ORIGINAL ARTICLE

COMPARISION OF ANALGESIC EFFICACY OF TAP BLOCK WITH PARENTRAL OPIOID FOLLOWING TOTAL ABDOMINAL HYSTERECTOMY

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ABSTRACT: OBJECTIVE: Our study aims to evaluate the efficacy of ultrasound guided TAB in postoperative pain relief in a cohort of patients undergoing total abdominal hysterectomy by comparing it with patients who do not receive TAB. The primary end point studied was total 24 hour morphine consumption. The secondary objectives measured were postoperative heart rate, systolic & diastolic blood pressure, respiratory rate, postoperative pain score, nausea, vomiting and sedation score.
KEYWORDS: Transverse Abdominis Plane Block, Abdominal Hysterectomy, Ultrasound guided.

STUDY DESIGN: Forty patients of ASA I aged 30 to 60 years scheduled for total abdominal hysterectomy surgery in Amala Institute of Medical Sciences, Kerala, India were included in this prospective cohort study. Study duration was for 15 months. First 20 consecutive patients satisfying the inclusion criteria and who received ultrasound guided transverses abdominis block with 15 ml of 0.25% bupivacaine on each side was designated as TAB group. The first 20 patients satisfying inclusion criteria and who did not receive TAB were designated as Non-TAB group. The relevant data of each patient were recorded and the results were statistically analyzed.

RESULTS: Patients who received transverses abdominis block with bupivacaine had significantly reduced 24 h morphine requirements in milligrams (TAB group 6.75±2.45, Non-TAB group 12.00±2.51, p value<0.01). The mean time (in hours) to first request for morphine was significantly longer in patients who received transverses abdominis block (TAB group 5.8±2.97, Non-TAB group 1.93±1.17, p value<0.01). There was significant difference in the pain scores at the end of first postoperative hour, with patients without TAB complained of significant pain at rest, cough and movement. At all other time intervals in the first 24hrs the pain scores were higher in the non- TAB group but not significantly different. But pain requiring rescue analgesic (>3) was significantly higher in non-TAB group.

CONCLUSIONS: In conclusion we found that ultrasound guided transverses abdominis block provided substantial reduction in morphine consumption when compared with control group. TAB also reduced significantly the time to first dose of rescue morphine. The technique is found to be safe and effective. The study reinforces the recommendation for TAB as a part of multimodal post-operative analgesic regimen.

INTRODUCTION: Abdominal hysterectomies are among the most frequently performed major abdominal surgical procedures in females of perimenopausal age.[1] Postoperative pain requiring bed rest and persistent gastrointestinal dysfunction are key factors keeping the patients in hospital. An important component of the pain experienced by patients after abdominal surgery comes from the abdominal wall incision. Different analgesic modalities have been described for treatment of pain after abdominal surgeries. However, clinical utility of these approaches is limited as the degree of analgesia is unpredictable.

The abdominal wall sensory afferents course through the transverses abdominis plane superficial to the transverses abdominis muscle. Recent studies demonstrated that transverses abdominis block provides effective analgesia and reduces postoperative morphine consumption in patients undergoing major abdominal surgeries, caesarean section and abdominal hysterectomy[2]

Our study aims to evaluate the efficacy of ultrasound guided TAB in postoperative pain relief in a cohort of patients undergoing TAH by comparing it with patients who do not receive TAB. The primary end point studied was total 24 hour morphine consumption.

METHODS: Following approval of the institutional ethics committee, 40 ASA I female patients of ages between 30 to 60 years scheduled for abdominal hysterectomies via Pfannenesteil abdominal wall incision under spinal anaesthesia were included in this prospective cohort study. Study period was for 15 months in Amala Institute of Medical Sciences.

Patients with known allergy to any of the study medications, receiving medical therapies producing tolerance to opioids, with coagulopathy, psychiatric problems were excluded. Study protocol was explained to the patients and written informed consent was obtained from all the participants during pre-anesthetic evaluation. The first 20 consecutive patients satisfying the inclusion criteria and who received the TAB formed the TAB group. The first 20 consecutive patients satisfying the inclusion criteria and not received the TAB formed the non-TAB group.

