



EFFECT OF ADDITION OF DEXAMETHASONE TO LEVOBUPIVACAINE ON POST-OPERATIVE ANALGESIA IN ULTRASONOGRAPHY-GUIDED TRANSVERSUS ABDOMINIS PLANE BLOCK FOR INGUINAL HERNIA REPAIR: A PROSPECTIVE RANDOMIZED COMPARATIVE STUDY

Anaesthesiology

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ABSTRACT

INTRODUCTION- Postoperative pain is literally a form of acute pain which follows surgical insult with an inflammatory reaction and initiation of an afferent neuronal signal bombardment. Due to inadequate management of postoperative pain many patients continue to suffer unnecessarily. Hence it is understood that managing the post operative pain effectively is the need of the hour to reduce postoperative morbidity. **AIMS -** To evaluate and compare the duration of sensory blockade of 0.25% levobupivacaine with and without dexamethasone in ultrasonography-guided transversus abdominis plane (TAP) block. **METHODS-** After obtaining approval from Institutional ethical committee, a prospective randomized comparative study was carried out in 60 patients of ASA Grade I & II undergoing inguinal hernia repair under spinal anaesthesia. Patients were randomly divided into 2 groups; Group L (n=30) received 30ml of 0.25% Levobupivacaine with 2ml of Normal saline (NS) while Group D (n=30) received 30ml of 0.25% Levobupivacaine with 8mg Dexamethasone. **RESULTS-** Patients in group D (8.07±1.34 hr) had prolonged duration of analgesia in comparison to group L (5.33±1.92 hr) (p= 0.000). **CONCLUSION-** In the inguinal hernia repair surgeries performed under spinal anaesthesia with ultrasonography-guided TAP block, addition of dexamethasone was superior to levobupivacaine alone in providing better and prolonged post-operative analgesia with minimal post-operative nausea and vomiting.

KEYWORDS

Ultrasonography, TAP block, Levobupivacaine, Dexamethasone.

INTRODUCTION:

Postoperative pain is literally a form of acute pain which follows surgical insult with an inflammatory reaction and initiation of an afferent neuronal signal bombardment. Due to inadequate management of postoperative pain many patients continue to suffer unnecessarily.¹ Pain following abdominal surgery is primarily due to the incision made in the abdominal wall while rest of the pain resulting from internal visceral injury. Peripheral neural blockade like transversus abdominis plane block has brought a new school of thoughts in regional anaesthesia and that it is now a well-accepted component of multimodal analgesia. The transversus abdominis plane (TAP) block can provide pain relief to the noxious stimulus from the skin and muscles of the anterior abdominal wall in addition to the parietal peritoneum.² More than 60% of ambulatory patients who underwent inguinal hernia repair experienced moderate to severe postoperative pain at home. Therefore use of an effective adjuvant along with local anaesthetic to prolong the postoperative analgesia is an impending need.³ Dexamethasone is one sort of that drug which acts synergistically with local anaesthetics in blocking the impulses conducted in the nerve fibers. It modifies the function of potassium channels in excitatory neurons. It occupies the glucocorticoid receptors located in the endothelium of cutaneous blood vessels.⁴ It produces prolonging action of local anaesthetic action by causing vasoconstriction.⁵ Hence present study has been designed to find out the effect of dexamethasone addition to levobupivacaine in Transversus Abdominis Plane (TAP) Block for post-operative pain relief.

MATERIALS AND METHODS:

The present study entitled "EFFECT OF ADDITION OF DEXAMETHASONE TO LEVOBUPIVACAINE ON POST-OPERATIVE ANALGESIA IN ULTRASONOGRAPHY-GUIDED TRANSVERSUS ABDOMINIS PLANE BLOCK FOR INGUINAL HERNIA REPAIR: A PROSPECTIVE RANDOMIZED COMPARATIVE STUDY" was carried out in Department of Anaesthesiology, J.A. Group of Hospitals and G.R. Medical College, Gwalior (M.P.) from January 2019 to October 2020 after approval from Institutional ethical committee in patients of ASA grade I and II scheduled for inguinal hernia repair. Method of Randomization was Sealed Envelope Technique. Grouping: Patients were randomly divided into 2 groups:

1. Group L (n=30) - 30ml of 0.25% Levobupivacaine (28ml

Levobupivacaine + 2ml of Normal saline (NS).

