



# **Postoperative Analgesic Efficacy of Ultrasound-Guided Transversus Abdominis Plane (TAP) Block in Lower Abdominal Surgery**

**Zaigham Din Baloch<sup>a</sup>, Rafia Tabassum<sup>a</sup>, Salman A. Saleem<sup>b</sup>,  
Muhammad Saleh Khaskheli<sup>a</sup>, Rao Irfan<sup>c</sup> and Muhammad Naeem<sup>a</sup>**

<sup>a</sup> Department of Anesthesiology, SICU and Pain Center, PUMHS, Pakistan.

<sup>b</sup> Department of Anesthesiology, Shifa Medical College of Medicine, Islamabad, Pakistan.

<sup>c</sup> IPS, PUMHS, Pakistan.

## **Authors' contributions**

*This work was carried out in collaboration among all authors. Authors ZDB and RT designed the study. Authors SAS and MN performed the statistical analysis. Authors RI and MSK wrote the protocol, and wrote the first draft of the manuscript. Authors ZDB, RT and RI managed the analyses of the study. Author ZDB managed the literature searches. All authors read and approved the final manuscript.*

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## **ABSTRACT**

**Aim:** To determine the postoperative analgesic efficacy of ultrasound guided transversus abdominis plane blocks in different types of lower abdominal surgery.

**Methodology:** This study was conducted during July 2018 to December 2018 at the Department of Anesthesiology, Peoples Medical University & Hospital Nawabshah after the approval of ethical review committee PUMHSW Nawabshah, Pakistan. Patients undergoing elective lower abdominal surgeries between the age of 18-65 years and American Society of Anesthesiology (ASA) I to IV were included in this study while those patients with infection at the proposed site of injection,

# Consultant Anesthesiologist;

= Associate Professor, Chairperson;

° Associate Professor;

† Professor;

‡ Pharmaceutical Sciences, Associate Professor;

\* Anesthetist Specialist;

\*Corresponding author: E-mail: raoirfan1@pumhs.edu.pk;

allergy to local anesthetics, bleeding or coagulation disorders were excluded from this study. Informed written consent for the study was taken from all the patients. The sample size was sixty. Patients' oxygen saturation (SpO<sub>2</sub>), base line heart rate (HR), blood pressure (BP) and respiratory rate (R/R) was monitored and recorded. Ultrasound guided TAP block was performed after induction of general anesthesia (GA) included Post-Operative pain was determined by visual analog scale (VAS).

**Results:** A total of 60 patients were included in this study. Distribution of age 38.33% (n=17) for 26-35 years, gender 30% (n=18) male and 70% (n=42) females, height 5.1-5.6 feet in 51.67% (n=31) were observed while weight ≥50kg was observed in 66.67% (n=40) patients. ASA status 58.33% (n=35) stands in ASA status II-IV. Regarding surgical procedures 28.2% (n=17) underwent LS C-Section, 13.3% (n=8) appendectomy, 8.3% (n=5) Prostatectomy were observed.

**Conclusion:** Our study results showed that Ultrasound-Guided Transversus Abdominis Plane (TAP) Block provided accuracy and reliability and effective postoperative analgesia when used in surgeries of abdominal wall and minimal requirement of additional parental analgesics.

*Keywords: Efficacy; postoperative nausea and vomiting; PONV; granisteron; ondansetron.*

## 1. INTRODUCTION

Lower abdominal surgery is one of most common procedure area particularly, for genitourinary, obstetric/ gynecology procedures in females and prostatectomy in males' appendectomy and inguinal hernia repairs in both genders resulting in moderate to severe post-surgical lower abdominal pain [1,2]. Acute postoperative pain is a common problem encountered in clinical practice [3]. A consensus exists that acute postoperative pain is the major cause of prolonged hospital stay and patient dissatisfaction [4,5]. Transverse abdominis plane (TAP) block is an innovative approach described by Kuppavelumani et al. in 1993 [6]. Currently, ultrasound guidance is gold standard for peripheral nerve block. Generally, a linear probe is sufficient for transverse abdominis plane blocks [7]. Though, a convex probe is preferable for transverse abdominis plane blocks in markedly overweight patients. It is convenient to get ultrasound images; it can be employed in a lot of surgeries involving the anterolateral abdominal wall. The musculature of the lateral abdomen has 3 layers [8,9]. From superficial to deep, they are the external and internal oblique, and transversus abdominis muscles. On its course from medial to lateral, the internal oblique muscle slopes upward and creates a small gap above the iliac crest. It is this sloping edge, above the iliac crest, that defines the medial aspect of the lumbar triangle of Petit. The inferior lumbar triangle, also identified as the Petit triangle [10]. The superior lumbar triangle, also known as the triangle of Grynfeltt-Lesshaft [11]. The aim of this study was to estimate the postoperative analgesic efficacy of ultrasound

guided TAP blocks in various types of lower abdominal surgery.