All patients received a standard spinal anesthesia with 0.5% bupivacaine, (heavy) in the lateral position. No prophylactic antiemetics were given.

The transverses abdominis block was performed with ultrasound guidance at the end of surgery by anaesthesiologist who had experience in ultrasound guided nerve blocks for more than 5 years.

Under aseptic precautions bilateral transverses abdominis block was given with ultrasound guidance using the Venue 40 GE healthcare® ultrasound machine. The USG probe was positioned on the abdominal wall in the mid-axillary line between the iliac crest and the costal margin and carefully moved posterolaterally for optimal identification of the transverse abdominis fascial plane. A 23G spinal needle was inserted anterior and in line with the probe and followed visually into this plane and local anesthetic, 0.25%Bupivacaine -15ml on either side(dose not exceeding 2mg/kg) was infiltrated., after which the patients were shifted to recovery room for further monitoring post procedure.

Postoperative pain was assessed at rest, movement and cough using 10cm visual analogue scale (0=no pain and 10=worst imaginable pain). Hemodynamic variables were assessed and recorded at the time of arrival of the patient in the recovery room and then at ½, 1, 2, 4, 6, 12 and 24 hours after completion of surgery.

The morphine consumption, level of sedation, pain scores, presence and severity of side effects (nausea or vomiting) were assessed in the recovery room at 2, 4, 6, 12 and 24 hours. Time to first request for morphine and total morphine consumption during 24 hrs were also noted.

The level of sedation, assessed by using 4-point sedation scale (awake and alert = 0; quietly awake =1; asleep but easily aroused = 2; deep sleep=3). The incidence and severity of nausea was assessed by 4-point categorical scale (0-None, 1- Mild, 2-Moderate 3-severe).Rescue antiemetic dose and timing was also noted.

STATISTICAL ANALYSIS: Results were reported as the arithmetic mean +/- the standard deviation and scores as median with interquartile range. Pearson correlation coefficients were used to determine the presence of linear relationships and analysis of variance (ANOVA) used for statistical comparisons. Multiple comparisons were done using Dunnett T-test. Mann Whitney test was used to compare between different groups. A p value of ≤0.05 was considered significant. Analysis was done using SPSS software.

RESULTS: Forty patients of ASA I aged 30 to 60 years scheduled for total abdominal hysterectomy surgery were included in the study. First 20 consecutive patients satisfying the inclusion criteria and has received ultrasound guided transverses abdominis block with 15 ml of 0.25% bupivacaine on each side was designated as TAB group. The first 20 patients satisfying inclusion criteria and have not received TAB were designated as Non TAB group. Patient base line characteristics remain same for both groups.

	TAB Group (n=20)	**Non TAB (n=20)**	**p-value**
Age (year) (mean±SD)	47.8±7.01	46.25±9.51	0.587
Weight (kg) (mean±SD)	59.10±5.08	57.60±7.21	0.452
Height (cm) (mean±SD)	155.00±3.16	156.00±2.68	0.154
Duration of Surgery (hrs) (mean±SD)	2.00±0.44	2.03±0.34	0.842

TABLE 1: PATIENT BASELINE CHARACTERISTICS

Heart rate, systolic blood pressure, diastolic blood pressure, respiratory rate, pain score (at rest, on movement, on cough) and sedation score were recorded at 0, ½, 1, 2, 4, 6, 12 and 24 hour postoperatively. No significant difference in heart rate, systolic blood pressure, diastolic blood pressure and respiratory rate was observed between the groups and within the groups. However within the first two hours those who had received TAP block had significantly lower respiratory rate but still within the physiological range.

Pain was assessed by visual analogue scale (No pain=0; worst imaginable pain=10) at rest, on movement and on cough at time interval of 0, ½, 1, 2, 4, 6, 12 and 24 hrs postoperatively.

