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**Original Research Article**

# A Comparative Study between Ropivacaine with Dexamethasone and Ropivacaine in Ultrasound Guided Transversus Abdominis Plane Block for Postoperative Analgesia in Patients Undergoing Total Abdominal Hysterectomy

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## ABSTRACT

### Background
Total abdominal hysterectomy is the most commonly performed gynecological surgery. Patient normally suffers from significant pain after abdominal surgery. Transversus abdominis plane block is a regional anaesthetic technique used to provide analgesia to the anterior and lateral abdominal wall. Ropivacaine is a long acting amide local anaesthetic drug while Dexamethasone as an adjuvant has anti-inflammatory and blocking effects on neural discharge and nociceptor c -fibre transmission. Hence an attempt was made to study the effect of Dexamethasone as an adjuvant to Ropivacaine in ultrasound guided transversus abdominis plane block for total abdominal hysterectomy

### Methods
This Prospective Randomized Clinical Study was conducted at Department of Anaesthesiology and Critical care, Kempegowda Institute of Medical Sciences, Bangalore, between December 2018 to July 2020.Total sample size of 30, two groups of 30 subjects each for a period of 18 months. Patients were randomized using a computer generated randomization chart into two groups.

### Results
The test results demonstrated that on comparison of VAS scores, at the end of 2hrs, 4hrs, 6 hrs, 12hrs and 24hrs in group R was 1.07+/- 0.25, 2.03+/- 0.18, 4.13+/- 0.90, 5.10+/- 0.31 and 6.07+/- 0.25 respectively which was higher at all time intervals as compared to those shown by group RD patients (1.00, 1.20+/- 0.41, 3.13 +/- 0.35, 4.47+/- 0.51 and 5.50+/-

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0.57 respectively). The results were statistically significant at 4hrs, 6 hrs, 12 hrs and 24 hrs with p value < 0.001.

**Conclusion**

We conclude that addition of Dexamethasone as adjuvant to Ropivacaine in ultrasound guided Transverse Abdominis Plane block provides better post operative analgesia in patients undergoing total abdominal hysterectomy.

**Keywords:** TAP block, total abdominal hysterectomy, Ropivacaine, Dexamethasone.

## INTRODUCTION

Total abdominal hysterectomy is the most commonly performed gynecological surgery. Patient normally suffers from significant pain after abdominal surgery, with major source of pain being in the anterior abdominal wall and the abdominal viscera.[1] The transversus abdominis plane block is a regional anaesthetic technique used to provide analgesia to the anterior and lateral abdominal wall. In this technique, the local anaesthetic is deposited in between the two muscles - internal oblique and transversus abdominis muscles so that the T7-L1nerves are blocked.

Ropivacaine is a long acting amide local anaesthetic with a greater degree of motor to sensory differentiation, reduced lipophilicity hence decreased potential for central nervous system toxicity and cardio toxicity. Dexamethasone, through its anti-inflammatory and blocking effects on neural discharge and nociceptor c -fibre transmission, could be used as an adjuvant.[1]

With the use of ultrasound, nerve plexus or muscle and fascia can be exactly located for delivery of drug. It also helps in visually guiding the block needle to target nerves or plane, thus prompting fewer attempts with higher success rate. The use of ultrasound also helps in markedly reducing the volume of local anaesthetic drugs used and lower the risk of side effects.[2] Hence an attempt was made to study the effect of Dexamethasone as an adjuvant to Ropivacaine in ultrasound guided transversus abdominis plane block for total abdominal hysterectomy performed under sub arachnoid block

## AIMS AND OBJECTIVES

Ropivacaine with Dexamethasone as an adjuvant when compared to Ropivacaine alone in USG guided transversus abdominis plane block given for total abdominal hysterectomy

A. To assess pain severity based on VAS (visual analogue scale) score.
B. To assess duration of postoperative analgesia.

## MATERIALS&METHODS

The present Prospective Randomized Clinical Study was conducted in the department of Anaesthesiology and Critical care at Kempegowda Institute of Medical Sciences, Bangalore, for 18 months between December 2018 to July 2020.

