



Postoperative analgesic effectiveness and opioid sparing effect of ultrasound guided transverse abdominis plane block in total abdominal hysterectomy under general anesthesia

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ABSTRACT

Background: Ultrasound guided transvers abdominis plane (TAP) block is a recent modality of managing postoperative pain in lower abdominal surgeries. **Aims and Objective:** This study was carried out to evaluate postoperative analgesic effectiveness and opioid sparing effect of ultrasound guided transverse abdominis plane block in total abdominal hysterectomy. **Materials and Methods:** One hundred patients of age group 25 to 65 years enrolled for total abdominal hysterectomy under general anesthesia were studied in the postoperative period at Lal Ded Hospital, Government Medical College, Srinagar over a period of 18 months. Patients who received injection Ropivacaine by ultrasound guided TAP were kept in Group A and others who received only conventional analgesia were kept in Group B. Postoperative pain scores were assessed by VAS score at 1,2,3,4,5,6,12,18 and 24 hours. Time of first rescue analgesia, total opioid consumption and postoperative adverse events were also observed. **Results:** Postoperative VAS pain scores were significantly reduced at all time intervals in TAP block group (Group A) when compared with conventional analgesia group (Group B). Mean time for first rescue analgesia was 377 min in Group A as compared to 169 minutes Group B and the difference was statistically significant ($p < 0.05$). The mean opioid consumption in Group A was 104 ± 4.38 mg and in Group B it was 324 ± 26.15 mg and the difference between the two was statistically significant ($p < 0.05$). Postoperative adverse events were insignificant. **Conclusion:** Ultrasound guided TAP block provides effective postoperative analgesia and reduces opioid consumption in abdominal hysterectomy patients under general anesthesia.

Key words: Total abdominal hysterectomy; Total abdominis plane block; VAS score

INTRODUCTION

Total abdominal hysterectomy (TAH) is a major surgical procedure after which significant postoperative pain and discomfort can be anticipated.¹ A multipronged postoperative pain management regimen providing superior grade analgesia with negligible adverse effects is required by these patients. The abdominal wall incision is the main cause of pain and

discomfort experienced by the patients undergoing abdominal surgeries.² So blocking the sensory innervations to the abdominal wall is promising mode of providing postoperative analgesia after abdominal wall incision.³ However, the clinical utility of current approaches to the blockade of these nerve afferents such as abdominal field blocks is limited, and the degree of block achieved can be unpredictable. Rafi (2001) first introduced the transversus abdominis plane (TAP) block

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⁴ and described it as block delivering local anesthetic agents in the TAP using the iliac crest as anatomical landmarks by identifying the lumbar triangle of Petit. In 2007 Hebbard et al., introduced the first USG guided approach for TAP block for precisely identifying the facial plane.⁵ Recent published clinical trials have demonstrated reassuring results with this technique in patients undergoing major abdominal procedures as part of a multimodal postoperative pain management.⁶ Besides total abdominal hysterectomy, TAP block has been used for various other abdominal procedures such as large bowel resection, laparoscopic cholecystectomy, open/laparoscopic appendectomy, open prostatectomy, abdominoplasty with or without flank liposuction, inguinal hernia and iliac crest bone graft.⁷

The aim of the study was to evaluate the postoperative analgesic effectiveness and opioid sparing effect of USG guided transversus abdominis plane block after total abdominal hysterectomy.

MATERIALS AND METHODS

This analytical cross-sectional study was conducted in the department of Anesthesiology and Critical Care at Lal-Ded Hospital Srinagar which is one of the associated hospitals of Government Medical College, Srinagar. After approval by the hospital Ethical Committee, 100 patients with uterine fibroids and endometrial hyperplasia scheduled for elective total abdominal hysterectomy (TAH) were included in the study for a period of two years. Information regarding the TAP block protocol, postoperative analgesia, and the Visual Analogue Scale (VAS) were provided to the enrolled patients, and informed consent was obtained. Patients who were the American Society of Anesthesiologists (ASA) class I–II, aged 25–65 years, and with a body mass index (BMI) less than 35 kg/m² were included. Patients with mental retardation, coagulation disorders, patient's disapproval, local anaesthetic and opioid allergy, morbid obesity (BMI \geq 35), and infection of the abdominal wall and skin, or abnormality at the needle insertion site were excluded from the study. Patients were allocated into two groups: Group A and Group B. Patients in Group A received injection tramadol 1.5mg/kg intravenously and Ropivacaine by ultrasound guided TAP block and patients in Group B received only conventional analgesia that is injection tramadol 1.5mg/kg intravenously. Each group had 50 patients.