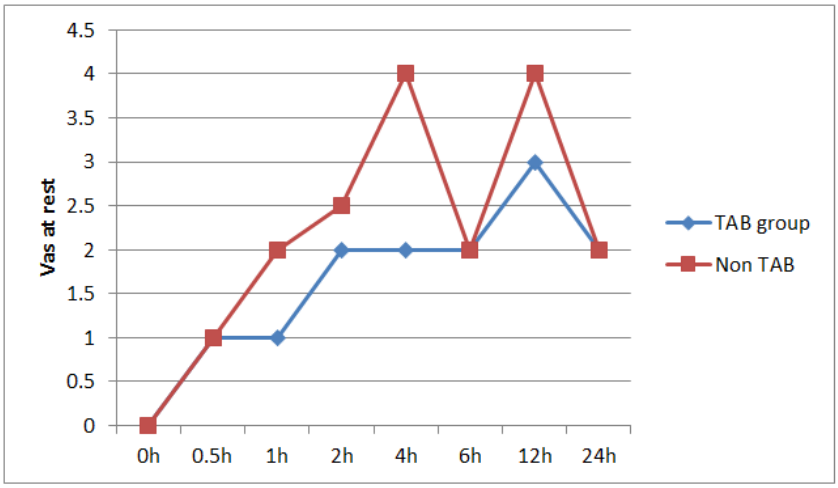

Fig. 1: Median VAS scores at rest at different time intervals between the groups

The scores were expressed as median (50th percentile) with the 25th and 75th percentile forming the points for interquartile range (IQR). There was significant difference in the pain scores at the end of first postoperative hour between the two groups. Patients who did not receive TAB complained of significant pain at rest, cough and movement. The difference in pain on movement in the initial half an hour was also significantly higher in those who did not receive TAB. At all other time intervals in the first 24hrs the pain scores were higher in the non-TAB group but not significantly different. But pain requiring rescue analgesic (>3) was significantly higher in non-TAB group.

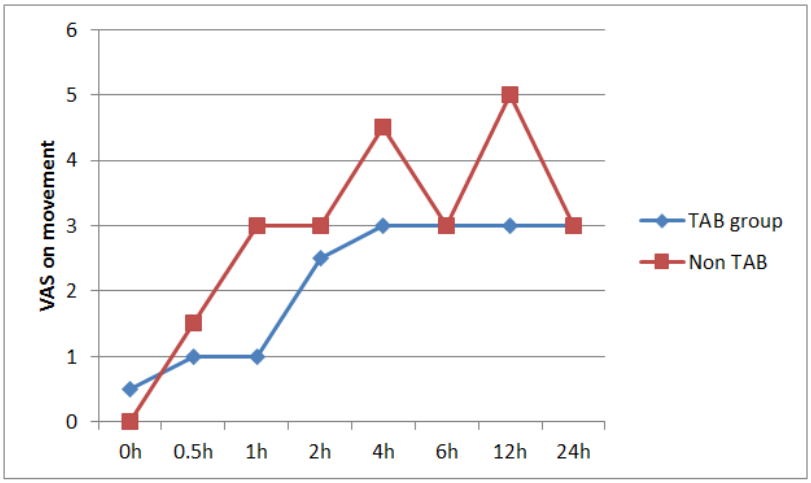

Fig. 2:Median VAS scores on movement different time intervals between the groups

All patients received injection morphine 5 mg i.m. (0.1mg/kg) as rescue analgesia, whenever pain scores were recorded >3. Patients who received transverses abdominis block had significantly reduced 24h morphine requirements. (TABLE II). The mean time to first request for morphine was significantly longer in patients who received transverses abdominis block. (TABLE III). Sixty five percent patients in TAB group received only 5mg morphine in 24hrs and none required more than 10mg while all patients in non-TAB group had to be given 10mg or more morphine as rescue analgesic.

Time (Hrs)	TAB Group (Mean ± SD)	Non TAB (Mean ± SD)	p-value
0-24	6.75±2.45	12.00±2.51	0.001

TABLE 2: TOTAL POSTOPERATIVE MORPHINE CONSUMPTION in mg

	TAB Group (Mean ± SD)	Non TAB (Mean ± SD)	p-value
Time(Hrs)	5.8±2.97	1.93±1.17	0.001

TABLE 3: TIME TO FIRST REQUEST FOR MORPHINE (rescue analgesia)

In patients who received TAP block sedation scores were reduced at 2nd hour postoperatively, but not at other time points assessed. Incidence of postoperative nausea vomiting was compared between TAP and non-TAP group. (TABLE IV).The difference was not statistically significant.