### Sample Size

Formula: $n = \frac{2S_p^2(Z_{1-\alpha/2} + Z1-\beta)^2}{(\mu d)^2}$

§ Where $S_p^2 = \frac{S_1^2 + S_2^2}{}$

§ N= Required sample size.

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$S_1^2$ and $S_2^2$= variances
Sp = pooled variance.
§ μd = difference between means(m1-m2)
Dropout rate: 2-3 subjects
Total sample size: Two groups of 30 subjects each.

**Method of Collection of Data**

Patients were randomized using a computer generated randomization chart into two groups.
**Group RD** = Ultrasound guided Bilateral transversus abdominis plane block with 20ml of 0.25% Ropivacaine and 1ml of dexamethasone (4mg) on each side.
**Group R** = Ultrasound guided Bilateral transversus abdominis plane block with 20ml of 0.25% Ropivacaine and 1ml of normal saline on each side.

**Inclusion Criteria**

1. Patients aged between 35-70 years.
2. Patient willing to give informed consent.
3. ASA physical status 1 and 2.
4. Elective total abdominal hysterectomy.

**Exclusion Criteria**

1. BMI <18 or >35 kg/m2
2. Infection at the site of block.
3. Patients on chronic opioid use.
4. Coagulopathy and patients on anticoagulants.
5. Known allergy to local anesthetic agents

At the end of the surgery based on randomization, patient received ultrasound guided bilateral transversus abdominis plane block which was performed using in-plane technique with 20ml of 0.25% Ropivacaine and 1 ml of normal saline on each side in group(R) and 20ml of 0.25% Ropivacaine with 1ml Dexamethasone (4mg) on each side in other group (RD) was administered under ultrasound guidance using high frequency linear transducer and 22G insulated needle.

**Procedure**

Patient in supine position, ultrasound probe placed transverse to the abdominal wall between lower costal margin and iliac crest. The linear transducer is placed in the axial plane in the mid axillary line and moved posteriorly and Transverse abdominis plane was identified after visualizing external oblique aponeurosis, internal oblique aponeurosis and transversus abdominis muscle and reached using 22G needle with bevel facing superiorly. Correct placement of needle tip confirmed by injecting 2-3ml Bolus dose which cause hypoechoic enlargement is seen on ultrasound and 20 ml of the test drug was administered by posterior approach. Procedure repeated on the opposite side. Post operatively patients were monitored in Postoperative ward. Hemodynamic parameters like HR, Blood pressure (both systolic and diastolic), SPO2 were monitored every 5 minutes till 20 minutes and then every 10 minutes until 1 hour and then at 90 minutes.

Pain was assessed on Visual Analogue Scale (VAS) for 2 hours, 4 hours, 6 hours, 12 hours and 24 hours after the surgery.

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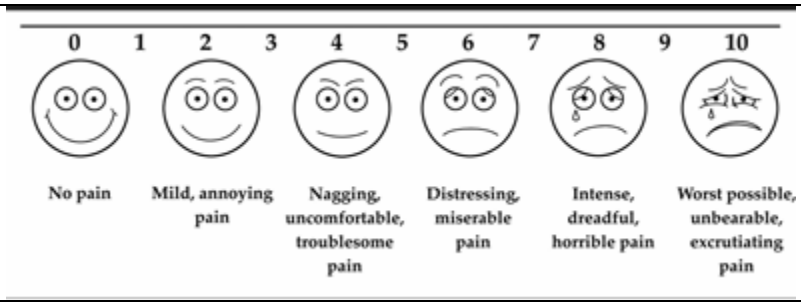


***Visual analogue scale (VAS)***

Visual analogue scale (VAS)
Rescue analgesics were administered if VAS ≥ 4 with diclofenac (75mg) intravenously.
The time for first rescue analgesia and total analgesic consumption in 24hrs were noted.
The patients were monitored and complications, if any, were recorded

