

# Comparison of Ultrasound-Guided Transversus Abdominis Plane Block versus Ultrasound-Guided Ilioinguinal/Iliohypogastric Nerve Blocks in Infraumbilical Surgeries

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## Abstract

**Background:** Infraumbilical surgeries are associated with acute or chronic post-operative pain. Ultrasound (USG)-guided regional nerve block provides the best option as they provide better and precise analgesia. The aim of present study is to compare the efficacy of USG-guided ilioinguinal nerve (IIN) and iliohypogastric nerve (IHN) versus transversus abdominis plane (TAP) block for post-operative analgesia in patient undergoing infraumbilical surgeries.

**Study and Design:** A prospective, randomized, and double blinded study was conducted on 60 patients of American Society of Anesthesiologists Grades I and II undergoing lower abdominal surgery at Guru Nanak Dev Hospital attached to Government Medical College, Amritsar.

**Materials and Methods:** Patients were randomly divided into two groups of 30 each. Group T received TAP block with 20 ml 0.25% levobupivacaine and injection fentanyl 1 µg/kg. Group L (IIN/IHN) received IIN/IHN block with 20 ml 0.25% levobupivacaine and injection fentanyl 1 µg/kg.

**Results:** Mean duration of analgesia was prolonged in Group L as compared to Group T ( $P < 0.05$ ). The visual analog scale score was lower in Group L as compared to Group T.

**Conclusion:** USG-guided ilioinguinal block with 0.25% levobupivacaine and injection fentanyl 1 µg/kg was found to be better than USG-guided TAP block.

**Key words:** Levobupivacaine, Fentanyl, TAP Block, VAS Score, Post operative analgesia

## INTRODUCTION

A substantial component of pain experienced in patients after infraumbilical surgeries is derived from the anterior abdominal wall incision.<sup>[1]</sup> Even a relatively small incision may be followed by risk of chronic pain in about 20%

of patients.<sup>[2]</sup> Infraumbilical surgeries are associated with acute or chronic post-operative pain. The most of the pain subsides with healing of tissues and removal of noxious stimulus but sometime it may persists.<sup>[3]</sup> Post-operative pain is associated with many negative outcomes such as fear, anxiety, discomfort, inability to cough and deep breathing, late mobility, with risk of deep vein thrombosis, and pulmonary embolism, thus prolonged hospital stay.<sup>[4]</sup> Post-operative pain relief comes within the realm of anesthesiologists.

Numerous modalities are being used for post-operative pain relief including nonsteroidal anti-inflammatory

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drugs (NSAIDs), opioid, paravertebral blocks, regional blocks,<sup>[5]</sup> epidural analgesics, local infiltration, and opioid remained a gold standard for post-operative analgesia but they are not devoid of side effects such as nausea, vomiting, sedation, respiratory depression, tolerance, addiction, and delayed post-operative recovery.<sup>[6]</sup> Over the time, scenario of post-operative analgesia management changed from pharmacological interventions to regional techniques.

Recent advance in ultrasound (USG) technology and its utilization in regional anesthesia have enabled the practitioner's to perform block under direct visualization with successful outcome. Transversus abdominis plane (TAP) block and ilioinguinal-iliohypogastric nerve blocks are regional anesthetic techniques in which local anesthetics are deposited to block the sensory nerves supplying the anterior abdominal wall.<sup>[7]</sup> Both TAP block and ilioinguinal nerve (IIN)/iliohypogastric nerve (IHN) block the same nerve. However, the only difference is that TAP is a compartment block while IIN/IHN is a truncal block. The present study is designed to compare the efficacy of USG-guided TAP block and USG-guided IIN and IHN block for post-operative analgesia in infraumbilical surgeries.

## MATERIALS AND METHODS

After obtaining clearance from institutional ethical committee, we carried out randomized prospective study in 60 patients of American Society of Anesthesiologists (ASA) Grades I and II in the age group of 18–60 years posted for elective Inguinal hernia surgeries under spinal anesthesia. Patients were randomly divided into two groups of 30 each. Group T received TAP block with 20 ml 0.25% levobupivacaine and injection fentanyl 1 µg/kg. Group L (IIN/IHN) received IIN/IHN block with 20 ml 0.25% levobupivacaine and injection fentanyl 1 µg/kg. Patients were kept NPO 8 h preoperatively after thorough pre-anesthetic checkup and lab investigations.

