



**A COMPARATIVE STUDY BETWEEN LATERAL TRANSVERSUS ABDOMINIS PLANE BLOCK VERSUS A DUAL (LATERAL + SUBCOSTAL) TRANSVERSUS ABDOMINIS PLANE BLOCK FOR POST OPERATIVE ANALGESIA IN OPEN NEPHRECTOMY**

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**ABSTRACT**

The Transversus abdominis plane block is one of the different approaches for providing post-operative analgesia in pts posted for nephrectomy. We compared precision USG guided Lateral TAP block with dual i.e, lateral + subcostal TAP block. We assessed the VAS score, nausea and vomiting scores in 24 hrs post-operative period. The VAS score and nausea and vomiting score in post - operative 24 hrs period was less in patients receiving Dual (lateral + subcostal TAP block) than Lateral TAP block. The Dual TAP block (lateral + Subcostal) is more effective than Lateral TAP block as a post-op pain management in patients posted for nephrectomy.

**KEYWORDS :** Transversus Abdominis Plane block, VAS score, Nephrectomy, Post operative analgesia

**INTRODUCTION**

Transversus abdominis plane (TAP) block, was first described by Kuppuelumani et al. in 1993 [1] and formally documented by Rafi in 2001 [2], is used for the management of surgical abdominal pain by injecting local anaesthesia into the plane between the internal oblique and transversus abdominis muscle [2,3]. TAP-block technique has been shown to be a very safe and effective postoperative adjunct analgesia method and is suggested as part of the multimodal anaesthetic approach to enhance recovery after lower abdominal surgeries [4].

The Transversus abdominis plane block is one of the different approaches for providing balanced postoperative analgesia in renal recipients. A multimodal approach with these blocks as one of the units of analgesia reduces the post operative opioid requirements and thus avoiding the potential side effects associated with opioids. Also, the use of ultrasound to correctly identify structures during administration of the transversus abdominis plane block further lessen the risk of complications.



Figure 1

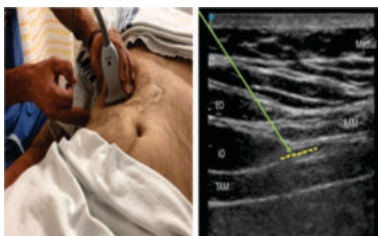


Figure 2

A TAP block, by blocking the lower 6 thoracic and first lumbar nerve as they course through the neuro-fascial plane that exists between the transversus abdominis and internal oblique muscles, provides analgesia for procedures involving the abdominal wall. TAP blocks have been used in a number of lower abdominal surgical procedures, with investigators reporting reductions in pain scores and opioid requirements

[5-7]. Nephrectomy predominantly involves an oblique incision in the right or left lower abdominal wall.



Figure 3

Table 1

Approach	Nerves blocked	Supplied areas
Subcostal	T6-T9 – Anterior cutaneous nerves	Upper abdomen, just below xiphoid and parallel to costal margin
Lateral	T10-T12 – Anterior cutaneous nerves	Anterior abdominal wall at the infraumbilical area, between two midclavicular lines
Posterior	T9-T12 – Anterior and possibly lateral cutaneous nerves	Anterior abdominal wall at the infraumbilical area and possibly lateral abdominal wall
Oblique subcostal	T6-L1 – Anterior cutaneous nerves	Supraumbilical and infraumbilical anterior abdominal wall
Dual TAP	T6-T12 – Anterior and possibly lateral cutaneous nerves	Supraumbilical and infraumbilical anterior abdominal wall

Abbreviations: TAP: transversus abdominis plane; USG, ultrasound guided

The aim while performing the lateral TAP block is to place a large volume of local anaesthetic in the fascial plane between the internal oblique and transversus abdominis which contains the nerves from T10-T12 dermatomes. A combination of lateral TAP block with subcostal TAP block i.e. A dual TAP block provides wider coverage involving the infraumbilical as well as supraumbilical planes since the addition of subcostal TAP block provides adequate coverage between T6-T9 dermatomes and the lateral TAB block covering the T10-T12 dermatomes thus blocking anterior cutaneous nerves. The onset of the sensory block appears to be relatively slow, taking up to 60 min to reach maximal effect, so ideally the block is placed at the start of surgery to give adequate time for the onset of sensory analgesia [6,8].

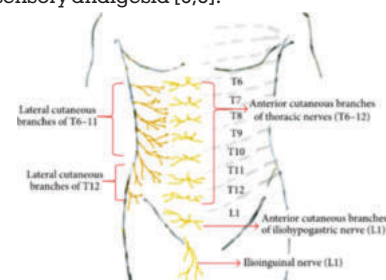


Figure 4

This Comparative study thus compares the efficacy and quality of postoperative analgesia of the Plain lateral TAP block versus a combination of lateral and subcostal TAP block ie Dual TAP block in patients posted for open nephrectomy. We compared VAS score and Post op nausea and vomiting score in first 24 hrs.