**Statistical Analysis**

After collecting the data, all the variables are examined for outliers and non-normal distributions. The Categorical variables are expressed as Frequency and Percentage. The Quantity variables are expressed as mean and standard deviation. Descriptive statistics are used to evaluate baseline characteristics. Student's t-test was used to calculate p value. Discrete variables were analyzed using Chi-Square test and Mann Whitney U test with a $P < 0.05$ considered statistically significant. The statistical analysis was performed using statistical software package SPSS 20.0

**Outcomes Measured**

**Primary Outcome**

1. Evaluate pain severity using VAS score

**Secondary Outcomes**

2. Rescue analgesia - initiation time

**RESULTS**

Group R - Ropivacaine; Group RD - Ropivacaine with Dexamethasone

The test results demonstrated that mean age of patients in group R was 46.67± 5.07 ranging between 36- 55 years while the mean age of patients in group RD was 44.20± 4.97 ranging between 35- 54 years.

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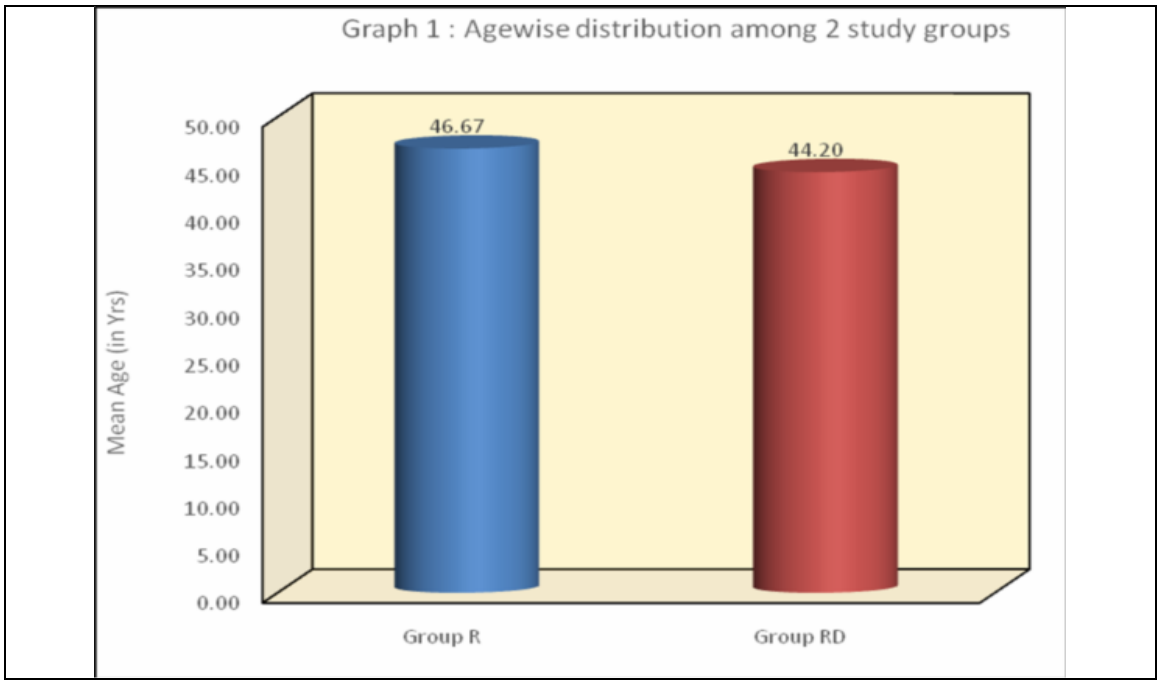
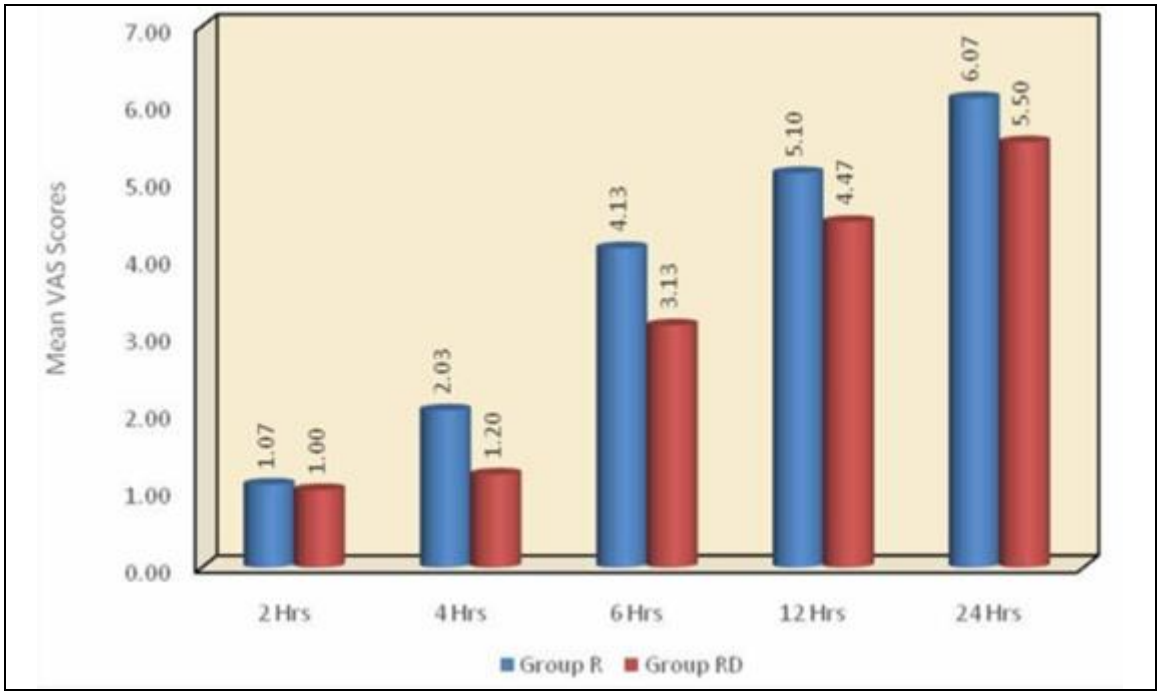



