

Effect of Transversus Abdominis Plane Block Using 0.25% Ropivacaine on Post-Operative Analgesia in Patients Undergoing Open Prostatectomy- A Randomised Controlled Study

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Abstract: Postoperative pain in patient undergoing open prostatectomy is quite uncomfortable for the patient. All the techniques for multimodal analgesia has some or the other side effects. Transversus abdominis plane (TAP) block is newer, effective and comparatively simpler to perform and provides better and denser pain relief than pharmacological agents. This randomized control study was conducted on 60 male patients of ASA grade 1 and 2 undergoing open prostatectomy after taking ethics committee approval. In group R (n = 30), 0.25% Ropivacaine hydrochloride (20ml) and in group S (n=30), 20 ml of normal saline was given through TAP block after completion of surgery. Time of first rescue analgesia and total dose of analgesic consumption for 24 hour postoperatively along with pain visual analogue scale (VAS) were measured and compared along with other vitals like heart rate, SBP, DBP and MAP. Postoperative TAP block using ropivacaine just after completion of surgery results in better analgesia in post-operative period in patients undergoing open prostatectomy. Time of rescue analgesia in group R was 158.5±42.08 and in group S was 68.6±98.8. Also total analgesic consumption and VAS score in postoperative period was significantly low in ropivacaine group when compared with the saline or control group (p<0.05). TAP block using ropivacaine 0.25% in open prostatectomy patients provide better analgesia in postoperative period and reduces amount of total analgesic consumption and thus the side effects associated with the later.

Keywords: Analgesia, Normal saline, open prostatectomy, Ropivacaine, TAP block.

INTRODUCTION

“Pain as an unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage [1]”. Most painful of all the steps of any surgical procedure is skin incision and its pain persists hours or days after surgery.

Untreated pain results in various complications like discomfort, hypertension, tachycardia, myocardial ischemia, angina, inability to cough, reduced mobility, increased chances of peripheral venous thromboembolism, increased morbidity and post-surgical stay of the patient concerned[2].

So many methods like opioids, gabapentin, ketamine, nonsteroidal anti-inflammatory drugs, alpha-2 agonists, and paracetamol or regional procedures like epidural catheterization, local anaesthetic infiltration in the incision are used traditionally for post-operative pain relief [3]. Ilioinguinal nerve block and hypogastric nerve block are kind of direct nerve blocks for the purpose of pain relief in lower abdominal surgeries.

Transversus abdominis plane (TAP) block is newer, effective and comparatively simpler to perform. It along with ilioinguinal nerve and hypogastric block, also blocks the lower intercostal (T7 – T11) thus provides better and denser pain relief [4]. In TAP block, nerves of anterior and lateral abdominal wall are desensitized by injecting long acting local anesthetic solution between internal oblique and transverses abdominis muscle via lumbar triangle of Petit which is formed posteriorly by the latissimus dorsi muscle and anteriorly by the external oblique and iliac crest forms its base. Thus it is very useful for patients inguinal hernia repair, abdominoplasty, caesarean section, prostatectomy and colorectal surgery [5, 6].

Ropivacaine is a long acting amide type local anaesthetic with chemical properties similar to that of bupivacaine but it is less toxic than bupivacaine. This study is aimed to assess the effects of transversus abdominis plane block using Ropivacaine for post-operative analgesia patients undergoing open prostatectomy under subarachnoid block.

MATERIALS AND METHODS

The present study was carried out after obtaining approval from the ethical committee. The present study was done on 60 male patients of ASA grade I & II of age group 35-70 years scheduled for elective inguinal hernia surgeries.

Exclusion Criteria

- BMI <18 or >35kg/m²
- Preoperative opioid or nonsteroidal anti-inflammatory drug treatment for chronic pain
- Chronic hepatic, renal failure, cardiac and neurological disease.
- Known allergy to local anaesthetic.
- Alcohol /drug abuse.

Group R (n = 30)	0.25% Ropivacaine hydrochloride (20ml)
Group S (n = 30)	20 ml of normal saline

PREPARATION OF THE PATIENT

Preoperative assessment

A thorough preoperative evaluation was done including history, general physical examination, systemic examination, airway and spine. Counseling was done and informed consent was taken.

Pre-medication

Pre-operative fasting of 8 hours, intradermal sensitivity test was performed and inj. Glycopyrolate 0.01 mg/kg IV 30 minutes before the induction of anaesthesia. Upon arrival of the patient in the operation room, intravenous access with 18G cannula established and 500 mL of crystalloid infusion started. All the baseline vital parameters like heart rate, SBP, DBP, MAP, ECG and SPO₂ were monitored.