After induction of anesthesia, patients in both groups were administered injection tramadol at dose of 1.5 mg per kg body weight intravenously. USG-guided bilateral TAP block was performed in the Group A, TAP-block group, at the end of surgery before extubation. The local anaesthetic drug 20 ml of 0.2% Ropivacaine (max dose 150 mg) was

slowly injected in TAP under real-time ultrasound imaging (visualising the spread of the drug). The same process was repeated on the opposite side. In Group B patients received only conventional analgesia. Intraoperatively injection paracetamol 1gm was given to all patients.

Patient's vital parameters like heart rate, blood pressure, oxygen saturation were noted on induction of anaesthesia and during surgery in all. Once the procedure, total abdominal hysterectomy, was over, patient was extubated and then shifted to recovery unit for observation. In recovery unit, Inj. Tramadol 1.5 mg/kg i.m. was used as first rescue analgesia either on demand or when the VAS score was \geq 3. If the patient asks for second/subsequent rescue dose between 3 and 6 hours, inj. Tramadol 0.75 mg/kg i.m. was given. If the patient asks for second rescue dose within 3 hours Inj. Tramadol was withheld to allow for the peak action of first dose. If the patient asks for rescue dose after 6 hours Inj. Tramadol 1.5 mg/kg i.m. was repeated. Postoperative adverse events such as nausea and vomiting were noted. Rescue antiemetic were given to any patient complaining of nausea and vomiting. The following parameters were recorded on prepared proforma in recovery ward at 1, 2, 3, 4, 5, 6, 12, 18 and 24 hr: Postoperatively heart rate, systolic arterial pressure, diastolic arterial pressure, time to first rescue analgesic request {once VAS Score was more or equal to 3} and total dose of opioid consumed in 24 hrs. The pain intensity was assessed by using Visual Analogue Scale. (0: (no pain), 1-3: (mild-pain), 4-6: (moderate-pain), 7- 10 (severe pain).

Adverse events related to tramadol such as nausea, vomiting, itching and those related to USG guided TAP block such as haematoma formation, local anaesthetic toxicity, peritonitis etc. were watched for.

STATISTICAL ANALYSIS

Outcome variables were measured via mean, standard deviation (SD) and percentages. Data were entered in Microsoft excel 2016 spread sheet. Analysis was done by appropriate statistical software package using two sample Student's t-test and Chi-square test, the results were considered statistically significant when "p" value was \leq 0.05.

RESULTS

In our study we have evaluated the analgesic effectiveness and opioid sparing effect of USG guided transversus abdominis plane block in patients undergoing TAH for postoperative pain relief. The observations and results were analysed, using two sample student's t-test and chi-square test, the results were considered statistically significant when "p" value was \leq 0.05.

Both the groups were comparable in terms of age, weight and surgery time and the differences was found to be statistically insignificant (p value > 0.05) as shown in Table 1.

Postoperative VAS pain scores were significantly reduced in Group A in all the time intervals except 1hr when compared to conventional analgesia group that is Group B as shown in Table 2.

As shown in Table 3 the mean time for first request of rescue analgesic was 377 minutes in TAP block group, Group A, when compared with 169 minutes in Group B, the difference of 208 minutes was statistically very significant. Likewise total Tramadol consumption was less in Group A (104 ± 4.38 mg) than in Group B (324 ± 26.15 mg), the mean difference of 220mg with $p < 0.05$ was statistically significant as shown in Table 3.

The incidence of postoperative nausea vomiting (PONV) in our study was significantly reduced in Group A compared to Group B who did not receive TAP block which correlated well with reduced consumption of total tramadol dose in postoperative period in group A as shown in Table 4

DISCUSSION

Pain after total abdominal hysterectomy is often severe. Effective analgesia has shown to reduce postoperative stress response and accelerate recovery, allow early ambulation, and prevention of postoperative morbidity from total abdominal hysterectomy. It is well recognized that local anesthetic techniques can improve the quality of postoperative recovery by reducing pain and analgesic requirements. Bilateral USG-guided TAP block has been demonstrated to provide excellent analgesia to the skin and musculature of the anterior abdominal wall in patients undergoing TAH.

We conducted an analytical cross-sectional study to evaluate the postoperative analgesic effectiveness and opioid sparing effect of USG-guided TAP-block after abdominal surgery. TAH under general anesthesia provides an excellent opportunity to perform USG-guided TAP block. In our study we used 20 ml of 0.2% Ropivacaine on each side for TAP block for TAH which is comparable to Carney J et al.,⁸ who used bilateral USG guided TAP block for TAH with 1.5 mg/kg of Ropivacaine (to a maximal dose of 150 mg). We selected Tramadol for rescue analgesia as several studies have confirmed the analgesic effects of single-dose intramuscular Tramadol 50-100mg can provide effective postoperative analgesia comparable to that obtained with morphine, pentazocine and ketorolac. All patients in TAP block group breathe deeply, coughed freely, moved without limitation and showed good satisfaction as compared to Conventional Analgesia group.

