

## A Comparison between Trans versus Abdomen is Plane Block and Peri Incisional Infiltration with 0.25% Bupivacaine in Post- Operative Analgesia in Infra Umbilical abdominal Surgeries

Arnab Saha<sup>1</sup>, Swarna Mukul Saha<sup>2</sup>, Asha Kahar<sup>3</sup>, Abha Rani<sup>4</sup>, Jisnu Nayak<sup>5</sup>

<sup>1</sup>Senior Resident, MBBS, MD, Department of Anesthesiology, Rampurhat Government Medical College & Hospital, Rampurhat, Birbhum

<sup>2</sup>Assistant Professor, MBBS, MD, Department of Anesthesiology, Burdwan Medical College & Hospital, Purba Bardhaman, 713104

<sup>3</sup>Senior Resident, MBBS, MS, Department of Obstetrics & Gynaecology, Rampurhat Government Medical College & Hospital, Rampurhat, Birbhum, West Bengal 731224

<sup>4</sup>Senior Resident, MBBS, MS, Department of Obstetrics & Gynaecology, Rampurhat, Birbhum, West Bengal 731224

<sup>5</sup>Assistant Professor, MBBS, MD, Department of Anesthesiology, Burdwan Medical College & Hospital, Purba, Bardhaman, 713104

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Corresponding author: Dr. Jisnu Nayak

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### Abstract

**Introduction:** The definition of pain is "an unpleasant sensory and motor experience related to or characterized by actual or potential tissue damage." In order to improve pain relief, balanced multi-modal analgesia has been popular recently. One of the most significant issues facing healthcare today is post-operative pain, and pain management is a hot topic right now.

**Aims:** To evaluate the post-operative analgesic effects of peri-incisional local anesthetic infiltration and transversus abdominis plane (TAP) block in cases of infra-umbilical abdominal surgeries.

**Materials & Methods:** The study was conducted in a tertiary care hospital, i.e., Burdwan Medical College & Hospital, Purba Bardhaman, and West Bengal. The study was primarily set in the Department of General Surgery and Department of Gynaecology & Obstetrics of this medical college.

**Result:** According to our research, the TAP rescue analgesic was administered to the group 514.70±45.10 minutes after surgery, whereas the LAI group received it at 419±29.40 minutes. There was a statistically significant difference in the mean initial dosage of rescue analgesic between the two groups (p<0.001).

**Conclusion:** When it comes to postoperative analgesia following non-traumatic abdominal procedures, the TAP block works better than peri-incisional infiltration with 0.25% bupivacaine. Its application in clinical practice for this patient population may result in better pain management, less opioid usage, and increased patient satisfaction.

**Keywords:** Transversus Abdominis Plane Block, Peri-Incisional Infiltration, Pain Management and Analgesic Efficacy.

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### Introduction

"An unpleasant sensory and motor experience connected to actual or potential tissue damage, or described in terms of such damage," is the definition of pain." [1] In order to improve pain relief, balanced multi-modal analgesia has been popular recently. One of the most significant issues facing healthcare today is post-operative pain, and pain management is a hot topic right now. While uncontrolled surgical pain can lead to severe morbidity and death, optimizing peri-operative and post-operative analgesia improves clinical

outcomes and promotes patient satisfaction. [2] It has been demonstrated that peripheral nerve block and peri-incisional local anesthetic infusion offer superior post-operative analgesia. Transversus abdominis plane (TAP) blocks are becoming more and more common, and they seem to improve analgesia following a variety of abdominal surgeries. Therefore, in terms of a multimodal strategy to post-operative pain treatment following infra-umbilical abdominal procedures, this study will add to the body of knowledge already available

about TAP block and peri-incisional infiltration of local anesthetics. Historically, systemic pharmaceuticals including opioids, non-steroidal anti-inflammatory drugs (NSAIDs), and local anesthetics injected into the skin surrounding the surgical site, or epidural or spinal analgesia techniques have been used to relieve pain.

Effective pain treatment throughout the perioperative and postoperative periods has been achieved by the use of regional anesthetic methods and nerve blocks, either alone or in conjunction with systemic analgesics.