## 2. MATERIALS AND METHODS

The current study was conducted at Anesthesiology Department, Peoples Medical University Hospital Nawabshah during July 2018 to December 2018 after the approval of ethical review committee (PUMHSW) Nawabshah, Pakistan. Patients undergoing elective lower abdominal surgeries between the age of 18-65 years and American Society of Anesthesiology (ASA) I to IV were included in this study while those patients with infection at the proposed site of injection, allergy to local anesthetics, bleeding or coagulation disorders were excluded from this study. Informed written consent for the study was taken from all the patients.

The sample size was sixty. Patients' oxygen saturation (SpO<sub>2</sub>), base line heart rate (HR), blood pressure (BP) and respiratory rate (R/R) was recorded. Intravenous line was maintained with 18G intravenous cannula and was preloaded with 500ml of hetastarch 6% solution. Patients' ultrasound guided transverses abdominis plane block was performed after induction of GA, with ultrasound system using linear ultrasound transducer (8-12 Hz), 15 minutes before the surgical incision on ipsilateral side. With intermittent aspiration local anesthetic (20ml of 0.25% of bupivacaine) was deposited to see a hypoechoic shadow pushing the two layers apart. Similarly, TAP was performed bilaterally for the procedures with midline incision.

Pain was assessed by VAS. Tramadol 50 mg IV Stat was given if VAS is 6 or above. The

outcome variable was recorded in all patients on proforma by the principal investigator. The data was analyzed by using SPSS software, Version 20.

### 3. RESULTS

In this study sixty subject were included. The distribution of age 10% (n=6) for 18-25 years, 38.33% (n=23) for 26-35 years, 28.33% (n=17) for 36-50 years and 23.33% (n=14) for 51-60 years of age (Fig. 1), gender 30% (n=18) male and 70% (n=42) females(Fig. 2), height 5feet and less in 16.67% (n=10), 5.1-5.6 feet in 51.67% (n=31) and 6 feet and above in 31.67% (n=19) were observed while weight  $\geq 50$ kg was observed in 66.67% (n=40) patients. The overall analyses showed that, in the TAP block group, the six-hour

VAS pain score was reduced by 1.4 (95% CI, -1.9 to -0.8;  $P \leq 0.001$ ), and the 12-hr pain score was reduced by 2 (95% CI, -2.7 to -1.4;  $P \leq 0.001$ ).

ASA status 41.67%(n=25) of patients stands in ASA status I while 58.33% (n=35)stands in ASA status II-IV (Fig. 3). Regarding surgical procedures 28.2% (n=17) underwent LS C-Section, 13.3% (n=8) appendectomy, 8.3% (n=5) Prostectomy, 10% (n=6) Hysterectomy, 13.3% (n=8) cholecystectomy, 5% (n=3) vesicle calculus, 8.3% (n=5) Laparotomy, 3.3% (n=2) Ovarian cyst (Laparotomy), 3.3% (n=2) Left Inguinal Hernia, 1.7% (n=1) Right Inguinal Hernia and 5% (n=3) Myos Repair were observed (Fig. 4).