	TAP Group n (%)	Non TAP n (%)
Nausea (grade 2 or more)	10(50)	16(80)
Vomiting	2(1)	9(45)

TABLE 4: Postoperative nausea and vomiting

DISCUSSION: In this study we assessed the analgesic efficacy of ultrasound guided transverses abdominis block in a cohort of patients aged 30 to 60 years and ASA I undergoing total abdominal hysterectomy. Patients who received transverses abdominis block with bupivacaine had significantly reduced 24 h morphine requirements. The mean time to first request for morphine was significantly longer in patients who received transverses abdominis block.

A multimodal approach to postoperative analgesia after total abdominal hysterectomy is required, because of the need to block nociceptive transmission from both the abdominal wall incision and from abdominal visceral sites.[2] Other benefits of effective regional analgesic techniques include reduced pain intensity, decrease incidence of side effects from analgesics, and improved patient comfort.

While a lower thoracic or lumbar epidural technique constitute the gold standard for postoperative analgesia, it is not always possible to provide neuraxial analgesia, due to logistic

issues and/or the presence of medical contraindications like coagulopathy. Opioids, such as morphine, can result in significant adverse effects, including sedation, nausea, and vomiting. One promising approach is to block nociceptive transmission from the surgical incision. However, strategies to block the incisional component of the pain have met with relatively limited success. In a qualitative systematic review, Moiniche et al.[3] found little evidence to support the use of instillation of local anesthetics into the wound incision Alternative approaches, which reduce the requirement for strong opioids postoperatively, are required.

The transverses abdominis block is a new regional anesthesia technique that provides analgesia after abdominal surgery by blocking the sensory supply of the anterior abdominal wall. This technique involves injection of local anaesthetic through the lumbar triangle into the transverses abdominis plane between the transverses abdominis and the internal oblique muscle. In this way, the injection targets the nerves of the antero-lateral abdominal wall and blocks the entire sensory supply of anterior abdominal wall. However, the technique is blind and reported complication includes inadvertent intraperitoneal injection[4] and visceral damage.[5]

However, recent reviews conclude that ultrasound guidance reduces the block time and the number of attempts, and decreases the block onset time.[6, 7] Another advantage of using an ultrasound-guided technique is that accidental puncture of the internal gastro-intestinal organs reported with the TAP block may be avoided

The results and observations of previous studies are comparable and consistent with our results with respect to total 24 hour morphine consumption.[8, 9] In the present study, TAB with 0.25% bupivacaine effectively reduced 24 hr. morphine consumption. The overall postoperative pain scores were not significantly reduced at rest, on movement and on cough but pain requiring morphine (>3) was significantly lower in patients receiving transverses abdominis block as compared to control group.

A limitation of our study was that we did not assess the pain score and morphine consumption after 24 hr. in this study. However, the TAP block has been demonstrated to produce clinically useful levels of analgesia for at least 48 h postoperatively.[10]The reasons for the prolonged duration of analgesic effect after transverses abdominis block may be related to the fact that the transverses abdominis plane is relatively poorly vascularised, and therefore drug clearance may be slowed.[1]

In our study the incidence and severity of postoperative nausea and vomiting was definitely less in TAB group, but the difference was not statistically significant as in other studies. The overall incidence of nausea and vomiting per se in our study was high. This is comparable with the study done by McDonnell et al[8] in which the incidence of postoperative nausea and vomiting was high (31% and 69% in block group and control group respectively). Prophylactic use of antiemetics was avoided in our study. Although, blood levels of bupivacaine were not measured in our study, no patient in the bupivacaine group revealed sign or symptoms of bupivacaine toxicity.

The TAB was easy to perform in all patients, and no complication due to TAB was detected. This technique is safe as the block has been given with ultrasound guidance. We observed that with ultrasound the transverses abdominis plane could be easily visualized and the

local anesthetic spread confirmed in TAP.[11] However block was performed by 2 different anaesthesiologists and some degree of technical variability could have occurred.

In conclusion we found that ultrasound guided transverses abdominis block provided substantial reduction in morphine consumption when compared with control group. TAB also reduced significantly the time to first dose of rescue morphine. The technique is found to be safe and effective. The study reinforces the recommendation for TAB as a part of multimodal post-operative analgesic regimen.

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