Its usage has been demonstrated to improve recovery and reduce post-operative problems, stress reactions, nausea, vomiting, and other issues related to opiate use.

The Transversus Abdominis Plane (TAP) block is a recently developed, simple, and secure method of regional pain relief. Rafi originally presented the method in 2001, and Mc. Donnell improved upon it.[3, 4] Using a landmark approach or ultrasound guidance, a local anesthetic drug is installed into a fascial plane between the internal oblique muscle and the transversus abdominis muscle.

The incision formed in the abdominal wall is the main source of pain following abdominal surgery. [4] Along the plane between the internal oblique muscle and the transversus abdominis muscle, TAP block anesthetizes the somatic supply of the anterior rami of the thoracolumbar nerves (T10-L1), the subcostal nerve (T12), the ilioinguinal nerve (L1), and the hypogastric nerve (L1).

Although local infiltration around the wound site has also been utilized extensively, there has been debate over its effectiveness as a strong and practical adjuvant in multimodal analgesia.

In order to provide post-operative analgesia to patients having infra-umbilical abdominal procedures, we want to compare the effects of transversus abdominis plane block and local wound infiltration.

## Materials & Methods

**Study Type and Design:** It was an observational descriptive study with longitudinal design to compare the effect of two interventions.

**Study Area and Setting:** The study was conducted in a tertiary care hospital, i.e., Burdwan Medical College & Hospital, Purba Bardhaman, and West Bengal. The study was primarily set in the Department of General Surgery and Department of Gynaecology & Obstetrics of this medical college.

**Study Population:** The target population were patients who were: Admitted in the afore mentioned study area for elective infra umbilical abdominal surgery under spinal anaesthesia in

Department of General Surgery and Department of Gynaecology and Obstetrics, Burdwan Medical College and Hospital, during the study period (1<sup>st</sup> February 2021 to 31<sup>st</sup> March 2022)

**Sample Size:** 100

Found eligible for inclusion in the study by application of exclusion and inclusion criteria:

### Inclusion criteria

- Age group 18-50 years of both sexes
- Patients with American Society of Anaesthesiologists grade I & II

### Exclusion criteria

- Patients who did not provide informed consent
- Coagulopathy or on anti-coagulation treatment with INR >1.5
- Patients with present infection at the stipulated site of injection
- Patients with chronic pain syndrome
- Patients who received any NSAID or Opiate 48 hours prior to surgery
- Patients with History of allergy to the anesthetic agent
- Patients having Body Mass Index (BMI) <18 Kg /m<sup>2</sup> or >35 Kg /m<sup>2</sup>
- Patients with history of alcoholism or other substance abuse.
- Patient having bronchitis or Chronic Obstructive Pulmonary Disease or active respiratory tract infection.
- Patients with existing Liver, Renal and Heart diseases.

### Statistical Analysis:

For statistical analysis, data were initially entered into a Microsoft Excel spreadsheet and then analyzed using SPSS (version 27.0; SPSS Inc., Chicago, IL, USA) and GraphPad Prism (version 5). Numerical variables were summarized using means and standard deviations, while categorical variables were described with counts and percentages.

Two-sample t-tests, which compare the means of independent or unpaired samples, were used to assess differences between groups. Paired t-tests, which account for the correlation between paired observations, offer greater power than unpaired tests.

Chi-square tests ( $\chi^2$  tests) were employed to evaluate hypotheses where the sampling distribution of the test statistic follows a chi-squared distribution under the null hypothesis; Pearson's chi-squared test is often referred to simply as the chi-squared test.

For comparisons of unpaired proportions, either the chi-square test or Fisher's exact test was used,

depending on the context. To perform t-tests, the relevant formulae for test statistics, which either exactly follow or closely approximate a t-distribution under the null hypothesis, were applied, with specific degrees of freedom indicated for each test. P-values were determined from Student's t-distribution tables.

A p-value  $\leq 0.05$  was considered statistically significant, leading to the rejection of the null hypothesis in favour of the alternative hypothesis.

