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A Comparative Study of 0.2% Ropivacaine vs 0.25% Bupivacaine in Transverse Abdominus Plane Block for Post Operative Analgesia in Patients Undergoing Abdominal Surgery

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Abstract

Introduction: Several modalities have been used to alleviate pain after laparoscopic abdominal surgeries – like nonsteroidal anti-inflammatory drugs (NSAIDs), opioids (both intravenous and patient controlled analgesia, infiltration of local anaesthetic, thoracic epidural block and multimodal analgesia. Apart from providing post operative pain relief, regional anaesthetic techniques improve patient recovery by preventing the neuroendocrine responses to surgery and reducing the postoperative opioid requirements. *Aim:* To compare the efficacy of 0.2% ropivacaine and 0.25% bupivacaine when used in USG guided Transversus abdominus plane block for post operative analgesia in abdominal surgeries. *Material and Methods:* 50 patients scheduled for elective lower abdominal surgeries. The patients were randomly divided into two groups of 25 each- Group B receiving 0.25% bupivacaine, group R receiving 0.2% ropivacaine. Conducted in Department of Anesthesiology, Great Eastern Medical School & Hospital, Srikakulam. *Result:* Results showed no significant differences between the study groups in terms of age, weight and gender distributions. VAS showed significant difference between the study groups at 6 hrs and 12 hrs. The mean postoperative VAS in group B (0.25% bupivacaine) was maximum at the end of 6 hrs (4.08) whereas the mean postoperative VAS in group R (0.2% ropivacaine) was maximum at the end 12 hrs (4.0). *Conclusions:* Ropivacaine can be used as a safe alternative to Bupivacaine, routinely for TAP block for patients undergoing abdominal surgeries.

Keywords: Laparoscopic abdominal surgeries; Nonsteroidal anti-inflammatory drugs.

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Introduction

Postoperative analgesia can be achieved by the use of oral or parenteral analgesics, peripheral nerve blocks, neuraxial blocks with local anaesthetics, intrathecal opioids, adjunctive techniques such as transcutaneous electrical nerve stimulation and physical therapy. Pain experienced by patients after abdominal surgery is mainly derived from the anterior abdominal wall incision. Therefore provision of postoperative analgesia after abdominal surgery dominantly from skin incision sites, creation of pneumoperitoneum and trauma created by surgery by blocking the sensory nerve

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supply to the anterior abdominal wall appears to be a promising approach. Although laparoscopic surgeries result in less pain than open surgeries, still the pain arises pre itself.

Several modalities have been used to alleviate pain after laparoscopic abdominal surgeries – like nonsteroidal anti-inflammatory drugs (NSAIDs) (including parecoxib/valdecoxib, ketoprofen, paracetamol, opioids (both intravenous and patient controlled analgesia, infiltration of local anaesthetic (both before and after creation of pneumoperitoneum, thoracic epidural block and multimodal analgesia (using opioid, NSAID and infiltration of local anaesthetic) [1]. Apart from providing post operative pain relief, regional anaesthetic techniques improve patient recovery by preventing the neuroendocrine responses to surgery and reducing the postoperative opioid requirements. Transversus abdominis plane (TAP) block is a regional analgesic technique that blocks abdominal neural afferents by introducing local anaesthetic into the neurofascial plane between the internal oblique and the transversus abdominus muscles thereby reducing the postoperative pain of abdominal surgeries. Based on anatomic studies, previously, the lumbar triangle of Petit was used as an access point to this neurofascial plane [2]. A loss of resistance technique was used to locate the transversus abdominis plane. Correct localization of the plane was found to be difficult and imprecise in blind technique, especially in elderly and obese patients. To overcome this, ultrasound guidance is being increasingly used to locate the Transversus abdominis plane. Ultrasound based studies have shown their superiority and accuracy over the blind abdominal wall injections.

Ultrasound guided nerve blocks have several advantages as direct visualization of neural structures and related structures like blood vessels and tendons, Guidance of the needle under real-time visualization., Avoidance of complications like intravascular and intraneuronal injection, Monitoring the spread of local anaesthetic and allowing repositioning of the needle after an initial injection to facilitate delivery of local anaesthetic to areas that may not be completely blocked with a single dose. Can be used in patients with poor twitch response to nerve stimulation.

