectus sheath block preoperatively versus postoperatively observed no difference in the vital parameters in both the groups.

In our study, we observed early extubation and also less post-operative sedation in TAP group. Early extubation observed in our study can be attributed to decreased dose of opioid used in the intraoperative period which has caused less sedation, leading to early extubation, thus can reduce the incidence of post-operative complications. Similar to our findings Amr and Amin⁹ in his comparative study between pre- versus post-incisional TAP block on acute and chronic pain in abdominal hysterectomy patients observed that patients who received post-incisional TAP block had higher sedation as compared to the control group. Chen et al.,⁸ in his RCT between subcostal TAP block and intravenous morphine observed that time to extubation was significantly shorter in TAP block group. However, in contrast to our study, Chen et al., and Dirican et al.,¹⁵ did not find any difference in the sedation score.

On analyzing the need for rescue analgesic, which was Inj Tramadol in our study, we found that the Mean Time of Rescue analgesia in pre-operative TAP Group was 452.90 ± 110.46 min and in post-operative TAP was 240 ± 89.13 min, this was significantly higher in Group B than Group A. Similarly, Chen et al., also had observed that the need for rescue analgesia in the patients with abdominal muscle block was significant and also it was prolonged. Similar results were also observed by Amr and Amin where total morphine consumption in ward in first 48 h was significantly reduced in the pre-incisional TAP group. Furthermore, the time of first rescue analgesia was significantly prolonged in patients who received TAP block as compared to the group who received SHAM block with more increase in pre-incisional group.

Similar to our results, Amr and Amin⁹ observed that post-operative VAS scores monitored up to 48 h were significantly higher in post-surgical TAP block group than those in the pre-incisional group. They also studied incidence of chronic pain by a short questionnaire 3 and 6 months later and concluded that incidence of chronic pain was significantly less in patients with pre-incisional TAP block. However, we did not follow-up the patients after 24 h.

In contrast to our results, Dirican et al.,¹⁵ in his comparative study between pre-operative and post-operative approaches to ultrasound guided transversus abdominis plane block for post-operative analgesia in TAH patients, observed that pain scores decreased in early periods and also reduced 24 h morphine consumption was less in post-operative TAP group when compared with pre-operative administration of the block.

In contrast to our observations, Rahimzadeh et al.,¹⁶ in his study on effect of pre-emptive versus post-operative USG-guided bilateral transversus abdominis plane (TAP) block on pain relief after laparoscopic cholecystectomy, observed that patients who received post-operative TAP block had lower NRS score at 8th and 12th h postoperatively and also time of first analgesic request was longer in patients who received post-operative TAP block.

Escudero-Fung et al.,¹⁷ conducted a retrospective study to determine the appropriate timing of Transversus Abdominis Plane Block and Post-operative Pain Management. They included patients with pre-induction TAP block, pre-incision TAP block and TAP block given before extubation. They studied the cumulative opioid and non-opioid drugs used till patient's discharge and found no difference in the post-operative pain scores or opioid consumption requirement between the groups, but non-opioid consumption like Ketorolac was higher in the post-operative TAP block group. Similar results are seen in our study also, where pre-incision TAP block had lower VAS scores in the post-operative period compared to the control group requiring less rescue analgesia, that is, Tramadol in first 24 h.

Limitations of the study

Our study was a single blinded study and we couldn't do double blinding, as one group received pre-operative TAP block and other group did not receive any block. We did not want to give placebo (Sham block) block to patients as it would have led to unnecessary prick. We included surgeries which were less than 180 minutes only. Surgeries with more than 180 minutes duration could not be assessed. We assessed the stress response to surgery by HR and MBP measurements and did not do any hormone assay measurements in our study. Further studies are needed with hormone assay measurement to assess the benefit of pre-operative blocks.

CONCLUSION

In our study, TAP block when given as pre-emptive analgesia before the skin incision in laparoscopic gynecological surgeries decreases intraoperative fentanyl consumption leading to early extubation and causes less sedation in

early post-operative period. Pre-operative TAP block can be used as a non-opioid analgesic method in laparoscopic gynecological surgeries, which can decrease the consumption of opioids, thereby avoiding opioid-related side effects.

ACKNOWLEDGMENT

The authors would like to express their gratitude to Dr Mahesh. V for sample size calculation and Statistical Analysis Reporting (SAR). We also thank the staff of OBG department who have been cooperative for our study.