### Result

**Table 1: Comparison of Surgery Related Characteristics in two study arms**

Characteristics	LAI group (n=50)	TAP group (n=50)	p value
	Number (%)	Number (%)	
<b>Indication for Surgery</b>			
Inguinal hernia	19 (38.0)	20 (40.0)	0.200 (Fisher's Exact Test)
Bulky Uterus	3 (6.0)	2 (4.0)	
Ch. Appendicitis	17 (34.0)	11 (22.0)	
Dysfunctional Ut.	1 (2.0)	5 (10.0)	
Bleeding			
Incisional Hernia	1 (2.0)	3 (6.0)	
Menorrhagia	0 (0.0)	1 (2.0)	
Pelvic SOL	3 (6.0)	1 (2.0)	
Simple Ovarian Cyst	0 (0.0)	3 (6.0)	
Uncontrolled Ut.	0 (0.0)	1 (2.0)	
Bleeding			
Uterine Fibroid	6 (12.0)	3 (6.0)	
<b>Type of Surgery</b>			
Elective Appendectomy	17 (34.0)	11 (22.0)	0.135 (Fisher's Exact Test)
Abdominal	5 (10.0)	8 (16.0)	
Hysterectomy			
Ovarian Cystectomy	0 (0.0)	3 (6.0)	
Hernioplasty	20 (40.0)	23 (46.0)	
Laparotomy	3 (6.0)	0 (0.0)	
Total Abdominal Hysterectomy with bilateral salpingo oophorectomy			
Average duration of surgery in minutes	69.9 (11.5)	66.8 (11.5)	0.174 (Independent Samples t-test)

**Table 2: Occurrence of post-operative nausea and vomiting among patients of twogroups**

Intervention groups	Post-operative nausea and vomiting		Total	p-value (Pearson Chi- Square test)
	Did not Occur	Occurred		
	Frequency (%)	Frequency (%)		
LAI	41 (82.0)	9 (18.0)	50 (100.0)	0.799
TAP	40 (80.0)	10 (20.0)	50 (100.0)	

**Table 3: Frequency of post-operative nausea and vomiting among patients of twointervention groups**

Intervention groups	Episode of post-operative nausea and vomiting		Total	p-value (Fisher's Exact Test)
	1 episode	2 episodes		
	Frequency (%)	Frequency (%)		
LAI	3 (33.3)	6 (66.7)	9 (100.0)	0.07
TAP	8 (80.0)	2 (20.0)	10 (100.0)	