Various local anaesthetic agents have been used to provide effective and adequate postoperative analgesia. The new long-acting amino-amide local anaesthetic, ropivacaine, an S- enantiomer of bupivacaine has higher anaesthetic potency with long duration of action and less toxicity profile as compared to Bupivacaine. It is 2-3 times less lipid soluble and has a smaller volume of distribution, greater clearance, and shorter elimination half-life than Bupivacaine in humans. The two drugs have a similar pKa and plasma protein-binding.

Ultrasound guided TAP block using 0.75% ropivacaine has been used for post operative analgesia in patients undergoing total abdominal hysterectomies, caesarean sections and laparoscopic cholecystectomy. The search of literature revealed no data comparing the efficacy of 0.2% Ropivacaine and 0.25% bupivacaine in ultrasound guided TAP block for post operative analgesia in abdominal surgeries. Therefore the present study is aimed at comparative evaluation and relative efficacy of 0.2% ropivacaine and 0.25% bupivacaine in ultrasound guided TAP block for post operative analgesia in abdominal surgeries.

Material and Methods

A prospective, randomized, double blinded, comparative study done in 1 and half year (August 2015 to February 2017) in Department of Anesthesiology, Great Eastern Medical School & Hospital, Srikakulam. Patient of either sex between 18-60 years of age, ASA grade I and II. Total number of subjects in study are 50 (randomly divided into two groups of 25 each).

The present study was conducted after obtaining approval of the hospital ethics committee, a written informed consent was obtained from 50 patients scheduled for elective lower abdominal surgeries. The patients were randomly divided into two groups of 25 each- Group B receiving 0.25% bupivacaine, group R receiving 0.2% ropivacaine.

Inclusion criteria

1. ASA physical status I or II
2. Aged between18 to 60 yrs
3. Body weight 50-75kgs (BMI >18.5 and <25)
4. Patients undergoing elective abdominal surgeries under general anesthesia
5. Patients giving valid consent

Exclusion criteria

1. Patients with history of sensitivity to local anesthetics
2. Patients with abnormal liver function infection at injection site
3. Patients with clotting abnormalities

4. Patients who were not unable to interpret VAS before surgery.
5. Pregnant women.

Preoperative Assessment and Premedication

The principal investigator evaluated patients preoperatively, discussed the methodology and took the written informed consent on the day prior to surgery. They were explained about linear visual analog scale for pain (0 – no pain, 10 – worst imaginable pain) in their own vernacular language. All patients received adequate fasting orders preoperatively according to the surgery planned.

Randomisation and blinding

Randomisation was done by simple random method. 50 slips labelled B (25) indicating 0.25% Bupivacaine or R (25) indicating 0.2% Ropivacaine were kept folded in an opaque box by an anaesthesiologist not involved in the study. Patient picked up a slip from the box and handed over the slip to that anaesthesiologist. The anaesthesiologist not involved in the study unfolded the slip and allotted the patient into group 1 (B) or group 2 (R) based on the slip picked up by that patient. Study drug was prepared by the anaesthesiologist not involved in the study based on the slip picked up by that particular patient and handed over to the primary investigator conducting this study.

Intraoperative Management

Procedure on day of surgery

The patient was shifted to the operating room and an intravenous access was established. Pulse rate (PR), non invasive blood pressure (NIBP), continuous electrocardiogram (ECG), respiratory rate (RR), end tidal carbon dioxide and arterial oxygen saturation (SpO_2) were monitored using multichannel monitors. Baseline readings were noted and monitored every 5 minute intervals for first 30 minutes of surgery and then every 15 minutes till the end of surgery.

Induction of anaesthesia

All patients received a standardized general anaesthetic technique. They were administered injection inj. Glycopyrrolate 10 mcg/kg intravenously iv and inj. Fentanyl 2 mcg/kg iv. They were preoxygenated with 100% oxygen for 3 mins. Intravenous induction was achieved with Propofol 2-2.5 mg/kg. After confirming the ability to ventilate the lungs, intravenous Vecuronium 0.1 mg/kg was used for neuromuscular blockade. Patients ventilation was assisted with 2% Sevoflurane in 100% oxygen for 3 minutes, followed by laryngoscopy and orotracheal intubation was performed using either 7 or 7.5 mm internal diameter polyvinyl chloride cuffed orotracheal tube in women and either 8 or 8.5 mm internal diameter polyvinyl chloride cuffed orotracheal tube in men. Maintainance of anesthesia was done with sevoflurane1-1.2 MAC, 66% N_2O, 33% O_2. Inj Fentanyl 1 mcg/kg as needed to maintain intraoperative analgesia was given. Injection Paracetamol 1 gm IV was given at the time of skin closure.