On arrival of patient in operation theater, routine monitoring (electrocardiogram, pulse oximetry, and non-invasive blood pressure) was done and baseline vitals recorded. 18 G i/v canula was used to preload the patient with crystalloids. With patient in the lateral decubitus position, under all aseptic conditions, L3-L4 or L4-L5 space located and Quincke's needle number 25 or 26 G introduced into subarachnoid space through midline approach. After free flow of cerebrospinal fluid (CSF), 2.5–3 ml of 0.5% bupivacaine injected into CSF. Surgery started under adequate anesthesia. Oxygen started through simple oxygen mask.

After giving the subarachnoid block, the patient will be positioned supine, the skin over the anterior abdominal wall will be disinfected and draped. Blocks were placed under ultrasound guidance for allotted groups. In T groups, drug was injected in between internal oblique and transversus abdominis whereas drugs were given near to IIN and IHN nerves in group L after identifying the structures with linear transducer with frequency of 5–8 MHz. Pulse, blood pressure and oxygen saturation were assessed for 24 hours from the time of administration of block at 0, 2, 4, 6, 8, 12, 24 hour interval. "0" reading was taken when there was two segment regression of pain on the opposite side of block. Pain was assessed by Visual Analog Scale and the duration of postoperative analgesia was recorded in both the groups.

## Statistical Analysis

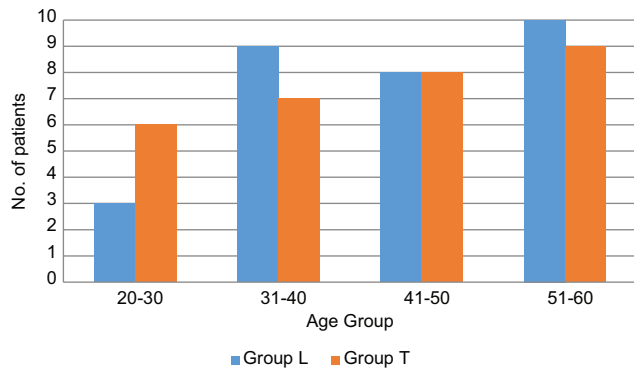
The data from the present study were systematically collected, compiled, and statistically analyzed to draw relevant conclusions. Sample size was calculated in consultation with statistician taking mainly the duration of post-operative analgesia and VAS score and based on the previous studies to get the power of study more than 85%. The continuous data were represented as standard deviation (mean ± SD). Number of patients and percentage of cases expressed discrete categorical data. Categorical variables were analyzed using independent Chi-square test. The *P*-value was calculated finally to evaluate the level of significance. *P* > 0.05 was considered non-significant, *P* = 0.01–0.05 was considered significant, and *P* < 0.001 was highly significant. The results were then analyzed and compared to the previous studies.

## RESULTS

While comparing the distribution of age, sex, and ASA grade between the two groups was statistically non-significant, heart rate, blood pressure, and oxygen saturation were statistically non-significant in both the groups.

The mean duration of analgesia was prolonged in Group L as compared to Group T. It was 10 ± 1.96 h in Group L and 7.40 ± 1.97 h in Group T. The VAS score was significantly lower in group L as compared to group T (*P* < 0.05). The VAS score was assessed at 0 hours which was taken when there was two segment regression of pain on the opposite side of body. VAS score was assessed further at 1, 2, 3, 4, 6, 8, 10, 12, 16, 20, 24 hrs.

Rescue analgesia was given when the VAS score was more than 3, injection diclofenac/m was given in rescue analgesia. In group T first dose of rescue analgesia was given between 5 to 9 hours when the patient started feeling



pain and the VAS score was more than 3. The second dose of rescue analgesia was given between 15 to 19 hours. In group L first dose of rescue analgesia was given between 8 to 12 hours when the patient started feeling pain and the VAS score was more than 3. The second dose of rescue analgesia was given between 18 to 22 hours.