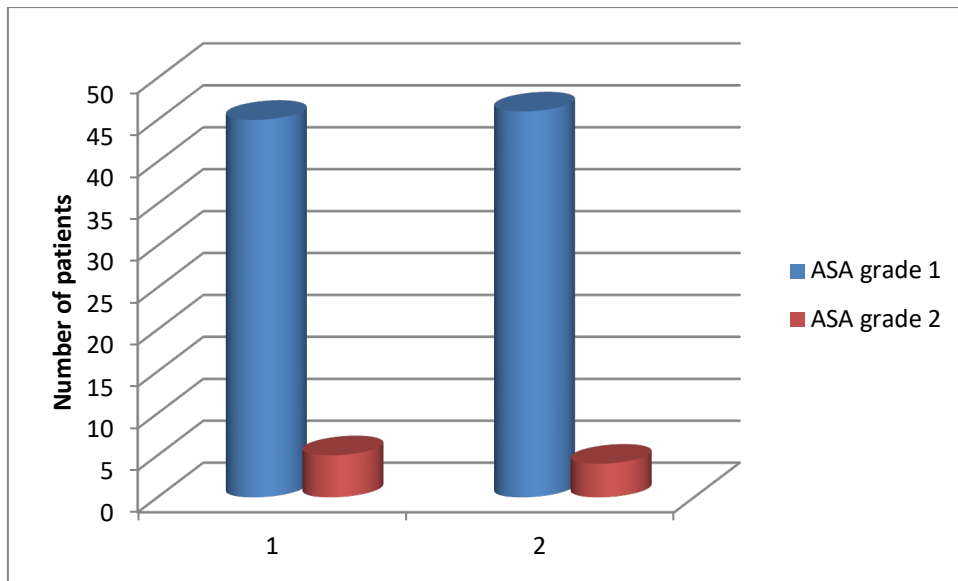


Figure 1: ASA grade

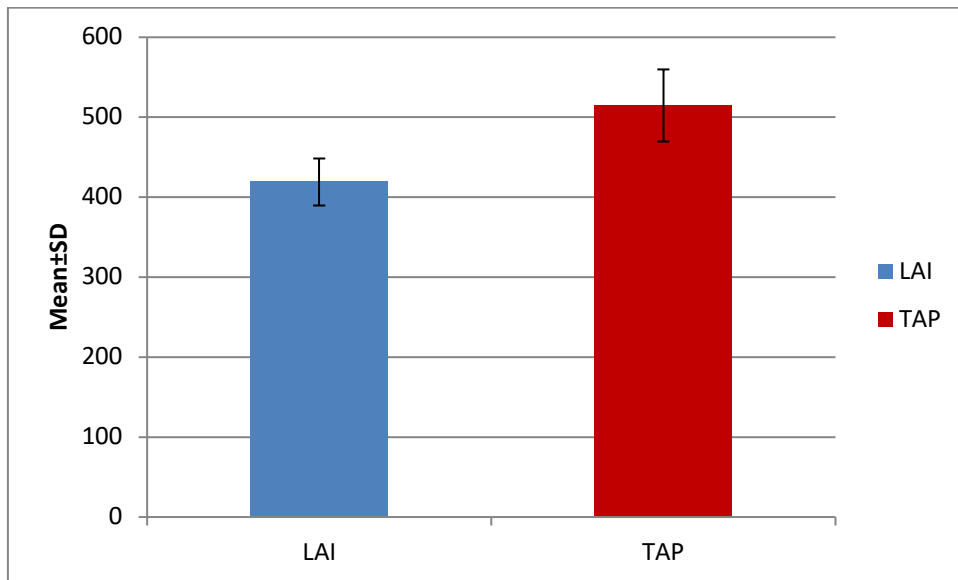


Figure 2: Mean time of firstdose of rescue analgesic (Trescue in minutes)

**Indication for Surgery**

In LAI group (n=50), 19 (38.0) patients had Inguinal hernia, 3 (6.0) patients had Bulky Uterus, 17 (34.0) patients had Ch. Appendicitis, 1 (2.0) patient was Dysfunctional Ut. Bleeding, 1 (2.0) patient was Incisional Hernia, 3 (6.0) patients had Pelvic SOL, and 6 (12.0) patients had Uterine Fibroid. In TAP group (n=50), 20 (40.0) patients had Inguinal hernia, 2 (4.0) patients had Bulky Uterus, 11 (22.0) patients had Ch. Appendicitis, 5 (10.0) patients had Dysfunctional Ut. Bleeding, 3 (6.0) patients had Incisional Hernia, 1 (2.0) patient was Menorrhagia, 1 (2.0) patient was Pelvic SOL, 3 (6.0) patients had Simple Ovarian Cyst, 1 (2.0) patient was Uncontrolled Ut. Bleeding and 3 (6.0) patients had Uterine Fibroid. Association of Indication for Surgery with Characteristics was statistically not significant (p=0.200).

**Type of Surgery**

In LAI group (n=50), 17 (34.0) patients had Elective Appendectomy Surgery, 5 (10.0) patients had Abdominal Hysterectomy Surgery, 20 (40.0) patients had Hernioplasty Surgery, 3 (6.0) patients had Laparotomy Surgery, and 5 (10.0) patients had Total Abdominal Hysterectomy with bilateral salpingo oophorectomy Surgery. In TAP group (n=50), 11 (22.0) patients had Elective Appendectomy Surgery, 8 (16.0) patients had Abdominal Hysterectomy Surgery, 3 (6.0) patients had Ovarian Cystectomy Surgery, 23 (46.0) patients had Hernioplasty Surgery, and 5 (10.0) patients had Total Abdominal Hysterectomy with bilateral salpingo oophorectomy Surgery. Association of Type of Surgery with Characteristics was statistically not significant (p=0.135).

In LAI group (n=50), 69.9 (11.5) minutes were average duration of surgery compared to 66.8(11.5) minutes in TAP group (n=50). Association of average duration of surgery were statistically not significant (p=0.174).