At the end of surgery

Hemodynamic parameters of the patient were noted and TAP block was administered

Group R (n=25): Patients in this group received 20 ml 0.2% Ropivacaine in TAP block on each side.

Group B (n=25): Patients in this group received 20 ml of 0.25% Bupivacaine in TAP block on each side.

Post block hemodynamic parameters of the patient were noted.

After giving TAP block

Oral suction was performed and reversal of neuromuscular blockade was done with Neostigmine 0.05 mg/kg and Glycopyrrolate 0.01 mg/kg after confirming the return of neuromuscular function. Then patient was extubated and shited to postoperative recovery ward. All patients received injection Diclofenac 75 mg IV in the ward and this was continued 12th hourly in the ward.

Results

The following observations, including patients preoperative hemodynamic parameters, the postoperative hemodynamic parameters, the pain scores using visual analogue score were recorded in a preformed proforma.

Table 1: Demographic Data

Characteristics	Group B	Group B	p value
Age in years (Mean ± SD)	49.28 ± 6.37	47.32 ± 8.01	0.3
Weight in kg (Mean ± SD)	60.7 ± 8.0	67.2 ± 10.6	0.06
Gender (Male/Female)	11/14	13/12	0.5

The patients had mean age (mean + SD) of 49.28 ± 6.37 and 47.32 ± 8.01 years in Group B and Group

R respectively. The mean age of the patients in both the groups was comparable and the difference was statistically not significant (p>0.05).

The mean body weight of patients (mean + SD) in group B and R was 60.7 ± 8.0 and 67.2 ± 10.6 kgs respectively. The body weight of patients in both the groups was comparable and statistically non significant (p > 0.05).

The male: female ratio in group B was 11: 14 as compared to 13:12 in group R. The sex ratio of two groups were comparable to each other and statistically non significant (p>0.05).

The two groups were comparable with respect to age, weight, gender (Table 1).

Table 2: Type of surgery comparison between two groups

Type of surgery	Group B		Group R	
	No.	%	No	%
Total laproscopic hysterectomy (TLH)	09	36	08	32
Laproscopic anterior resection (LAR)	08	32	09	36
Lap hemicolectomy (LHC)	06	24	07	28
Laproscopic bilateral inguinal hernioplasty (LIH)	02	8	01	

We conducted the study in 4 types of lower abdominal surgeries i.e. total laproscopic abdominal hysterectomy, laprocopic anterior resection, laproscopic hemicolectomy and laproscopic bilateral hernioplasty (Table 2)

Hemodynamic Parameters

Table 3: Pre block variation of hemodynamic parameters

Hemodynamic parameters	Group B		Group R		p value
	Mean	SD	Mean	SD	
Heart Rate	78.24	9.25	73.84	6.88	0.45
Mean Arterial Pressure	77.56	11.03	75.52	7.17	0.44

The preblock hemodynamic parameters were comparable in both groups B and R. The p value is not significant among the groups. The post block heart at 6 hrs, 12 hrs and 24 hrs among B group and R group were significant whereas at 30 min, 1 hr and 3 hrs they were not significant (Table 3).

Table 4: Variation of post block mean arterial pressure among the groups

MAP	Group B		Group R		p value
	Mean	SD	Mean	SD	
30 min	77.56	9.50	73.28	7.42	0.08
1 hour	78.4	8.70	76.56	9.56	0.48
3 hours	78.77	9.23	78.2	8.87	0.25
6 hours	82.4	9.60	79.52	8.46	0.27
12 hours	79.48	8.38	80.84	8.97	0.58
24 hours	76.36	6.56	76.24	6.04	0.95

The above table 4 shows that mean arterial pressures at 30 min, 1 hr, 3 hrs, 6 hrs, 12 hrs and 24 hrs were not significant among B and R groups.

Table 5: VAS score among groups

VAS after extubation	Group B		Group R		p value
	Mean	SD	Mean	SD	
30 min	1.12	1.48	1.0	1.11	0.33
1 hour	1.8	1.38	1.6	1.22	0.21
3 hours	2.48	0.96	2.28	1.1	0.24
6 hours	4.08	1.49	2.7	0.79	<0.001
12 hours	3.36	0.66	4.0	2.5	0.03
24 hours	3.92	1.49	3.92	0.91	0.50

VAS was not significant at 30 min, 1 hr, 3 hrs and 24 hrs but statistically significant at 6 hrs and 12 hrs (Table 5).