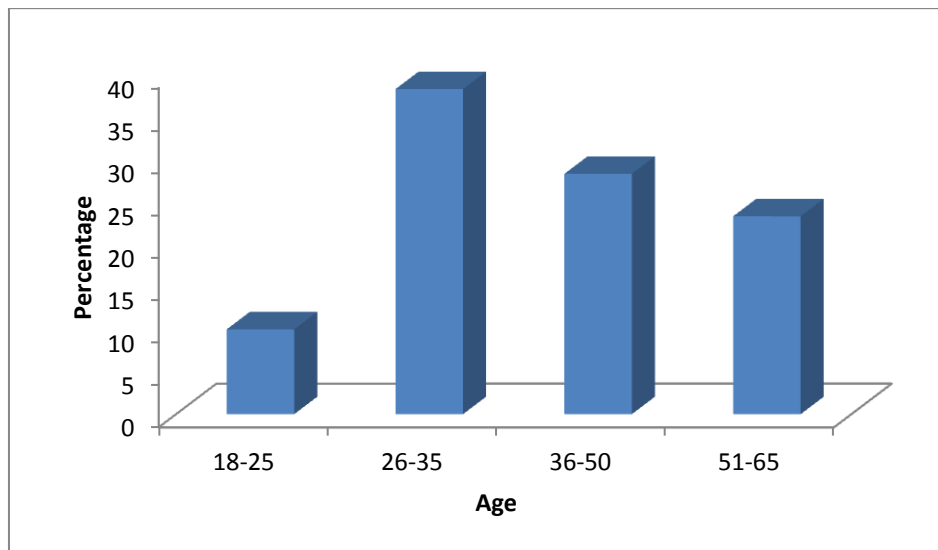


Fig. 1. Age distribution of the patients

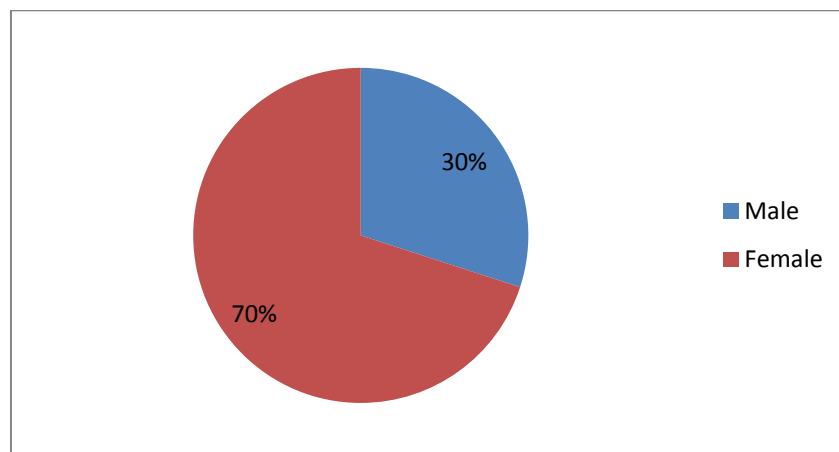
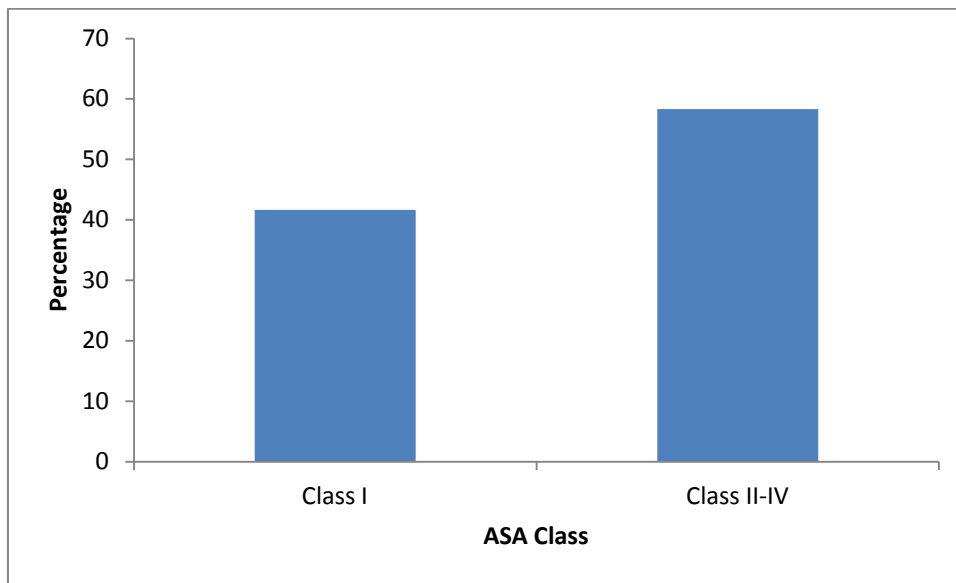
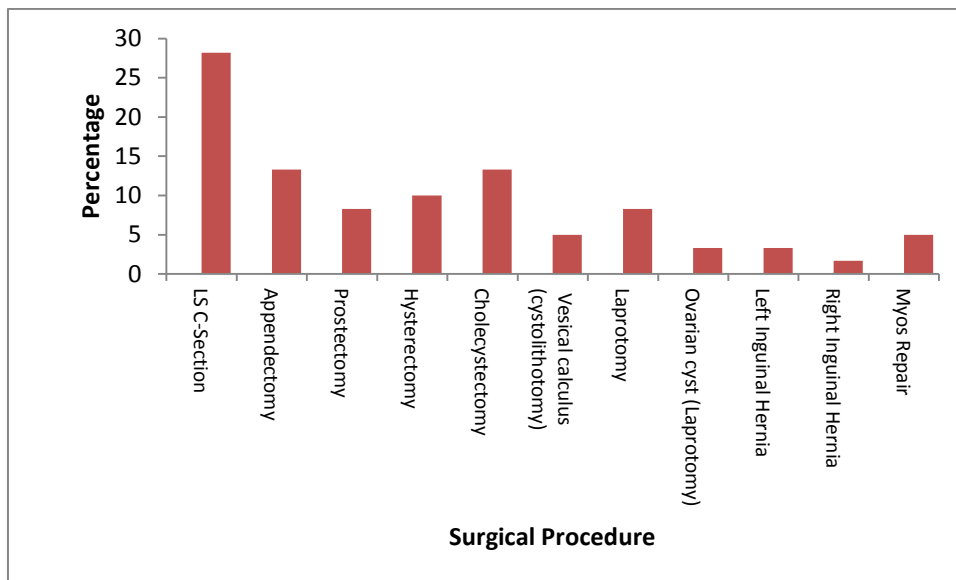