Under all aseptic precautions, cleaning, painting, draping is done in sitting position and Sub-arachnoid block is induced with 25 gauge spinal needles in L₃ – L₄ intervertebral space. After confirmation of free flow of cerebrospinal fluid, 3.0ml of 0.5% Bupivacaine (heavy) is injected intrathecally, patient was made supine and effect was checked up to desired level of T₁₀ for prostate surgery. All the vital parameters like heart rate, SBP, DBP, MAP, ECG and SPO₂ were monitored.

After accomplishment of the procedure, under all aseptic precautions cleaning and painting was done. Nerve stimulator with insulated needle at 1miliampere current is used. Firstly, needle is advanced through triangle of Petit at right angles to the skin in coronal plane until resistance was encountered. Further advancement of the needle results in first pop-up feel indicating lying of needle plane between external and internal oblique fascial layers. Further traversing

- Infection at the injection site.

Consent

Details of procedure were explained to all the patients during preanaesthetic assessment and an informed and written consent was obtained.

PATIENTS' GROUPING

60 male patients of ASA grade I & II scheduled for open prostatectomy under spinal anaesthesia were divided into 2 groups (n=30 each) randomly using envelope technique depending upon the drug given through TAP block after completion of surgery as below:

resulted in a second “pop” indicative of entry into transversus abdominis plane. Twitching of external oblique muscle was appreciated externally as confirmation of the space and current was reduced down to 0.3-0.4 miliampere and then 20ml of 0.25% Ropivacaine or saline was injected after aspiration according to the study group.

Readings of vital parameters i.e. heart rate, SBP, DBP, MAP and ECG were recorded before induction of sub-arachnoid block as baseline and then at induction 0, 5, 10, 30, 60 min. and at 120 min intervals intraoperatively and then post-operatively recorded at 0 min, 1, 4, 16, 20 and 24 hours after surgery. Time of first rescue analgesia and total dose of analgesic consumption for 24 hour postoperatively along with pain visual analogue scale (VAS) were also measured and compared. Adverse effects such as hypotension, bradycardia, nausea, vomiting, headache, dizziness, constipation and cardiovascular instability were also recorded.

The observations were recorded and subjected to statistical analysis using student's “t” test and for qualitative variables chi square test was used. The observations recorded in both the groups were tabulated and statistical analysis was carried out by using SPSS version 17 statistical software. For intergroup comparison, p > 0.05 and p < 0.05 were considered as insignificant & significant respectively. p < 0.01 was considered as highly significant.

RESULTS

Data obtained from the patients involved in study were analyzed. The mean age, weight, sex, type of surgery and duration of anaesthesia were comparable in the two study groups as shown in table 1.

Table-1: Showing demographic variables in two groups

Demographic data	Group R	Group C
Age	58.06±11.63	56.20±10.57
Weight	57.36±13.15	55.53±8.25
Sex (male)	100%	100%
Duration of surgery	56.23 ± 7.47	58.4 ± 9.23

Preoperative heart rate, systolic, diastolic and mean blood pressure level were comparable in all the three groups. Intraoperatively, vitals like heart rate,

SBP, DBP and MAP were measured at various time intervals with insignificant statistical difference in value ($p > 0.05$).

Table-2: Mean (±SD) time for first rescue analgesia in two groups

Variable	Group R (n=30)	Group C (n=30)
	Mean± SD	Mean± SD
Time for first Rescue Analgesia (mins)	158.5±42.08	68.6±98.8