## DISCUSSION

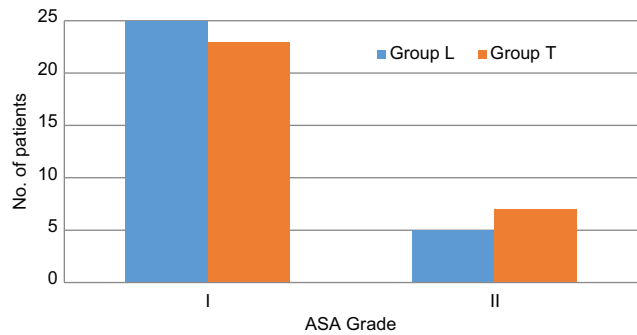
Pain and discomfort are important components which are experienced after abdominal wall incision; the anterolateral abdominal wall is innervated by thoracolumbar nerves T7 to L1 which emerges from the anterior rami of spinal nerves. The anterior abdominal wall incision is responsible for the most of the pain experienced after abdominal surgeries.<sup>[8]</sup> Adequate post-operative analgesia is vital to ensure early mobilization and discharge of patients, as stress response to pain may lead to tachycardia, hypertension, inability to cough, decreased lung compliance, and increased risk of deep vein thrombosis due to immobilization of patient.<sup>[4]</sup> Thus, anesthetic and analgesic techniques should aim to reduce post-operative morbidity to improve outcome. Nowadays, multimodal analgesia techniques are used and among them regional nerve block techniques offer great advantage.

In this study on comparison, duration of post-operative analgesia was prolonged in L group compared with T group and the result is supported by study conducted by Kamal *et al.* 2018.<sup>[9]</sup> In study conducted by Sundaram *et al.*<sup>[10]</sup> in 2019, the mean duration of rescue analgesia was higher in ilioinguinal/iliohypogastric block than transverse abdominis plane block. This can be explained as TAP is a compartment block while ilioinguinal/iliohypogastric (IIH) nerve block is a truncal block.

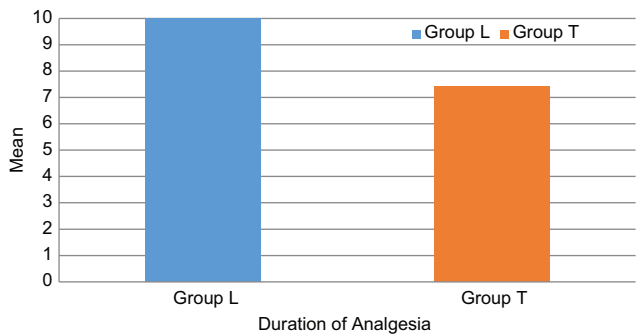
In our study, post-operative VAS score was recorded and was lower in group L at 1, 2, 3, 4, 6, and 8 h. At 0 hours, 1 h no patient require rescue analgesia as it was due to residual effects of spinal anaesthesia. At 2, 3, 4, 5 h the

ASA grade	Group L		Group T	
	No.	% age	No.	% age
I	25	83.33	23	76.67
II	5	16.67	7	23.33
Total	30	100.00	30	100.00

$\chi^2: 0.417, df: 1, P=0.519$ , ASA: American Society of Anesthesiologists



Group	Duration of analgesia	
	Mean	SD
L	10.000	1.9652
T	7.400	1.9757
P-value	0.001	



mean VAS score was non significant between two groups as due to effect of respective blocks. At 6,8,10 hours VAS score was significantly lower in group L than Group T. The prolonged effect of ilioinguinal/iliohypogastric nerve block can be explained as due to anatomical course of IIN/IHN nerve, use of ultrasound for performing blocks and direct perineural deliverance of the drug. Other factor that favoured was easier spread of local anesthetic in the deep inguinal ring and blocking the genital branch of genitofemoral nerve. These findings were consistent with the study conducted by Youfa Zhou in 2019.<sup>[11]</sup> They found that transverse abdominis plane block has significantly higher pain score at 6 and 8 hours post operatively. In 2019 YuluJinYongliangli *et al.*<sup>[12]</sup> conducted a study in which they found that VAS score was significantly lower in ilioinguinal /iliohypogastric block at 24 and 48 hrs after surgery. In our study total dose of rescue analgesia and

number of doses of rescue analgesia were comparable and statistically non significant.

## CONCLUSION

We concluded that ilioinguinal/iliohypogastric nerve block with 0.25% levobupivacaine and injection fentanyl 1 µg/kg leads to prolonged duration of post-operative analgesia as compared to transversus abdominis plane block

## LIMITATION

Limitation of our study was small sample size, only male patients of ASA I and ASA grade 2 was studied. We did not follow our patients beyond 24 hours so difference between two groups regarding incidence and severity of chronic post-surgical pain could not be compared.

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