

# Evaluation of Efficacy of Transversus Abdominis Plane Block and Systemic Analgesia for Post-Operative Pain in Total Abdominal Hysterectomy: A Comparative Study

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## Abstract

**Introduction:** Management of post-operative Pain is gaining considerable attention with pain being recognized as the fifth vital sign. Post-operative pain management remains unresolved as pain is individualized and varies with surgery. The aim is to evaluate the analgesic efficacy of transversus abdominis plane block by continuous catheter technique and systemic analgesia for post-operative pain in total abdominal hysterectomy. **Subjects and Methods:** This randomized controlled trial was done in patients undergoing total abdominal hysterectomy via Pfannenstiel incision. Patients were assigned into 2 groups, systemic analgesics group (n=25) and TAP block group (n=25) randomly. **Results:** Out of 50 patients, 25 patients had systemic analgesics and 25 patients had TAP block. Demographics and surgical procedure times were comparable. Mean VAS pain score with coughing on day 1 and 2 in systemic analgesics group was 3.96 and 2.07 and in TAP block group were 0.7 and 0.3. Meantime taken to mobilize the patient after the surgery in the systemic analgesics group was 30.7 hours and in TAP block group was 22.4 hour. 18 patients needed rescue medication in the systemic analgesics group, and 9 patients required rescue medication in the TAP block group. In group 16 patients with systemic analgesics had post-operative nausea and vomiting, and 5 patients in group block TAP. **Conclusion:** Continuous TAP block provides better pain relief, denoted by lower visual analogue scores and better recovery profile enhancing recovery in patients undergoing abdominal hysterectomy.

**Keywords:** Post-operative Pain, Transversus abdominis plane block, Abdominal hysterectomy.

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## Introduction

Effective pain relief provides a smoother post-operative course with earlier discharge from hospital, but it may also reduce the onset of chronic pain syndromes.<sup>[1]</sup> Pain management is progressing with more selective targeting, thereby minimizing side effects, enhancing mobility, earlier discharge and avoiding late complications as in low backache and neuropathic pain. Factors influencing post-operative pain management technique are the site of surgery, familiarity with different methods of analgesia and the availability of resources to monitor in the post-operative period.<sup>[1]</sup>

Abdominal hysterectomy is a commonly performed surgery for indications like dysfunctional uterine bleeding, Fibroids and Cervical intra epithelial neoplasia. Acute blood loss compounds the cardiovascular strain posed by the coexisting

chronic anaemia and the co-morbidities already present. Post-operative pain management with early ambulation is essential.

Systemic opioids and an epidural infusion in high risk cases have been the modalities of post operative pain management in hysterectomies. However, extensive use of opioids is associated with a variety of side effects, such as ventilatory depression, drowsiness and sedation, post-operative nausea and vomiting (PONV), pruritus, urinary retention, ileus and constipation that can delay hospital discharge.<sup>[2]</sup> Intra- and post-operative usage of high doses of bolus or constant infusions of strong opioid analgesics can significantly enhance post-operative pain as a result of their rapid withdrawal and acute tolerance build.<sup>[3]</sup>

Blocking the afferent neural supply by local anesthetics seems to offer more advantages. Among these Transversus

abdominis plane block and Local infiltration are preferred over epidural. Nerve blocks have, reduced incidence of hypotension, urinary retention, nausea, vomiting, backache and complications such as epidural hematoma epidural abscess and paraparesis,<sup>[4]</sup> all of which are seen with epidural.<sup>[5,6]</sup>

While local penetration in the early post-operative cycle reduces the magnitude of incisional pain, many patients do feel severe pain as the local anesthetic effect wears off and wound infection remains a possibility. Continuous injection or occasional boluses of the surgical wound (or peripheral nerve) with local anesthetic solutions is introduced as a way to expand the incisional pain relief caused by local anesthetics into the post-operative period.<sup>[7,8]</sup> Transversus abdominis plane block is being used for post-operative pain in appendectomy,<sup>[9]</sup> hysterectomy,<sup>[10]</sup> laparoscopic surgeries,<sup>[11]</sup> retropubic prostatectomy and caesarean section.<sup>[12,13]</sup> however, there are not many studies evaluating the analgesic effectiveness of transverse abdominal block by continuous catheter procedure and systemic analgesia.