Table 6: Comparison of duration of analgesia

	Group B		Group R		„p" value
	Mean	SD	Mean	SD	
Time to first rescue analgesic requirement	401.73	297.85	747.5	394.7	<0.00001

The mean duration of analgesia (mean + SD)

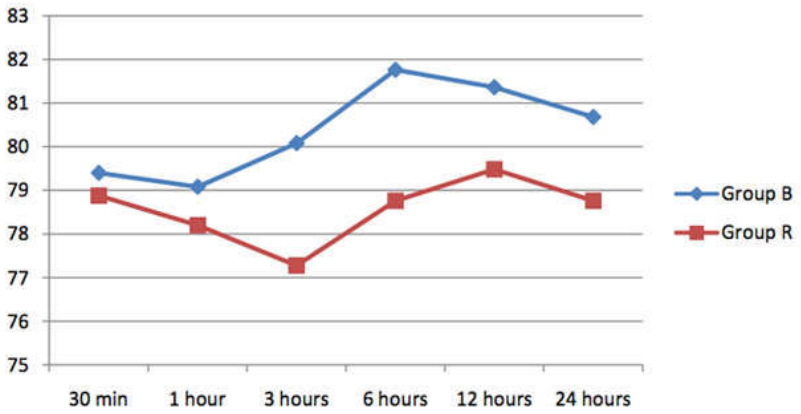

Fig. 1: Variation of post block heart rate among the groups

were 410.73 + 297.85 mins in group B and 747.5 + 394.7 mins in group R. The difference was statistically highly significant in group R compared to group B (p value <0.001) (Table 6).

Table 7: Patients who received rescue analgesia at the corresponding time interval

	Group B	Group R
<30 min	1	1
30 min-1 hr	2	1
1 hr-3 hrs	2	1
3 hrs-6 hrs	3	2
6 hrs-12 hrs	14	2
12 hrs-24 hrs	1	

The above table 7 shows that 2, 3, 3, 4, 9, and 2 patients received rescue analgesia at 30 min, 1 hr, 3 hrs, 6 hrs, 12 hrs and 24 hrs respectively in B group whereas 1, 1, 2, 2, 2 and 12 people received rescue analgesia at 30 min, 1 hr, 3 hrs, 6 hrs, 12 hrs and 24 hrs respectively in R group. 2 patients in B group and 5 patients in R group did not receive any rescue analgesia in 24 hrs.

Discussion

Pain after laparoscopic abdominal surgeries is due to many causes, some of which include - abdominal wall distension and incision at the trocar site. Several modalities have been used to alleviate pain after surgery. Ultrasound guided transversus abdominis plane block has become an integral part of multimodal analgesia after abdominal surgeries. Various drugs such as ropivacaine, bupivacaine, and levobupivacaine have been used in ultrasound guided TAP block [2]. In posterior approach of TAP block, a local anaesthetic is injected in the neurofascial plane between internal oblique and the transversus abdominis muscles, in order to block the nerves of the abdominal wall – namely the T7-T12 intercostal nerves, ilioinguinal nerve, iliohypogastric nerve and the lateral cutaneous branches of dorsal rami of the L1-L3 spinal nerves.

Performance of TAP block has become an integral part of the multimodal regimen for providing postoperative analgesia in number of surgeries. In addition to providing real time visualization of the neural structures, use of ultrasound helps in delineating trajectory of needle and navigating it away from other anatomical structures. Thus it avoids intravascular and intraneuronal injection [3].

The present study showed that when administered via ultrasound-guided TAP block with ropivacaine (0.2%) provided more effective pain relief in the immediate post-operative period as compared to bupivacaine (0.25%). The findings are in synchrony with the previous studies, which found ropivacaine to be more effective than bupivacaine.

Gaurav Kuthiala and Geeta Chaudhary [4] stated that a strict correlation exists between the lipid solubility of the local anaesthetic and its potency and toxicity. According to minimum local anaesthetic concentration (MLAC) studies, which are based on effective analgesia in 50% of patients) ropivacaine has similar potency to bupivacaine at higher doses. (eg, doses required for peripheral nerve blocks for surgical anaesthesia), ropivacaine is less potent than bupivacaine and levobupivacaine at lower doses, such as those used for epidural or intrathecal analgesia.

