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Original Research Article

COMPARATIVE STUDY OF ULTRASOUND-GUIDED TRANSVERSE ABDOMINIS PLANE BLOCK WITH 0.25% BUPIVACAINE AND 0.2% ROPIVACAINE FOR POSTOPERATIVE ANALGESIA FOLLOWING CAESAREAN SECTION

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ABSTRACT

Background: The transverse abdominis plane block is commonly used for providing postoperative analgesia in lower abdominal surgeries and can be effectively used for providing analgesia in lower segment caesarean section. Present study was aimed to compare ultrasound-guided transverse abdominis plane block with 0.25% bupivacaine and 0.2% ropivacaine for postoperative analgesia following caesarean section. **Material and Methods:** Present study was prospective, comparative study, conducted in pregnant women aged 20 to 35 years, ASA physical status II and III, undergoing elective and emergency caesarean section under spinal anesthesia. Sixty patients who underwent TAP block under either Bupivacaine or Ropivacaine were divided into two groups of 30 each randomly **Results:** There was no significant variation in time for full regression of block between the two groups as per the t-test (p=0.10). The mean time of full regression of block for group B is 131 min and it was 128 min in group R. There was no significant variation in time required for 1st analgesia between the two groups as per the t-test (p=0.63). The mean time required for 1st rescue analgesia in group B was 468 min and it was 465 min in group R. There was no significant variation in VAS from baseline to 48 hours during rest between the two groups. There was no significant variation in VAS score in both groups at various intervals from baseline to 48 hours during movement. Nausea and vomiting were seen in one patient each in the ropivacaine group, **Conclusion:** Analgesic efficacy and safety of Bupivacaine and Ropivacaine were found to be almost similar in TAP block under the ultrasound- guidance for pain management after Caesarean section.

Keywords: Analgesic efficacy, Bupivacaine, Ropivacaine, TAP block, Caesarean section

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INTRODUCTION

Pain after caesarean section is usually described as moderate to severe by most patients and failure to adequately treat may affect mother-baby bonding, care of the baby, and breastfeeding. The pain of caesarean section essentially has two components somatic (due to abdominal wall incision) and visceral (from the uterus). But the pain in caesarean section occurs mainly due to abdominal wall incision.[1]

Various modalities were used to manage pain like NSAIDS, Epidural block, and usage of opioids during the post-operative (PO) period. Opioids can cause side effects like emesis, respiratory depression, decrease in motility of the gut, sedation, etc. NSAIDs can cause renal dysfunction, gastrointestinal hemorrhage, etc. Hence Regional analgesic technique has gained widespread popularity as an important component of postoperative analgesia regimen. The use of ultrasound (US) can increase the rate of success and reliability of regional blocks for post-operative analgesia and also prevent major complications.[2]

The transverse abdominis plane block is commonly used for providing postoperative analgesia in lower abdominal surgeries and can be effectively used for providing analgesia in lower segment caesarean section. Various long-acting amide-linked LA agents, including Ropivacaine[4] and Bupivacaine[5], have been used for postoperative analgesia with ultrasound-guided TAP block. Bupivacaine is a racemic molecule while Ropivacaine is a pure enantiomer that has been developed to reduce the potential toxicity and improve sensory block (SB) and motor blocks (MB).[3] Present study was aimed to compare ultrasound-guided transverse abdominis plane block with 0.25% bupivacaine and 0.2% ropivacaine for postoperative analgesia following caesarean section.

MATERIAL AND METHODS

Present study was prospective, comparative study, conducted in department of Anaesthesiology, at NRI Medical College & General Hospital, Chinakakani, Guntur, India. Study duration was of 1 year (November 2021– October 2022). Study was approved by institutional ethical committee.

Inclusion criteria

- Pregnant women aged 20 to 35 years, ASA physical status II and III, undergoing elective and emergency caesarean section under spinal anaesthesia Willing to participate in present study

Exclusion criteria

- Allergy to the amide group of local anaesthetics
- Bleeding disorders
- Infection at the site of the block
- Cardiovascular, pulmonary or neurological diseases

Study was explained to participants in local language & written informed consent was taken. Patients were shifted to the operating room; the Intravenous line was secured with an 18G cannula and connected to intravenous fluids. Baseline monitoring included SpO2, ECG, NIBP, and baseline vitals recorded. All patients received subarachnoid block by 23G Quinckie's needle at L3-4 /L2-3 interspace with a total volume of 2ml of 0.5% Hyperbaric Bupivacaine was given by a standard midline approach. B and R groups received 10 mg of hyperbaric bupivacaine. The face mask delivered supplemental oxygen at 5 L/ min throughout the surgery.