**** - Statistically Significant***

The test results demonstrated that on comparison of VAS scores, at the end of 2hrs, 4hrs, 6 hrs, 12hrs and 24hrs in group R was 1.07+/- 0.25, 2.03+/- 0.18, 4.13+/- 0.90, 5.10+/- 0.31 and 6.07+/- 0.25 respectively which was higher at all time intervals as compared to those shown by group RD patients (1.00, 1.20+/- 0.41, 3.13 +/- 0.35, 4.47+/- 0.51 and 5.50+/- 0.57 respectively). The results were statistically significant at 4hrs, 6 hrs, 12 hrs and 24 hrs with p value < 0.001.




**Graph 2: Mean VAS scores between 2 groups at different time intervals**

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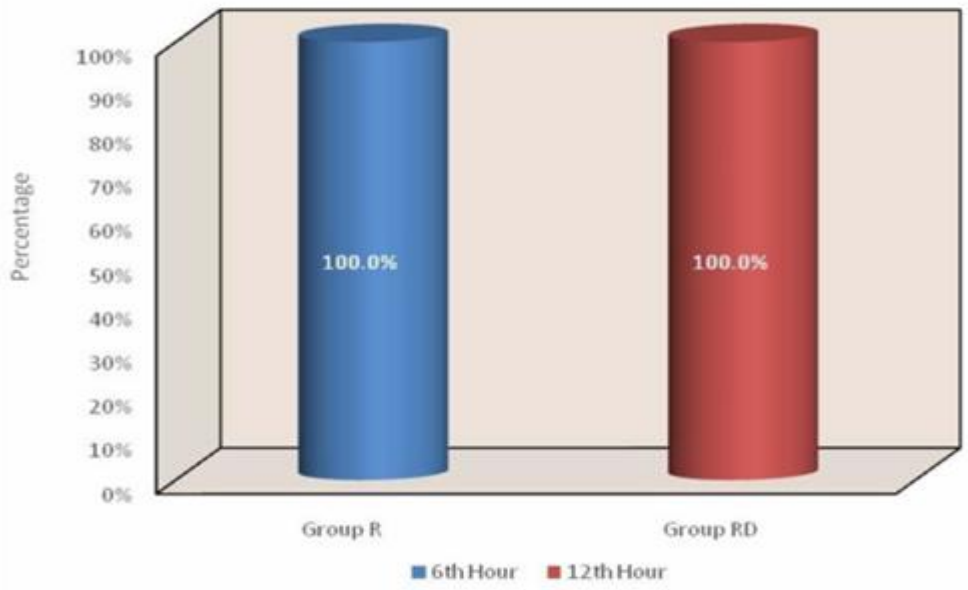
**** - Statistically Significant***