### Aim

To evaluate the efficacy of transversus abdominis plane block by continuous infusion and systemic analgesia for post-operative pain management in patients undergoing abdominal hysterectomy.

## Subjects and Methods

This RCT was conducted in Apollo hospital, Chennai. Sample size was taken based on a study done by Carney et al,<sup>[10]</sup> and after a pilot study. Patients were assigned into 2 groups, study group who received TAP block group (n=25), and control group which received the usual systemic analgesia as per the institution protocol. Randomization was done using sealed envelope technique. Inclusion criteria include ASA physical status 1 or 2, age group between 25 to 65 years, elective total abdominal hysterectomy through Pfannenstiel incision. Exclusion criteria includes patient refusal, history of adverse reaction to local anesthetics, ASA status III, IV and V, chronic preoperative opioid consumption, psychiatric disorders. Written informed consent was obtained from all participants.

Demographic details such as age, height, weight, surgery duration as well as clinical variables such as rest pain, dynamic pain, sedation, ambulation of patients, post-operative nausea and vomiting, systolic and diastolic blood pressure, heart rate and respiratory rate were collected. All the patients had standardized anesthetic management. They were premedicated with Tablet Alprazolam 0.5 mg per orally the night before surgery at 10pm. All the baseline values were recorded. Anesthesia was induced with INJ. Propofol 2 mg/kg, Fentanyl 1.5 µg/kg and endotracheal intubation was facilitated with

Atracurium 0.5mg/kg i.v, anesthesia was maintained with 66% nitrous oxide, 33% oxygen and Desflurane 3%. All the patients were ventilated in volume control mode (Aestiva 5, Datex Ohmeda) to achieve target EtCO<sub>2</sub> of 30–35mmHg.

After the completion of surgical procedure in TAP group ultrasound-guided Transversus abdominis plane block was done. Residual neuromuscular blockade was reversed using Neostigmine 0.05 mg/kg and Glycopyrrolate 0.01mg/kg in both the groups. Tracheal extubation was accomplished when the patient was hemodynamically stable, responsive and cooperative. Recovery from anesthesia was identical for all patients and the patients were shifted to the Post Anaesthesia Care Unit (PACU) for post-operative management. Patients in Group A received a bilateral Transversus abdominis block using ultrasound guidance. They were given 20 ml of 0.25% bupivacaine as a bolus followed by 0.12% continuous infusion with 0.12% bupivacaine at 8-10 ml/hr was infused bilaterally with infusion pumps. In systemic analgesics group, patients were given intravenous tramadol 1.5mg/kg 8<sup>th</sup> hourly and intravenous paracetamol 1 gram 8<sup>th</sup> hourly.

In PACU, when a patient developed Pain of Visual Analogue Scale (VAS) ≥ 4, in a 10-point scale (where 0, none; 10, very severe) intramuscular Diclofenac 75 mg was administered in both the groups. The total dosage was kept within the toxic limit. Data was tabulated and was analysed statistically

## Results

Out of 50 patients, 25 patients had systemic analgesics and 25 patients had TAP block. Mean age in systemic analgesic group was 42.04 years whereas in TAP block group was 44.28 years, mean weight in TAP block group was 64.64 kgs, mean weight systemic analgesic group was 63.04 kgs, the mean height in TAP block group was 158.32 cms, the mean height in the systemic analgesic group was 159.58 cms.

The mean surgery duration in systemic analgesics group was 74 min with the shortest time being 45 min and the longest time being 150 min. In the TAP block group, the mean duration was 75.2 min with the shortest time being 50 min and the longest time being 120 min. (p=0.576).

Patients in TAP block group reported significantly less pain at rest throughout the post-operative period. (p<0.001) at all-time intervals for 48 hours postoperatively.