At the end of surgery ultrasound probe was placed on the anterior abdominal wall as three layers are distinct here. After identifying TAP, the probe was positioned posterolaterally to lie along the mid-axillary line. Under all aseptic precautions, the block was given with a 22G hypodermic needle attached to a 20 ml syringe containing the drug as per group allocation. The drug was deposited in the fascial plane after aspiration. Check aspiration was done every 5ml

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to rule out the intravascular injection. The patient was observed for 15 min and then shifted to the post-anesthesia care unit.

Sixty patients were divided into two groups of 30 each randomly

- Group B: Bupivacaine group -10 ml of 0.25% Bupivacaine given bilaterally
- Group R: Ropivacaine group-10ml of 0.25% Ropivacaine given bilaterally

The parameters compared in the two groups were time of 1st request for analgesia, pain score of patients - at rest and movement using VAS (0-no pain and10- severe pain) & adverse effects during 48 hours. The presence and severity of pain, nausea, vomiting and other side effects were assessed in the post-anesthesia care unit and obstetric ward at 2, 6, 12, 24 & 48 hours.

Data was collected and compiled using Microsoft Excel, analyzed using SPSS 23.0 version. Frequency, percentage, means and standard deviations (SD) was calculated for the continuous variables, while ratios and proportions were calculated for the categorical variables. Difference of proportions between qualitative variables were tested using chi- square test or Fisher exact test as applicable. P value less than 0.5 was considered as statistically significant.

RESULTS

The mean age in group B was 23 years and the mean age in group R was 26 years. The mean weight for group B was 72.6 kgs and for group, R was 73. 3 kgs. The mean height for group B was 153.8cm and for group, R was 156.16cm. 2 patients from group B and 3 patients from Group R belonged to GRAVIDA 3. 16 patients from the B group and 17 patients from group R belonged to GRAVIDA 2. 12 patients from group B and 10 patients from group R belong to GRAVIDA 1. The average duration of surgery for group B was 46 min. and for group, R was 47 min. The groups were comparable concerning Age, weight, height, gravida status & mean duration of surgery. There was no statistical difference between the two groups

Table 1: Demographics and baseline characteristics

Parameters	Group B	Group D	P value
Age (yrs)	22.86±2.08	26.16±1.5	0.10
Weight (kgs)	72.60±4.8	73.3±2.74	0.49
Height (cms)	153.80±14.2	156.16±7.93	0.21
Gravida1	12	10	0.81
Gravida2	16	17	
Gravida3	2	3	
Duration of surgery(min)	45.8	46.7	0.22

There is no significant difference in the time for full regression of block between the two groups as per the t-test (p=0.10). The mean time of full regression of block for group B was 131 min and it was 128 min in group C

Table 2: Time for full regression of block in minutes

	GROUP B	GROUP R	Pr>[t]
TOTAL	3922.00	3838.00	
MEAN ±SD (min)	130.7 3± 2.71	127.93±3.73	0.1015

There was no significant variation in the time needed for 1st analgesia between the two groups as per the t-test (p=0.63). The mean time in group B was 468 min and it was 465 min in group R.

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Table 3: Time for first rescue analgesia in minutes

	GROUP B	GROUP R	Pr>[t]
Total	14047.00	13955.00	
Mean ± SD	468.23±7.18	465.16±5.20	0.0633

There was no significant variation in VAS score in both groups at various intervals from baseline to 48 hours during movement.

Table 4: Mean VAS at rest from baseline to 48 hours in both groups

VAS	Group B	Group R	P value
VAS (at rest)	0.0	0.0	1
VAS 2H	0.06	0.0	0.41
VAS 6H	0.02	0.01	0.1
VAS 12H	0.36	1.06	0.37
VAS 24H	0.2	0.4	0.08
VAS 48H	0.0	0.1	0.07

There was no significant difference in VAS scores at rest between both groups.

Table 5: Mean VAS (AT movement) variation from baseline to 48 hrs. in both groups

VAS	Group B	Group R	P value
VAS (at movement)	0.0	0.0	1
VAS MOVEMENT 2H	0.0	0.0	1
VAS MOVEMENT 6H	0.2	0.00	1
VAS MOVEMENT 12H	1.06	0.70	1
VAS MOVEMENT 24H	0.78	0.4	0.3
VAS MOVEMENT 48H	0.3	0.1	0.34

Postoperative Nausea and vomiting were seen in one patient each in the ropivacaine group

Table 6: Side effects

SIDE EFFECTS	Group B	Group R	Total
NAUSEA	0	1	1

Chi-square value 2.06, P=0.35

DISCUSSION

In the present study, we didn't find any difference in the efficacy of LA like Ropivacaine, and VAS scores were not significantly different.