**Case Discussion**

Six patients undergoing open nephrectomy were randomly allocated in one of the following groups

Group D received Ultrasound guided dual(lateral + Subcostal) TAP block with 0.375% ropivacaine 40 ml (20ml+20ml)

Group S received Ultrasound guided lateral TAP block with 0.375% ropivacaine 40ml

After an informed consent and a quick review of the pre-anaesthetic condition one day prior to surgery, patient shifted in Operating room.

Once in the operating room intravenous cannula was inserted and intravenous fluid started and application of standard monitoring was done. General anaesthesia was induced in both groups by fentanyl 2mcg/kg and propofol 2mg/kg and atracurium 0.5 mg/kg, tracheal intubation was done using appropriate size of ETT and anaesthesia was maintained using isoflurane and intermittent atracurium (0.1 mg/kg boluses given as per requirement).

USG guided regional anaesthesia procedure (dual TAP block or Plain Lateral TAP block) was performed under aseptic precautions for both groups. A Local anaesthetic drug volume of 40 ml of 0.37% ropivacaine was injected after negative aspiration of blood. The block procedure was performed by a single experienced performer as a single shot procedure. Intravenous fentanyl 0.5mcg/kg every 45 min was given to all patients intraoperatively for intraoperative analgesia.

Intravenous paracetamol 20mg/kg was given for all patients intraoperatively

Tracheal extubation was done and all the patients after extubation were shifted to recovery. Routine monitoring was continued. Both groups received injection Paracetamol 20 mg/kg 8 hourly for post operative analgesia. Post-extubation, pain assessment was carried out at regular intervals in the PACU and post-operative ICU as per pre-structured proforma. Post operatively the VAS score, Vitals and Nausea score was noted at 0 hour, 1 hour, 2 hours, 3 hours, 4 hours, 5 hours, 6 hours, 12 hours, 18 hours and 24 hours.

**VAS Score (1-10)**

Table 2

1	2	3	4	5	6	7	8	9	10
No Pain		Distressing			Intense			Excruciating	

**NAUSEA SCORE**

- 0 - NONE
- 1 - NAUSEA
- 2 - RETCHING
- 3 - VOMITTING

**RESULTS**

The pain score and nausea and vomiting score in post - operative 24 hrs period were significantly lower in patients receiving Dual (lateral + subcostal TAP block) than Lateral TAP block.

**VAS Score**

The Average Post operative VAS score taken at 0 hour, 1 hour, 2 hours, 3 hours, 4 hours, 5 hours, 6 hours, 12 hours, 18 hours and

24 hours in Three patients receiving Plain Lateral TAP block was 4,5 and 4 where as those receiving a dual TAP block had an average post operative VAS score of 2, 1 and 2. The Average Post operative VAS score was much lower in Patient receiving the dual block than those receiving the plain lateral TAP block

The Post operative VAS score at 24 hrs was 2, 3 and 2 out of 10 for patients receiving Lateral TAP Block whereas VAS Score was 1 in all three patients receiving Dual TAP Block (Lateral + Subcostal TAP Block)

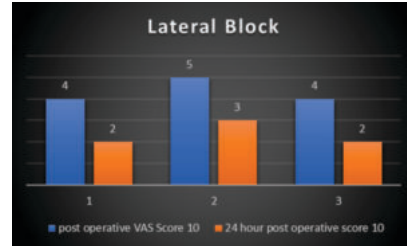


Chart 1

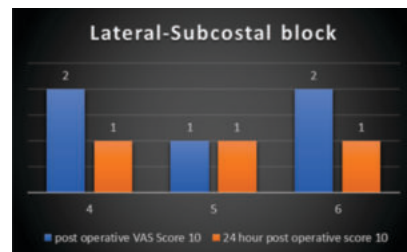


Chart 2

Post operative Nausea and Vomiting Score – 2 patients receiving Lateral TAP Block experienced Nausea and 1 patient experienced vomiting, whereas 1 patient receiving Dual (Lateral + Subcostal) TAP block experienced nausea.

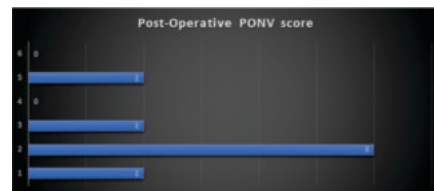


Chart 3

Case 1,2 and 3 – Lateral TAP block  
Case 4,5 and 6- Lateral + Subcostal TAP block

**DISCUSSION**

Ultrasound guided Pre-incision Dual TAP block improved the quality of analgesia in 24 hours post operative period after open nephrectomy as compared to a Plane Lateral TAP block. Also, the post operative nausea was lesser with the pre- incisional dual TAP block, where only 1 patient experienced nausea as compared to a plane lateral TAP block where 1 patient experienced vomiting and 2 patients experienced nausea in post operative period.