However, Olivier *et al.* [5] and Ahmed *et al.* [6] concluded that postoperative analgesic efficacy is comparable at all concentrations i.e. 0.2%, 0.5% and 0.75% of ropivacaine. Therefore, we presumed that even low concentrations of ropivacaine i.e. 0.2% ropivacaine would be equipotent or superior to 0.25% bupivacaine in transverse abdominus plane block in patients undergoing abdominal surgeries and conducted the above study.

Demographic Data

The difference in the mean age (mean + SD) 49.28 ± 6.37 and 47.32 ± 8.01 years, body weight 60.7 ± 8.0 and 67.2 ± 10.6 kgs and sex ratio 11: 14 and 13:12 of the patients in B group and R group were statistically non significant (p>0.05). Thus showing that baseline characterstics were comparable among the groups (Table 1).

Type of surgery

In our study, we chose patients undergoing four types of lower abdominal surgeries which included total laproscopic hysterectomy (TLH), laproscopic anterior resection (LAR), laproscopic hemicolectomy (LHC) and laproscopic bilateral inguinal hernia (LIH). In B group 9 underwent TLH (36%), 8 underwent LAR (32%), 6 underwent LHC (24%) and 2 underwent LIH (8%) whereas in R group 8 underwent TLH (32%), 9 underwent LAR (36%), 7 underwent LHC (28%) and 1 underwent LIH (4%) (Table 2).

Mark J Young *et al.* [7] described TAP block as an effective component of multimodal postoperative analgesia for a wide variety of abdominal procedures including large bowel resection, open/

laparoscopic appendectomy, cesarean section, total abdominal hysterectomy, laparoscopic cholecystectomy, open prostatectomy, renal transplant surgery, abdominoplasty with/without flank liposuction, and iliac crest bone graft.

Hemodynamic Variations

In our study, preoperative hemodynamics (mean + SD) - pulse rate (per min) (group B 78.24 + 9.24 vs group R 73.84 + 6.88) and mean arterial pressure (group B 77.56 + 11.03 vs group R 75.52 + 7.17) were comparable between the groups and statistically non significant. (p>0.05) (Table 3).

The mean heart rate per min at 30 min, 1 hour, 3 hours, 6 hours, 12 hours, and 24 hours in the postoperative period were compared between 0.25% bupivacaine and 0.2% ropivacaine. The results of both the studies were comparable at 30 min, 1 hr and 3 hrs but statistically significant difference was seen at 6 hrs (group B 81.76 ± 8.35 vs group R 78.76 ± 4.94), 12 hrs (group B 81.36 ± 10.14 vs group R 79.48 ± 4.36) and 24 hrs (group B 80.68 ± 11.87 vs group R 78.76 ± 4.03).

The relative rise in pulse rate in Group B could possibly be explained because of the shorter duration and reduced efficacy of analgesia in the bupivacaine group as compared to the ropivacaine group.

The mean arterial pressure in mm of Hg (mean + SD) at 30 mins, 1 hour, 3 hours, 6 hours, 12 hours, and 24 hours in postoperative period was also compared between 0.25% Bupivacaine and 0.2% Ropivacainegroups. The mean arterial pressure in both the groups were comparable and showed no significant difference.

This is similar to findings by Dr. Dipikapatel *et al.* [8] who compared 0.25% bupivacaine and 0.5% ropivacaine for TAP block in lower abdominal surgeries.They found that at 6, 12 and 18 hours, there was a significantly low pulse rate and low blood pressure in Group R compared to Group B ($p < 0.05$). This difference was attributed to a relative rise in pulse and systolic blood pressure in Group B because a longer duration of analgesia was maintained in Group R.

Neha faluda *et al.* [9] who also compared 0.25% bupivacaine and 0.5% ropivacaine, found that the difference between the mean pulse rate and mean systolic and diastolic blood pressure were statistically non-significant between group B and group R at all periods of time in the first 24 hrs.

VAS pain score

In our study, the mean postoperative VAS in group B (0.25% Bupivacaine) was maximum at the end of 6 hrs whereas the mean postoperative VAS in group R (0.2% Ropivacaine) was maximum at the end of 12 hrs. VAS score were not only lower in patients receiving 0.2% Ropivacaine but also statistically significant at 6 hrs (group B 4.08 ± 1.49 vs group R 2.7 ± 0.79).