In a similar study, Sinha S et al.,[6] noted that ropivacaine group patients had significantly fewer pain scores (VAS) compared to patients in the Bupivacaine group at various intervals like 10, 30, and 60 min. But both drugs were found to be equivalent for postoperative analgesia and 24 h rescue analgesic requirement. Their study concluded that Ultrasound-guided TAP using ropivacaine can provide effective analgesia during the immediate postoperative period till 60min compared to Bupivacaine.

In a similar study, Nidhi Sharma et al.,[2] noted that average NRS score was more in the bupivacaine group at 2, 4, 6, and 14 hours after the block. But the duration of analgesia was more in the ropivacaine group and the total requirement of analgesic was less in the Ropivacaine group compared to Bupivacaine.

Results were similar to the meta-analysis conducted by Baeriswyl et al.,[7] on US-guided TAP Block for abdominal surgeries. They found it reduced IV opioid(morphine) consumption at 6 hours after surgery irrespective of surgery type. Thirty-one trials with 1611 adults were included. Opioid usage was reduced on average by 6 mg. it varied from 7 to 14mg. The

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magnitude of the decrease in morphine consumption at 6 hours was not affected by the timing of injection, the approach for a block that was adopted, or for the presence of postoperative multimodal analgesia.

Pain scores were decreased at 6 hours in the postoperative period. There were no changes in the incidence of postoperative nausea and vomiting or the incidence of pruritus. One patient had a bruise and one patient had an anaphylactoid reaction. In present our study, postoperative nausea, and vomiting were seen in 1 patient each. No patient had allergies or bruises in our study.

Kadam et al.,[8] did a retrospective study and found no significant variation in satisfaction scores of patients after TAP block versus local anesthetic infiltration in patients posted for a lap. cholecystectomy. A study done by Belavy D et al.,[9] compared the efficacy of analgesia with a US-guided TAP block using 0.5% ropivacaine after a Caesarean section. Results showed a significant decrease in the total dose of morphine used in the R group compared to the placebo group, in which the total morphine consumed was 31mg. It was only 18mg in the ropivacaine group. VAS also decreased more in the Ropivacaine group compared to the placebo or control group.

McDonnel et al.,[10] showed there was a significant decline in VAS scores and the need for Morphine in the Ropivacaine group. These studies imply the effectiveness of local anesthetics. Puchakala D et al.,[11] did a study to compare 0.25% Bupivacaine with 0.375% Ropivacaine for postoperative analgesia using a TAP block in a caesarean section. Results showed that the mean time for 1st dose of rescue analgesia after surgery completion was 298.2 min in the Bupivacaine group and 447 min in the Ropivacaine group. There was a significant difference in time for 1st dose of analgesia needed. This finding was in contrast to our study finding, in which there was no significant variation in time for 1st rescue analgesia need. The total need for diclofenac was 162.86 mg in the bupivacaine group and it was only 130.71 mg in the ropivacaine group. There was a significant variation in the dose of diclofenac between both groups. VAS at 4,6 and 8 h post-caesarean section was less in Ropivacaine patients. The authors concluded that 0.37% ropivacaine causes a longer duration of analgesia with low analgesic requirement compared to 0.25% bupivacaine for TAP block.

Limitations of our study were small sample size (n = 60), indicating that the study sample was small, and the primary limitation was the interpretation of results. Larger studies with more subjects produce narrow confidence intervals (95% to 99%) and more accurate results. Patients were followed up till 10 days after completion of the study only. Patient satisfaction scores were not taken or assessed for pain relief.

Recommendations for future studies:

- Multi-centre studies including various tertiary care hospitals and certain specialized clinics could be done as more patient populations from different backgrounds could be involved.
- Controls may be included- those who were given normal saline and case- control studies can be done to know more about the efficacy of new medications.
- Meta-analysis of existing research could be done.
- Double-blind studies can be done to make the research more accurate.
- Studies on Ultrasound-guided TAP block with local anaesthetics and alpha agonists like dexmedetomidine in patients scheduled for Caesarean section to decrease post-operative analgesia can be done.

CONCLUSION

Analgesic efficacy and safety of Bupivacaine and Ropivacaine were found to be almost similar in TAP block under the ultrasound- guidance for pain management after Caesarean section. As there was a decrease in VAS scores in both groups, both medications can help to

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reduce the consumption of opioids during the postoperative period. There were no major side effects seen in both groups.

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