Table 1: Demography and patients characteristic

| Parameter | Group A (n=50) | Group B (n=50) | P value |
|------------------------|-----------------|-----------------|---------|
| Age (years) | 45.7 \pm 3.16 | 46.5 \pm 3.53 | >0.05 |
| Weight (kg) | 55.8 \pm 3.74 | 56.9 \pm 3.90 | >0.05 |
| Surgery time (minutes) | 87.3 \pm 4.44 | 87.8 \pm 4.34 | >0.05 |

Values are expressed as mean \pm standard deviation

Table 2: Mean VAS- pain score

| Time | VAS score | | P value |
|------|-----------------|-----------------|---------|
| | Group A (n=50) | Group B (n=50) | |
| 1hr | 0 | 1.28 \pm 1.10 | >0.05 |
| 2hr | 0 | 5.20 \pm 0.52 | <0.05 |
| 3hr | 0 | 3.64 \pm 0.38 | <0.05 |
| 4hr | 0 | 4.92 \pm 0.20 | <0.05 |
| 5hr | 1.52 \pm 0.93 | 5.04 \pm 0.47 | <0.05 |
| 6hr | 1.92 \pm 0.91 | 4.8 \pm 0.35 | <0.05 |
| 12 | 2.24 \pm 0.62 | 4.68 \pm 0.54 | <0.05 |
| 18hr | 2.20 \pm 0.62 | 4.48 \pm 0.51 | <0.05 |
| 24hr | 2.00 | 4.00 \pm 0.64 | <0.05 |

Values are expressed as mean \pm standard deviation.

Table 3: Postoperative Analgesic requirement

| | Group A (n=50) | Group B (n=50) | P value |
|---|-----------------|-----------------|---------|
| Time for first demand of analgesic (minutes after recovery) | 377 \pm 20.94 | 169 \pm 8.96 | <0.05 |
| Total tramadol requirement (in mg) | 104 \pm 4.38 | 324 \pm 26.15 | <0.05 |

Values are expressed as mean \pm standard deviation.

Table 4: Incidence of PONV Adverse events

| | Group A (N=50) | Group B (N=50) | P value |
|------|----------------|----------------|---------|
| PONV | 10 (20) | 15 (30) | <0.05 |

Values are expressed as number of patients (proportion of patients).

Our study results demonstrated that end operative USG-guided TAP block reduced VAS score significantly in the study group (Group A) at all the intervals except 1hr when compared to conventional analgesia group (Group B). It is well correlated with the findings of Carney J et al.,⁸ which explains the extension of pain relief by USG-guided TAP block up to and beyond 24 hours. The reason for prolonged duration of analgesic effect after TAP blockade may be due to the relatively poor vascularization and slowed drug clearance from transversus abdominis plane. Similar decreased VAS Scores were observed by Mc Donnell et al. G. Niraj et al.^{9,10}

In our study the mean time for first request of rescue analgesic was 377 minutes in TAP block group (Group A), when compared with 169 minutes in the other group,

Group B, the difference of 208 minutes was statistically very significant. Total Tramadol consumption was less in group A than in group B, the mean difference of 220mg was statistically significant. Thus, TAP block as a component of multimodal analgesia decreased the total tramadol consumption and delayed the time for first demand of rescue analgesic by nearly two and a half times.

Carney J et al.,⁸ demonstrated that bilateral TAP for hysterectomy reduced morphine consumption to half compared to patient group receiving conventional analgesia alone. McDonnell JG et al.,⁹ demonstrated that the TAP block reduced overall postoperative morphine requirements by more than 50 % in the first 48 postoperative hours and a longer time to first morphine request.

We observed in our study that TAP Block also reduced the incidence of PONV. Many clinical studies (McDonnell JG et al.)⁹ also observed similarly reduced PONV incidence

Complications like peritoneal and visceral punctures related to TAP block were not encountered in our study. However, Niraj G¹⁰ in 2008 reported a case of Liver Trauma with a blunt regional anaesthesia needle while performing Transversus Abdominis Plane Block.

CONCLUSION

Ultrasound guided transverses abdominis plane block as a component of multimodal analgesia provides effective postoperative analgesia in the first 24 hours after TAH. As a component of multimodal analgesic regimen USG-guided TAP block significantly reduced opioid consumption and postoperative nausea, vomiting. USG-guided TAP block was easy to perform, and provided reliable and effective analgesia in this study, and no complications due to the USG-guided TAP block were detected.

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Author's contributions:

MSM- Concept and design of the study, prepared first draft of manuscript, statistically analysed and interpreted; **SA**- interpreted the results, reviewed the literature and manuscript preparation; **AT**- concept, coordination, review of literature and manuscript preparation; **RAB**- collection of data, preparation and revision of manuscript.

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