Incidence and number of episodes of nausea vomiting between the two groups were statistically insignificant. In Group-LAI 45(90%) patients were in ASA I and 5(10%) patients were in ASA II. In Group-TAP 46(92%) patients were in ASA I and 4(8%) patients were in ASA II. Both groups were similar in their ASA distributions (p=0.998). It can be noted that in group TAP rescue analgesic was given at 514.70±45.10 minutes postoperatively and in group- LAI, it was at 419± 29.40 minutes postoperatively. Difference of mean first dose of rescue analgesic in both groups were statistically significant (p<0.001)

### Discussion

In this observational study, we examined the postoperative analgesic effectiveness of per-incisional local anesthetic infiltration and bupivacaine in bilateral TAP block guided by USG during infra-umbilical abdominal operations performed under spinal anesthesia. Group LAI got peri-incisional local anesthetic infiltration with 0.25% Bupivacaine on each side, whereas Group TAP (n = 50) received bilateral USG guided TAP block with 0.25% isobaric Bupivacaine.

We observed that both groups' mean VAS at baseline and the second and fourth hours after surgery were comparable. The analgesic impact of hyperbaric bupivacaine 0.5%, which was used for spinal anesthesia, and the infusion of 1 gram of paracetamol, which was administered as part of the analgesic protocol one hour after the procedure, may help to explain these findings.

In our study mean time for first dose of rescue analgesic (T-rescue) in LAI group was 419 minutes. Moïniche S et al.[5] in 1988 in their systemic review of 90 RCTS concluded that per-incisional local anaesthetic infiltration is a cost effective and technologically less demanding procedure for providing post-operative analgesia. Tabssam S et al.[6] compared peri-incisional LAI with saline infiltration in a placebo-controlled randomized control study. It found that per-incisional LAI did not significantly affect post-operative pain scores as measured by VAS, but it did decrease the need for intravenous analgesics like Tramadol in patients who received per-incisional Bupivacaine infiltration. Alemnew EF et al.[7] In this study, they examined the analgesic efficacy of transversus abdominis plane block and wound site local anesthetic infiltration following cesarean birth under spinal anesthesia. They found that the wound infiltration group's mean T rescue

time was 287 minutes. Abbas, M. H et al.[8] according to their study, post-operative pain levels at 4 and 24 hours were comparable to placebo, suggesting that bupivacaine infiltration of abdominal wounds and extraperitoneal space did not appear to provide analgesic advantages in patients having laparoscopic TEP repair of unilateral inguinal hernias.

Hebbard et al. [9] outlined a TAP block using ultrasound guidance in 2007. Similar to what we saw, the use of ultrasound imaging aids in accurate plane identification, appropriate drug deposition, and enhanced block efficacy.

With a p-value <0.001, we found that the mean VAS scores at the 8th and 12th postoperative hours were considerably lower in the TAP group than in the LAI group. We observed that the TAP group's mean T-Rescue time was 514 minutes. Thus, it may be said that the TAP group had analgesia for a longer period of time. Mishra M et al.[10] in 2016 noted similar results in their clinical trial of Transversus abdominis plane block versus wound infiltration of local anaesthesia for post-operative analgesia.

Carney et al. [11], stated in their study that TAP block provided post-operative analgesia at 6 to 24 hours post-operatively in patients undergoing TAH.

We observed that heart rate and blood pressures (SBP, DBP, MAP) were similar across both the groups up to post-operative 5th hour. We noted statistically and clinically significant rise in heart rate and mean arterial pressure in LAI group from 6th postoperative hour to 12th postoperative hour. The hemodynamic stability in group TAP patients during this period may be due to superior analgesic effect of TAP block that countered pain associated stress response. Paul O E et al.[12] noted in their studies similar hemodynamic stability in patients receiving TAP blocks. For the next 12 hours no significant hemodynamic changes were observed among both the groups.