At 12 hrs (group B 3.36 ± 0.66 vs group R 4 ± 2.5) the Ropivacaine group had significantly more pain when compared to the Bupivacaine group. This was because group B had already received rescue analgesia while group R had not. This suggests that Ropivacaine provides longer duration of analgesia when compared to 0.25% Bupivacaine.

Neha Sharma *et al.* [10] conducted a study in 60 adult patients undergoing elective abdominal surgery under general anaesthesia. They compared 0.25% Bupivacaine with 0.5% Ropivacaine in TAP block. The mean pain scores at 0 min, 30 min and 4 h were similar in both the groups and inter group comparison was not statistically significant. However, comparison of pain score at 8h and 12h post operatively showed significant difference in both the groups with Bupivacaine having significantly higher VAS scores both at rest and on coughing.

Sharadha Sinha *et al.* [11] conducted a study on sixty adults undergoing elective.

laparoscopic cholecystectomy who were randomised to receive ultrasound-guided TAP block at the end of the surgical procedure with either 0.25% bupivacaine (Group I, $n = 30$) or 0.375% ropivacaine (Group II, $n = 30$). The pain scores were significantly lower at 10 min, 30 min and 1 h post-operatively in Group II as compared to Group I.

Dipikapatel *et al.* [12] found that there was statistically significant difference in VAS score at 6 hours ($p<0.05$) and 12 hours ($p<0.01$) after performing the block. They found that VAS scores were higher in the Bupivacaine group as compared to the Ropivacaine group.

Duration of analgesia

The mean time to first request for rescue analgesia in patients receiving 0.25% Bupivacaine was 410.73 ± 297.85 mins and 747.5 ± 394.7 mins in patients receiving 0.2% Ropivacaine. It indicates that mean duration of analgesia with 0.2% ropivacaine (approximately 12.5 hrs) was significantly higher than 0.25% bupivacaine (approximately 6 hrs). This

finding is similar to that of other studies (Table 6).

Dipika Patel *et al.* [12] who compared 0.25% bupivacaine with 0.5% ropivacaine found that the mean duration of analgesia was 7.38 ± 2.35 hours in bupivacaine group and 9.98 ± 2.38 hours in ropivacainegroup. The difference was statistically highly significant in ropivacaine group compared to bupivacaine group ($p<0.01$). Neha Fauladi *et al.* [9] found that the mean duration of analgesia in their study was longer in Ropivacaine group (12.61 ± 5.13 hour) as compared to Bupivacaine group (9.92 ± 4.81) by 2.69 ± 0.52 hours, which was statistically significant.

Venkateshmurthy *et al.* [13] compared 0.5% bupivacaine with 0.75% ropivacaine, not exceeding 2.5 mg/kg body weight in unilateral TAP block in 60 patients following inguinal hernia repair. In their study TAP block was used as a sole anaesthetic agent. In group B the duration of analgesia was 573.00 ± 45.72 mins, in group R it was 675.54 ± 30.31 mins. (p value of < 0.001). All studies therefore showed ropivacaine to have better analgesic potency as well as longer duration of analgesia following TAP block.

These may be explained by intrinsic vasoconstrictor effect of ropivacaine. Hui-Jin Sung *et al.* [14] stated that aminoamide local anesthetics induce vasoconstriction at low doses and vasodilation at high doses. Depending on the vascularity of the injection site vasoconstriction induced by local anesthetic and addition of epinephrine may contribute to decreased absorption of local anesthetics into systemic circulation. This leads to prolonged nerve exposure to local anesthetics and reduced plasma levels, in addition to the potency of intrinsic vasoconstriction being partially associated with duration of anesthesia produced by the local anesthetic. They concluded that the octanol/ buffer partition coefficient of local anesthetics is the primary factor in determining the potency of local anesthetic-induced vasoconstriction. They determined the order of potency of vasoconstriction induced by local anesthetics in isolated endothelium-denuded aorta to be levobupivacaine > ropivacaine >lidocaine > mepivacaine.

However, Rathman *et al.* [15] showed that bupivacaine inhibits thromboxane A2 induced vasoconstriction. This is not seen with Ropivacaine which might explain the shorter duration of action of Bupivacaine as compared to Ropivacaine.

Since the above two studies have been conducted in rats, still a lot of research needs to be conducted using different concentrations of Bupivacaine and Ropivacaine before extrapolating this data to humans.