Systemic analgesics and TAP group had a significant difference in mean pain during coughing (p<0.001)

Out of 50 patients, 25 patients had systemic analgesics and 25 patients had TAP block. Mean VAS pain score on day 1 and 2 in systemic analgesics group was 3.96 and 2.07 and in TAP block group is 0.7 and 0.3. From 0 hour, in the immediate post-operative period. In 0 hour the sedation score was higher in

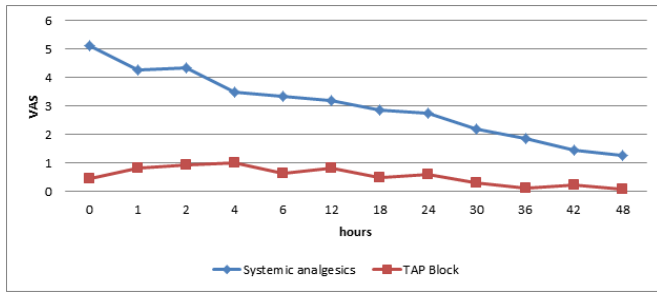


Figure 1: Comparison of Pain at Rest.

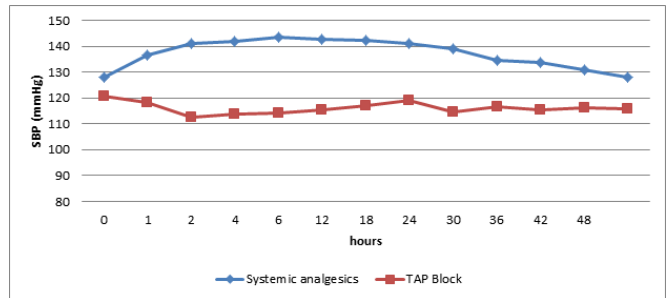


Figure 4: Comparison of Systolic blood pressures.

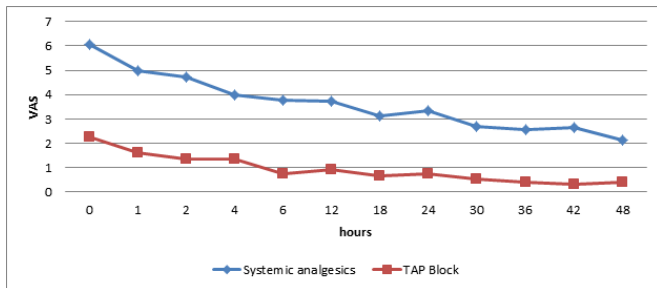


Figure 2: Comparison of pain on coughing.(Dynamic Pain)

Both group participants were equal to each other in preoperative systolic and diastolic blood pressures.

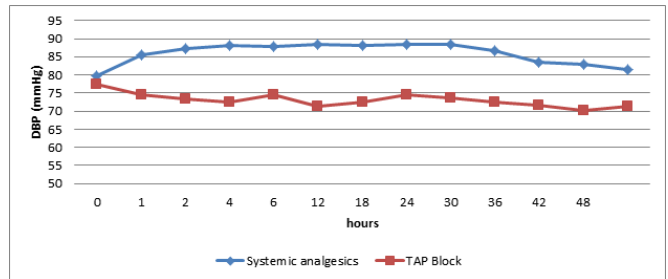


Figure 5: Comparison of Diastolic Blood Pressures.

both the groups but more in systemic analgesics group with a significant p-value.

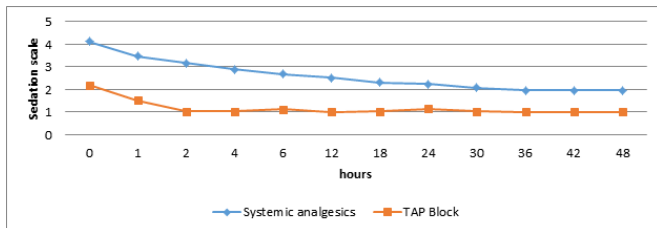


Figure 3: Distribution of Sedation scale

The Heart rate was comparable in both groups during the preoperative period and the immediate post-operative period.

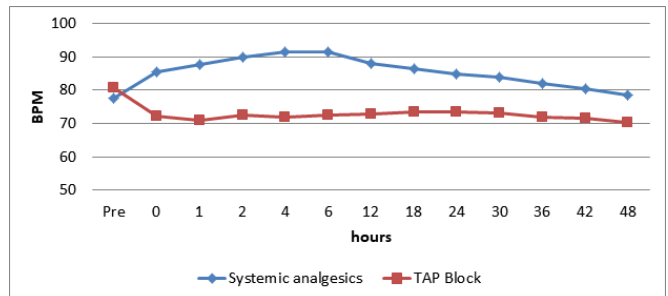


Figure 6: Comparison of Heart Rate

The mean time taken to mobilize the patient after the surgery in the TAP block group was 22.4 hours, whereas it was 30.7 hours in the systemic analgesics group. ( $p < 0.0001$ )