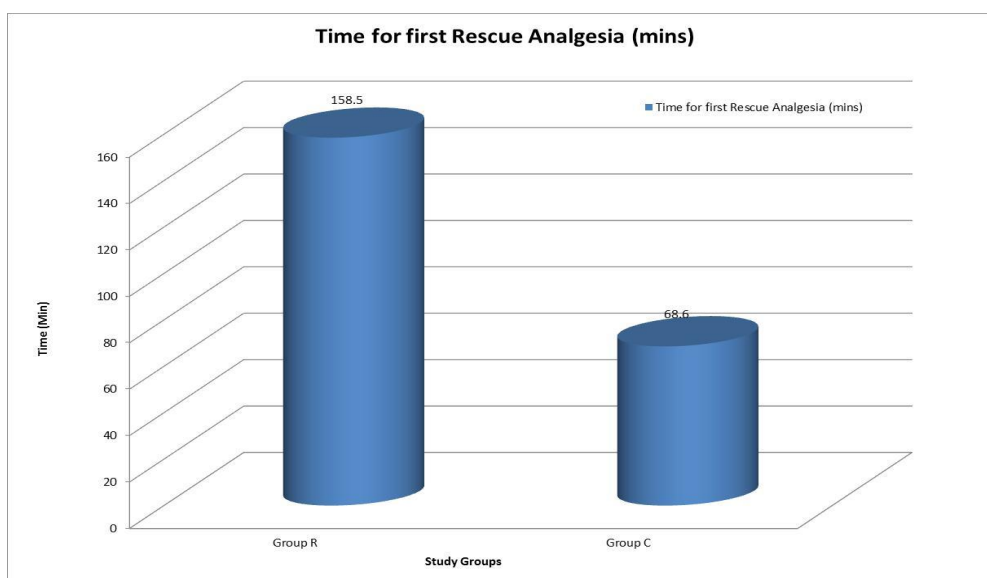


Table-3: Total analgesic (tramadol) consumption in 24 hr (mg) and vas score mean (±sd) in two groups

Variable	Group R (n=30)	Group C (n=30)
	Mean± SD	Mean± SD
Total analgesic Dose (mg)	309.5±20.57	400.6±47.38
VAS score	5.60±0.16	6.80±0.39

DISCUSSION

Unrelieved pain after surgery can interfere with sleep and physical functioning and can negatively affect a patient's well-being on multiple levels [7]. Inadequate pain control may result in increased morbidity or mortality [8]. Pharmacological agents like opioids, ketamine, nonsteroidal anti-inflammatory drugs, alpha-2 agonists, and paracetamol or regional procedures like epidural catheterization are usual methods of post-operative pain relief [3]. Despite this overwhelming rationale for effective postoperative pain control, clinically the results are not satisfactory [9]. TAP block is a regional nerve block used to provide analgesia to anterior and lateral abdominal wall which involve injection of long acting local anaesthetic through lumbar triangle of petit into the plane between

the transversus abdominis and internal oblique muscle to block the thoracolumbar intercostal nerves [10].

Ropivacaine is a local anaesthetic that is structurally related to Bupivacaine. Bupivacaine is a racemate while Ropivacaine is a pure S (-) enantiomer developed for reducing potential toxicity and improving relative sensory and motor block profiles. Thus the safety index of Ropivacaine is higher than bupivacaine.

Selected groups were comparable for the demographic variables like age and weight parameters, type and duration of surgery and sex with $P > 0.05$. Heart rate, SBP, DBP and MAP were comparable in both the study groups throughout the perioperative period.

Nanze Y *et al.* [11] found no significant change in HR, SBP, DBP and MAP perioperatively in three study groups at various time interval ($p > 0.05$).

Bhattacharjee S *et al.* [12] in their study with TAP block in patients undergoing total abdominal hysterectomy found no significant changes in HR, SBP, DBP and MAP in study groups postoperatively.

Kabariety R E *et al.* [13] & Venkatraman R *et al.* [14] observed that no significant change in HR, SBP, DBP and MAP post-operatively among all the three groups they took in their study at various time intervals ($p > 0.05$).

The time for first rescue analgesia in group R was significantly more as compared to group C ($p < 0.05$) thus, Ropivacaine hydrochloride (0.25%) seems to provide longer duration of analgesia as compared to the control group.

Saxena A *et al.* [15] concluded that patient given saline made their first request for analgesics significantly sooner than the levobupivacaine group ($p < 0.05$).

Cansiz K H *et al.* [16] concluded that time for first rescue analgesic dose was earlier in control group as compare to Levobupivacaine group ($p < 0.05$). Thus the above studies did earlier show result in favour of our study.

Also, total analgesic consumption at 24 hours between two groups was significantly less in group L as compared to control group ($p < 0.05$).

Papagiaunopoulou P *et al.* [17] showed lesser consumption of analgesics in Levobupivacaine group and Ropivacaine group ($p < 0.01$) in comparison of control ($p < 0.001$) group.

Peterson P L *et al.* [18] Sinha *et al.* [19] & Mankikar M G *et al.* [20] concluded with less VAS score in drug group when compared to the control group thus, all shows result in accordance with our study.

CONCLUSION

This study was carried out to study effect of transversus abdominis plane block using Ropivacaine to provide post-operative analgesia in patients undergoing open prostectomy.

We conclude that TAP block using 0.25% Ropivacaine when given at the end of open prostectomy, results in less analgesia requirement in 24 hours, prolongation of time of first rescue analgesia and reduced VAS score in Ropivacaine group thus shows better post-operative analgesia when compared to the control group.

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