REFERENCES

- Shin JW, Lee HH, Lee SP and Park CY. Total laparoscopic hysterectomy and laparoscopy-assisted vaginal hysterectomy. *JLS*. 2011;15(2):218-221. <https://doi.org/10.4293/108680811X13071180406394>
- Garimella V and Cellini C. Postoperative pain control. *Clin Colon Rectal Surg*. 2013;26(3):191-196. <https://doi.org/10.1055/s-0033-1351138>
- Sravani P, Indrani C, Rajanna SP and Saxena RK. Efficacy of surgical transversus abdominis plane block in patients undergoing cesarean delivery. *J South Asian Fed Obstet Gynecol*. 2020;12(5):302-306. <https://doi.org/10.5005/jp-journals-10006-1828>
- Vadivelu N, Mitra S, Schermer E, Kodumudi V, Kaye AD and Urman RD. Preventive analgesia for postoperative pain control: A broader concept. *Local Reg Anesth*. 2014;7:17-22. <https://doi.org/10.2147/LRA.S62160>
- Woolf CJ and Salter MW. Neuronal plasticity: Increasing the gain in pain. *Science*. 2000;288(5472):1765-1769. <https://doi.org/10.1126/science.288.5472.1765>
- Dahl JB and Møiniche S. Pre-emptive analgesia. *Br Med Bull*. 2005;71(1):13-27. <https://doi.org/10.1093/bmb/ldh030>
- Mishra AK, Afzal M, Mookerjee SS, Bandyopadhyay KH and Paul A. Pre-emptive analgesia: Recent trends and evidences. *Indian J Pain*. 2013;27:114-120. <https://doi.org/10.4103/0970-5333.124582>
- Chen CK, Tan PC, Phui VE and Teo SC. A comparison of analgesic efficacy between oblique subcostal transversus abdominis plane block and intravenous morphine for laparoscopic cholecystectomy. A prospective randomized controlled trial. *Korean J Anesthesiol*. 2013;64(6):511-516. <https://doi.org/10.4097/kjae.2013.64.6.511>
- Amr YM and Amin SM. Comparative study between effect of pre- versus post-incisional transversus abdominis plane block on acute and chronic post-abdominal hysterectomy pain. *Anesth Essays Res*. 2011;5(1):77-82. <https://doi.org/10.4103/0259-1162.84199>
- Vrsajkov V, Mancic N, Mihajlovic D, Milicevic ST, Uvelin A and Vrsajkov JP. Subcostal transversus abdominis plane block can improve analgesia after laparoscopic cholecystectomy. *Bras J Anesthesiol*. 2018;68(2):149-153. <https://doi.org/10.1016/j.bjan.2017.10.006>
- Basaran B, Basaran A, Kozanhan B, Kasdogan E, Eryilmaz MA and Ozmen S. Analgesia and respiratory function after laparoscopic cholecystectomy in patients receiving ultrasound-

- guided bilateral oblique subcostal transversus abdominis plane block: A randomized double-blind study. *Med Sci Monit.* 2015;21:1304-1312.
<https://doi.org/10.12659/msm.893593>
12. 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(6):763-767.
<https://doi.org/10.1093/bja/aep067>
13. Ruqaya M Elsayed Goda, Tarek Abd El Kareim Eldahshan. Comparative study between ultrasound guided TAP block and paravertebral block in upper abdominal surgeries. *Egypt J Anaesth.* 2017;33(1):41-45.
<https://doi.org/10.1016/j.egja.2016.11.004>
14. Jeong HW, Kim CS, Choi KT, Jeong SM, Kim DH and Lee JH. Preoperative versus postoperative rectus sheath block for acute postoperative pain relief after laparoscopic cholecystectomy: A randomized controlled study. *J Clin Med.* 2019;8(7):1018.
<https://doi.org/10.3390/jcm8071018>
15. Dirican B, Erdogan M, Ucar M, Uzgul U, Gulhas N, Kayhan G, et al. Comparison of preoperative and postoperative approaches to ultrasound-guided transversus abdominis plane block for postoperative analgesia in total abdominal hysterectomy. *Biomed Res.* 2017;28(4):1738-1742.
<https://doi.org/10.19080/jaicm.2017.04.555636>
16. Rahimzadeh P, Faiz SH, Latifi-Naibin K and Alimian M. A Comparison of effect of preemptive versus postoperative use of ultrasound-guided bilateral transversus abdominis plane (TAP) block on pain relief after laparoscopic cholecystectomy. *Sci Rep.* 2022;12(1):623.
<https://doi.org/10.1038/s41598-021-04552-6>
17. Escudero-Fung M, Lehman EB and Karamchandani K. Timing of transversus abdominis plane block and postoperative pain management. *Local Reg Anesth.* 2020;3:185-193.
<https://doi.org/10.2147/lra.s278372>

Authors Contribution:

JP- Definition of intellectual content, literature survey, prepared first draft of the manuscript, implementation of study protocol, data collection, data analysis, manuscript preparation, and submission of article; **KK-** Concept, design, clinical protocol, data collection, and manuscript preparation; **KiP-** Literature search, clinical protocol, manuscript editing, manuscript revision, and data analysis; **MM-** Clinical protocol and review manuscript; **SR-** Review manuscript; **RS-** Manuscript editing and manuscript revision; and **KeP-** Preparation of tables, references.

Work attributed to:

Rajarajeswari Medical College and Hospital, Bengaluru, Karnataka, India.

ORCID ID:

Dr. Jyoti Petkar - <https://orcid.org/0000-0002-4595-6781>
Dr. Kishore Kumar - <https://orcid.org/0000-0001-5946-3657>
Dr. Kiran Petkar - <https://orcid.org/0000-0002-3129-4529>
Dr. Manasa M - <https://orcid.org/0000-0003-0348-4250>
Dr. Sudheer - <https://orcid.org/0000-0002-8706-7712>
Dr. Rangalakshmi S - <https://orcid.org/0000-0003-0051-4266>

Source of Funding: None, **Conflicts of Interest:** None.