Fig. 2. Gender distribution of the patients



**Fig. 3. ASA status distribution of the patients**



**Fig. 4. Surgical procedure distribution of the patients**

No postoperative pain within 60 minutes was observed in any patient. Our results shows that Ultrasound-Guided TAP block is useful TAP block among lower abdominal surgery patients.

#### 4. DISCUSSION

Total 60 patients were included in this study. Pain scores at six and 12 hr were investigated by various researchers [5,8,12] and this studies, respectively. The overall analyses showed that, in the TAP block group, the six-hour VAS pain score was reduced by 1.4 (95% CI, -1.9 to -0.8;

$P < 0.001$ ), and the 12-hr pain score was reduced by 2 (95% CI, -2.7 to -1.4;  $P < 0.001$ ) [7]. Heterogeneity was high ( $I^2=0.94$ , for both outcomes). A Study [11] investigated the pain score at 24 hr and found a reduction of 1.2 (95% CI, -1.6 to -0.8;  $P < 0.001$ ) in the TAP block group ( $I^2 = 0.93$ ). Consumption of opioids at 24 hr after surgery was investigated in previous studies, with a significant reduction in opioid intake of 14.7 mg (95% CI, -18.4 to -11.0;  $P < 0.001$ ) in the TAP block group [9,11]. Only three studies [8,9,10] addressed the comparison between TAP block and epidural anesthesia, and none of them

showed any significant differences between the two techniques.

Only one RCT [10] investigated eight-hour pain score and 24-hr morphine consumption. Six studies [5] investigated the efficacy of TAP block vs local anesthetic infiltration at the wound site. Compared with local infiltration, TAP block significantly reduced the six-hour VAS pain score [9,10] by 1.4 (95% CI, -2.2 to -0.6;  $P < 0.001$ ); however, this difference was not significant at 12 hr [2,5] and 24 hr 1-3.5. The TAP block significantly reduced 24-hr tramadol consumption by 5.0 mg (95% CI, -9.5 to -0.5;  $P = 0.004$ ) [8].

#### 4. CONCLUSION

Our study results showed that Ultrasound-Guided Transversus Abdominis Plane (TAP) Block provided accuracy and reliability and effective postoperative analgesia when used in surgeries of abdominal wall and minimal requirement of additional parental analgesics.

#### CONSENT

As per international standard or university standard, patients' written consent has been collected and preserved by the author(s).

#### ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

#### COMPETING INTERESTS

Authors have declared that no competing interests exist.

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