A study conducted in 2014 by Khaled M.A. Abdelsalam et al compared a Lateral TAP block with 0.5 % bupivacaine 30 ml verses lateral TAP block with 0.9% normal saline in kidney transplantation patients and concluded that ultrasound guided pre-incisional TAP block confers analgesic benefit when added to multimodal analgesia (PCA morphine and Paracetamol infusion) after kidney transplant.[9]

A study conducted in 2016 by Sakatoshi Yoshiyama et al did a retrospective study comparing a posterior TAP block and Lateral TAP block for laparoscopic gynaecologic surgeries

and concluded that posterior TAP block provides more effective analgesia than the lateral TAP block. In consideration to this study, we added up a subcostal TAP block to a lateral TAP block and compared it with a plain Lateral TAP block and since a dual block has wider coverage of dermatomes, it provided better analgesia in our patients[10]

A study conducted in 2020 by Ibrahim Hakki Tor et al investigated a combination of the subcostal TAP block and rectus sheath block versus wound infiltration on opioid consumption and pain scores in laparoscopic cholecystectomy and concluded that the combination of sub costal TAP block and rectus sheath block decreased opioid consumption and opioid use related side effects like pruritis, nausea, sedation and also decreased pain scores as compared to local infiltration.[11]

A study conducted in 2020 by Ashok Jadon et al compared quadratus lumborum block with TAP block for post operative analgesia after caesarean section and concluded that quadratus lumborum block provides longer duration of pain relief and reduces the use of supplemental analgesia as compared to TAP block. However lateral approach of TAP block is used here and in our study addition of subcostal TAP block to lateral TAP block provided wider dermatomal coverage and hence better analgesia. [12]

A study conducted in 2021 by Khaled Abdel-Baky Abdelrahman et al compared USG guided Transversus abdominis plane block versus USG guided paravertebral block for post operative pain following open renal surgeries in a randomised clinical trial over a period of 1 year and concluded that TAP block and PVB block were comparable in controlling pain in patients undergoing renal surgeries but the PVB was more potent in reducing VAS scores and total analgesic requirements however the time to first analgesic request was non-significant between the two. However, this being a clinical trial, the approach of TAP block was not standardised.[13]

A study conducted in 2019 by Xue Li et al studies the efficacy of ultrasound guided lateral TAP block in retroperitoneoscopic renal surgery. They compared TAP block with 0.4% ropivacaine 30 ml versus 0.9 % normal saline and concluded that lateral TAP block did not decrease intra and post operative opioid consumption nor did it provide analgesia in post operative 24 hours after surgery. However, in our study we added subcostal TAP block to Lateral TAP block to improve the dermatomal coverage and hence provided better analgesia post operative.[14]

With respect to our comparison between the dual TAP block (lateral plus subcostal) and Plain Lateral TAP block as a tool for post operative analgesia for renal recipients, we went through review articles (2012,2017,2019) describing the various approaches of TAP block and their anatomic coverage and decided to compare the stated two which were the best possible approaches to cover the incision pain and with less complications [15,16,17]

A study conducted in 2014 by Sussan Soltani Mohammadi<sup>1</sup>, Arman Dabir, Gita Shoeibi compared TAP block with bupivacaine and epinephrine or placebo (saline) for renal recipients. They concluded that the TAP block effectively reduced post operative pain, intraoperative fentanyl consumption and PCA morphine consumption during first 24 hours after renal transplantation in renal recipients. [18]

In a study conducted in 2009 by Jankovic et al., continuous TAP block was used in seven kidney recipient patients; postoperative pain and morphine patient controlled analgesia (PCA) consumption was reduced compared with 35 previously audited patients receiving morphine PCA only.

They found that TAP block reduced mean IV morphine requirements by more than 80% [19].

According to a meta-analysis conducted in 2009 by Siddiqui et al. on the clinical effectiveness of transversus abdominis plane block, they concluded that TAP block reduces the need for postoperative opioid use, provided more effective pain relief, and reduced opioid-associated side effects which correlates with our study however we furtherer dissected on to which approach or rather combination of approach of TAP block was better for our subjects [20].

Complications of TAP block include block failure, intravascular injection, or injection into the peritoneal cavity, with associated risks of damage to bowel and other abdominal viscera. Since ultrasound-guided TAP blocks can accurately visualize the needle, TAP plane, and the injectate, these complications were reduced [2,6].

## CONCLUSION

The Dual TAP block (lateral + Subcostal) is more effective than Lateral TAP block as a post-op pain management in patients posted for open nephrectomy. Also, the chances of post operative Nausea and vomiting was lower in patients receiving Dual TAP block as compared to those receiving Plain Lateral TAP block.

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