Regarding PONV, no statistically and clinically significant changes were observed among both the groups within 1st 24 hours postoperatively. But occurrence of PONV episodes were more in group LAI. Grape S et al.[13] There is moderate evidence that TAP block offers better analgesia than wound infiltration after inguinal and infra-umbilical hernia repair, according to a systematic review and meta-analysis with trial sequential analysis published in 2022. Additionally, TAP block groups were linked to lower rates of PONV, which were ascribed to lower opioid consumption.

## Conclusions

When it comes to postoperative analgesia following non-traumatic abdominal procedures, the TAP block works better than peri-incisional infiltration with 0.25% bupivacaine. Its application in clinical practice for this patient population may result in better pain management, less opioid usage, and increased patient satisfaction.

## References

1. Amin SA, Tahir SH. Impact of bupivacaine infiltration of postoperative wound on parenteral narcotic analgesic requirement for pain. *Journal of Surgery Pakistan*. 2010 Oct; 15:177-81.
2. Thornton PC, Buggy DJ. Local anaesthetic wound infusion for acute postoperative pain: a viable option? *BJA EDITORIAL II. British Journal of Anaesthesia* (2011) 107(5):656-8
3. Rafi AN. Abdominal field block: a new approach via the lumbar triangle. *Anaesthesia*. 2001 Oct; 56(10):1024-6.
4. McDonnell JG, O'Donnell BD, Farrell T, Gough N, Tuite D, Power C, Laffey JG. Transversus abdominis plane block: a cadaveric and radiological evaluation. *Regional Anesthesia & Pain Medicine*. 2007 Sep 1; 32(5):399-404.
5. Moiniche S, Mikkelsen S, Wetterslev J, Dahl JB. A qualitative systematic review of incisional local anaesthesia for postoperative pain relief after abdominal operations. *British journal of anaesthesia*. 1998 Sep 1; 81(3):377-83.
6. Tabssam S, Firdous R. Comparison of pain score and postoperative analgesic requirement in patients undergoing caesarean section with & without peri incisional local anaesthesia. *Journal of University Medical & Dental College*. 2014 Dec 3; 5(2):8-12.
7. Alemnew EF, Lemma DT. Analgesic effectiveness of transversus abdominis plane block versus wound site infiltration after cesarean delivery under spinal anesthesia at Debre Tabor General Hospital, Debre Tabor, Ethiopia: A prospective cohort study, 2019. *International Journal of Surgery Open* 23 (2020) 17-22
8. Abbas, M. H., Hamade, A., Choudhry, M. N., Hamza, N., Nadeem, R., & Ammori, B. J. (2010). Infiltration of wounds and extraperitoneal space with local anesthetic in patients undergoing laparoscopic totally extraperitoneal repair of unilateral inguinal hernias: a randomized double-blind placebo-controlled trial. *Scandinavian journal of surgery: SJS: official organ for the Finnish Surgical Society and the Scandinavian Surgical Society*, 99(1), 18–23.
9. Hebbard P, Fujiwara Y, Shibata Y, Royse C. Ultrasound-guided transversus abdominis plane (TAP) block. *Anaesthesia and intensive care*. 2007 Aug 1; 35(4):616-8.
10. Mishra M, Mishra SP, Singh SP. Transversus abdominis plane block versus wound infiltration of local anesthesia for post-operative analgesia. *J MedSci Clin Res*. 2016; 4:9916–9922.
11. Carney J, McDonnell JG, Ochana A, Bhinder R, Laffey JG. The transversus abdominis plane block provides effective postoperative analgesia in patients undergoing total abdominal hysterectomy. *Anesthesia & Analgesia*. 2008 Dec 1; 107(6):2056-60.
12. Paul, O.E., Bonaventure, J., Roddy, B.B., Joël, T., Anatole, A.E. and Jacqueline, Z.M. Intraoperative Hemodynamic and Analgesic Effects of Pre-Incisional Transversus Abdominis Plane Block during Total Abdominal Hysterectomy. *Open Journal of Anesthesiology*. 2017; 7, 393-399.
13. Grape S, Kirkham KR, Albrecht E. The analgesic efficacy of transversus abdominis plane block vs. wound infiltration after inguinal and infra-umbilical hernia repairs: A systematic review and meta-analysis with trial sequential analysis. *European Journal of Anaesthesiology*. 2022 Jul 1; 39(7):611-8.