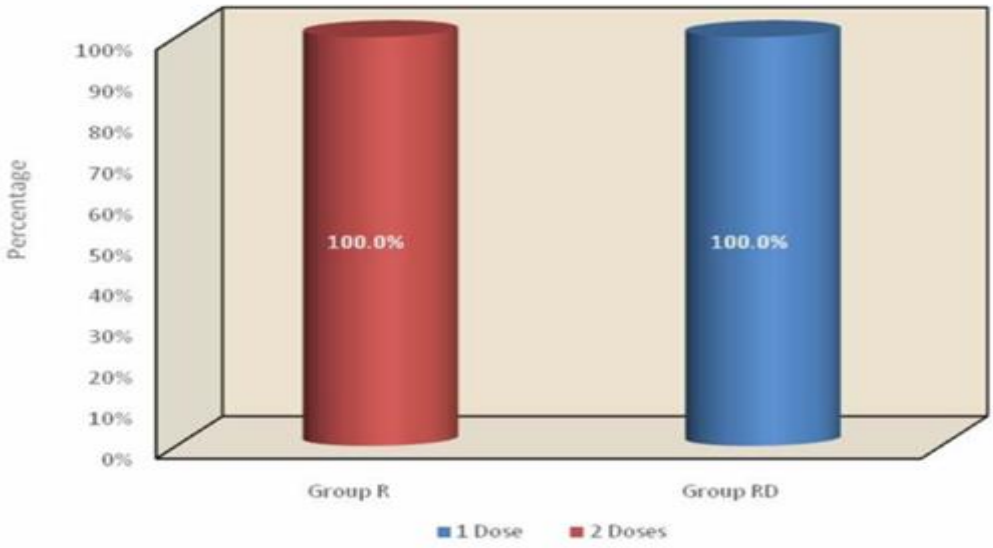
The test results demonstrated that the time of first rescue analgesia in Group R was at the 6th postoperative hour in all patients (100%) as opposed to need for first rescue analgesia at 12th hour in all patients(100%) of RD group and results were statistically significant with p value < 0.001




**Group 3: Distribution of time of first rescue analgesia between group R and group RD**

**** - Statistically Significant***

The test results demonstrated that total analgesic consumption by patients were in the form of two doses in 100% patients in group R and one dose in 100% of patients of group RD, and these results were statistically significant with p value < 0.001.




**Graph 4: Distribution of total analgesic consumption in 24 hrs. between group R and group RD**

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## DISCUSSION

Dexamethasone, a very potent and highly selective glucocorticoid has been used as an adjuvant to local anaesthetics in various nerve blocks resulting in variable effects on onset but prolonged duration of analgesia and motor block. Ropivacaine is well tolerated local anesthetic agent with less toxic potential and better sensorimotor differentiation.[1]

In our study, the age of patients in group R were between 36-55 with mean age as 46.67 while in group RD age ranged between 35-54 with mean age as 44.20. This finding was similar to that in the studies conducted by Uma Datt et al[3] and Jyoti Deshpande et al.[1]