Rescue analgesic requirement was comparatively less in the TAP group. Out of 25 patients only 9 required rescue medication while it was 18 in systemic analgesics group. Moreover the mean of total tramadol consumption is about 800mg in systemic analgesics group while it was 99mg in TAP group that showed a significant difference ( $p < 0.0001$ ). In systemic analgesics group 16 patients had post-operative nausea and vomiting and 5 patients in TAP block group ( $p = 0.002$ ).

Respiratory rate was high in TAP group during preoperative period giving a statistically significant difference with systemic analgesics group while during the rest of the period, it is higher in systemic analgesic group.

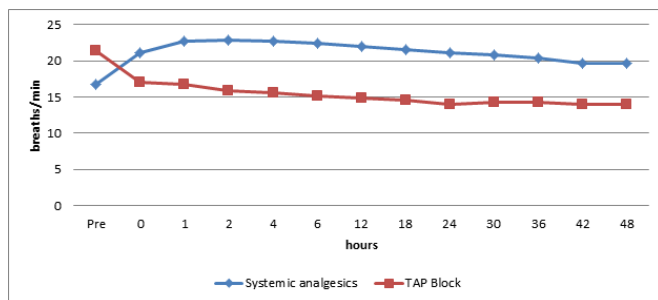


Figure 7: Comparison of Respiratory rate

## Discussion

Multimodal or "balanced" analgesic techniques involving the use of smaller doses of opioid in combination with non-opioid analgesic drugs, such as local anesthetics, acetaminophen and non-steroidal anti-inflammatory drugs (NSAIDs), are becoming increasingly popular in the prevention of post-operative pain.<sup>[2]</sup>

Pain after abdominal surgeries has two components. One is the somatosensory component that arises from the surgical wound of abdominal wall and the second is the visceroperitoneal component that results from the viscera and the peritoneum. The main component of pain in elective surgeries is the one from abdominal wall incision which can be blocked by blocking the somatosensory nerves.

Transversus abdominis plane block, which blocks the nerves as it crosses the inner oblique and the transverse abdominis, was first identified as landmark based technique through the triangle of petit by Rafi in 2001.<sup>[14]</sup> Subsequently the ultrasound-based technique was described by Hebbard has been used in providing post-operative analgesia as a part of multi modal analgesia.<sup>[15]</sup> Mcdonnell et al showed a 47% decrease in opioid consumption after abdominal hysterectomy and Jumna et al showed a 60% reduction of morphine in caesarean delivery.<sup>[16,17]</sup> Both the studies had incorporated TAP before the surgery and under spinal.

In our study, we had used a dose of 0.25% Bupivacaine as a bolus followed by 0.12% continuous infusion by a catheter. This would provide continuous pain relief even with movement as seen by the VAS with cough impulse. There was 50% reduction in rescue analgesic requirement, incidence of nausea, vomiting. Mobilization was earlier by 8 hrs.

So the main advantages of continuous TAP block are improved patient comfort, with decreased side effects like nausea, vomiting, sedation or respiratory depression and can be extended for 48 hrs. When compared to epidural block there is absence of sympathetic or motor deficit hence early mobilization, decreased need for catheterizations and can

also be used in situations where neuraxial techniques are contraindicated. TAP blocks involves no risk to the spinal cord, and so can be used in people with spinal cord deformities. In conclusion, TAP block is a simple and effective analgesic technique, where parietal pain plays a main role in post-operative pain. Coming on to the complications of TAP block, literatures have revealed needle trauma, intraneural injection, neural ischemia, inadvertent intravascular injection, local anesthetic toxicity, infection, failed block which are common to all regional techniques. The use of ultrasound-guided TAP block is increasing because of reduced complications. The limitations are using a catheter bilaterally, which is quite cumbersome. But the VAS score throughout the study group remained less on comparison with the systemic analgesia group.

## Conclusion

From this study, we conclude that analgesic efficacy of transverses abdominis plane block in Total abdominal hysterectomy is superior, and has fewer side effect profile than systemic analgesia. This plays a major role in early mobilization and recovery.

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