Timing of request for rescue dose

In 0.25% bupivacaine group, majority of patients (14 out of 25) received first dose of rescue analgesic between 6 hrs to 12 hrs. In 0.2% ropivacaine group, majority of patients (13 out of 25) received first dose of rescue analgesic between 12 hrs to 24 hrs. These results suggest that 0.2% ropivacaine provided longer duration of analgesia in majority of patients when compared to 0.25% bupivacaine. This also explains the mean duration of analgesia in 0.25% bupivacaine as 410.73 + 297.85 mins and in 0.2% ropivacaine as 747.5 + 394.7 mins. In our study out of 50 patients, 2 patients from 0.25% bupivacaine group and 5 patients from 0.2% ropivacaine group did not request for rescue analgesia in first 24 hrs.

El Dawlatley *et al.* [16] studied the analgesia of USG guided TAP block following laproscopic cholecystectomy and reported reduced rescue analgesic requirement.

Madhumani N. Rupasinghe *et al.* [17] retrospectively reviewed the 24 hrs total PCA morphine requirement with or without TAP block following ceasarean section to achieve a desired (VAS) visual analog pain score of 3 or less in patients. They observed over 30% reduction in morphine usage for those who received the TAP block.

Gildasio S. De Oliveira [5] compared postoperative opioid requirement in patients undergoing laproscopic surgery who received TAP blocks with either 0.25% ropivacaine, 0.5% Ropivacaineor saline. There was significant reduction in opioid consumption in the Ropivacaine groups as compared to saline group. However the opioid requirement was comparable between the 0.25% Ropivacaine and 0.5% Ropivacaine.

Complications

In our study, none of the patients from either group encountered complications like intra abdominal organ injury, local anaesthetic toxicity or transient femoral palsy as we did not cross the toxic dose of both the drugs and used ultrasound for visualisation of drug deposition in the right plane.

Lancaster and Chadwick reported a case of liver laceration after USG-guided TAP block, which was likely as a result of failure to adequately visualize the needle during the procedure. Another important concern is the local anaesthetic toxicity, particularly when B/L blocks were performed. TAP block has been shown to cause systemic toxicity if local anaesthetic spills over into the adjacent muscles or/ and if toxic dose of local anaesthetic has been used.

Transient femoral nerve palsy after TAP block is the result of local anaesthetic incorrectly injected between the transversus abdominis muscle and the transversalis fascia and accumulating around the femoral nerve. It is characterized by quadriceps femoris paresis, hypoesthesia over the anterior aspect of the thigh and absent patellar reflex. While it is not a major cause of postoperative morbidity, it may cause patient discomfort and anxiety as well as unexpected injuries due to falls. It is a self-limiting complication, but patients require overnight admittance for observation, thus increasing length of stay and hospital costs. Performing the TAP block under ultrasound guidance and injecting the least volume of local anaesthetic required are effective ways to reduce its occurrence [18].

Conclusion

VAS showed significant difference between the study groups at 6 hrs and 12 hrs. The mean postoperative VAS in group B (0.25% bupivacaine) was maximum at the end of 6hrs (4.08) whereas the mean postoperative VAS in group R (0.2% ropivacaine) was maximum at the end 12 hrs (4.0). Mean duration of analgesia was 410 minutes with SD of + 297.85 mins (approximately 7 hrs) in Bupivacaine group and 747.5 minutes with SD of +394.7 mins (approximately 12.5 hrs) in Ropivacaine group which was found to be statistically significant. In 0.25% bupivacaine group, majority of patients (14 out of 25) received rescue analgesia after 6 hrs. In 0.2% ropivacaine group, majority of patients (13 out of 25) received rescue analgesia after 12 hrs. 2 patients in bupivacaine group and 5 patients in ropivacaine group did not receive any rescue analgesia in 24 hrs. Hemodynamic parameters like heart rate showed no significant difference at 30 min, 1 hr, 3 hrs and 6 hrs whereas showed a significant difference at 12 hrs and 24 hrs. The mean arterial pressure did not show any significant difference at any time interval. During the study, no patients had complications related to procedure or side effects due to the study drugs. 0.2% Ropivacaine when compared with 0.25% Bupivacaine, provides a longer duration of analgesia and potent analgesic efficacy in ultrasound guided TAP block. Thus, it is concluded that Ropivacaine can be used as a safe alternative to Bupivacaine, routinely for TAP block for patients undergoing abdominal surgeries.

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