Ultrasonography-guided TAP block is an effective peripheral abdominal field block that blocks the ilioinguinal, iliohypogastric and lower intercostal (T7–T11) nerves. TAP block has been utilized as a part of multimodal regime for post-operative analgesia in various surgical procedures involving lower abdominal wall incision, total abdominal hysterectomy.[4]

For regional anaesthesia, local anaesthetics alone provide good operative conditions but have shorter duration of post-operative analgesia. Hence, various adjuvants such as opioids, clonidine and ketamine are added to local anaesthetics to achieve a quick, dense and prolonged block, but their use is limited by side effects such as nausea, vomiting and pruritus.[4]

In our study the VAS scores recorded at 2hrs, 4hrs, 6hrs, 12hrs and 24hrs in group R patients was higher as compared to the scores recorded in group RD patients. That is, the effect of analgesia in group RD was found to be better as compared to the effect seen in group R patients. Also, in group R patients, all of them required a rescue analgesic within 6 hours post-operatively whereas the group RD patients tolerated pain better and required the first rescue analgesic within 12 hours post-operatively. At the end of 24 hours, all patients in group R required 2 doses of analgesic (injection diclofenac 75mg) whereas all patients in group RD required only 1 dose of the same. These results are in complete tandem with the results seen in a study done by Jyoti et al.[1] where they added dexamethasone to Ropivacaine in Transversus Abdominis Plane Block for Transabdominal Hysterectomy under Subarachnoid Block and found that addition of dexamethasone to Ropivacaine TAP block provided lower postoperative VAS pain score, longer time of first analgesic, lesser tramadol (their choice of analgesic) requirements during postoperative 24 h, and lower incidence of nausea and vomiting as compared to control group. No complications or adverse effects related to procedure were observed.

Few other studies also supported the combination of dexamethasone to Ropivacaine in TAP block for better outcome. Cummings et al. reported longer analgesia when dexamethasone was added to Ropivacaine or bupivacaine for interscalene block, with the effect being more potent with Ropivacaine.[5]

El Sharnouby and El Gendy conducted a study with dexamethasone and isobaric bupivacaine in TAP block for laparoscopic bariatric surgeries. They found a significant improvement of analgesia as well as reduced incidence of nausea and vomiting promoting early ambulation in dexamethasone group. They also observed that the addition of 4 mg dexamethasone was equipotent to 8 mg dexamethasone for TAP block.[6] This encouraged us to select a lower dose that is 4 mg dexamethasone for our study. In accordance with the previous studies, our study also demonstrates that the dexamethasone can be used as adjuvant with ropivacaine in TAP block when spinal additives are contraindicated or not used.

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## CONCLUSION

Thus, we conclude that addition of Dexamethasone to Ropivacaine in ultrasound guided Transverse Abdominis Plane block provides better post operative analgesia in patients undergoing total abdominal hysterectomy as compared to plain Ropivacaine and this can be imbibed as an effective modality into regular clinical practice.

## SUMMARY

Total abdominal hysterectomy is the most commonly performed gynecological surgery following which the patient normally suffers from significant pain.

The transversus abdominis plane block is a regional anaesthetic technique used to provide analgesia to the anterior and lateral abdominal wall. It is an effective method to reduce postoperative pain and analgesic consumption in such cases. Various adjuvants have been used along with local anaesthetics like Ropivacaine to prolong the effects of transversus abdominis plane block with promising results, Dexamethasone bring one of them.

In our study, patients were randomized into two groups where one group received Ultrasound guided Bilateral transversus abdominis plane block with 20ml of 0.25% Ropivacaine and 1ml of dexamethasone (4mg) on each side while the other group received Ultrasound guided Bilateral transversus abdominis plane block with 20ml of 0.25% Ropivacaine and 1ml of normal saline on each side.

It was inferred that effect of TAP block with Ropivacaine and dexamethasone yielded better post operative outcomes in terms of lower VAS scores, better operative analgesia and delayed requirement of first rescue analgesia.

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