2. Group D (n=30) - 30ml of 0.25% Levobupivacaine with 8mg Dexamethasone (28ml Levobupivacaine + 2ml of Inj. Dexamethasone).

Inclusion Criteria:

- Patients scheduled for inguinal hernia repair surgeries.
- Patients of ASA grade I and II.
- Males of age group - 18-75 yrs.
- Weight 50-90 kg and height $\geq$ 150 cm
- Able to provide written informed consent.
- Willing to participate in study

Exclusion Criteria:

- Uncooperative patients / Not able to understand pain assessment test
- History of allergy or sensitivity or any other reaction to local anaesthetic of amide type.
- Known case of Diabetes Mellitus.
- Hypertensive patient
- History of significant neurological, psychiatric or neuromuscular disorder.
- Cardiac disease
- Patient with elevated AST, ALT values.
- History of bleeding disorder
- Morbid obesity.

After proper explanation of technique and positioning, mark was made at costal margin and iliac crest with a high frequency ultrasound probe was placed transverse to the abdominal wall between the markings. Under all aseptic precautions & after local infiltration of 2ml of 2% Lidocaine, a 22G 50mm needle was introduced in plane of the ultrasound probe directly under the probe (in plane technique) and advanced until it reaches the plane between the internal oblique and transversus abdominis muscles. The needle could also be introduced a few centimeters medial to the probe (a distance equivalent to the depth of the plane as viewed on the ultrasound image). Up on reaching the plane, 2 ml of saline was injected to confirm correct needle position after negative aspiration of blood, the study drug was injected. The transversus abdominis plane was visualized expanding with the injection (appears as a hypo echoic space). Just following the induction of block, under aseptic precautions, spinal anaesthesia was administered using 3 ml of 0.5% Inj. Bupivacaine (hyperbaric) at L3-4

or L4-5 intervertebral space with 25-gauge Quincke tip spinal needle (BD™ India Pvt. Ltd). Co-loading with a crystalloid solution at 10 mL/kg was done before administering spinal anaesthesia.

Statistical analysis was carried out using SPSS 21 software (IBM SPSS, New York, USA.). Kolmogorov-Smirnov Test used for verifying the normally distributed variables. Independent "T" Test was used to analyse the normally distributed continuous variables while rest of the variables were subjected to Mann Whitney U test for comparison. Study data of continuous variables were expressed as mean $\pm$ standard deviation. Chi Square test was used to compare the categorical variables. Statistical significance was considered, when the p value was <0.05 .

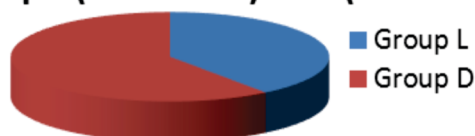
RESULTS:

Results showed that the study groups were comparable in respect to age, sex, weight & duration of surgery and the differences are statistically not significant ($p > 0.05$). Also hemodynamic variables such as pulse rate (PR), systolic blood pressure (SBP), diastolic blood pressure (DBP), mean arterial pressure (MAP), oxygen saturation (SpO₂) and respiratory rate (RR) were comparable among the study groups ($p > 0.05$).

Also the Group D (10.27 ± 1.26 min) has prolonged time for rescue analgesia (TFA) than Group L (7.87 ± 1.57 min) and the differences were statistically highly significant ($p < 0.001$).

PIE DIAGRAM SHOWING DURATION OF ANALGESIA AMONG THE STUDY GROUPS

Duration of Analgesia (hr)
Group L (5.33 ± 1.92) Vs D (8.07 ± 1.34)



p value = 0.000 Statistically highly significant

TABLE 1 SHOWING STATISTICAL COMPARISON OF OPIOID CONSUMPTION AMONG THE STUDY GROUPS

Parameters	Group L	Group D	P value
	Mean $\pm$ SD	Mean $\pm$ SD	
Total Opioid Consumption (mg)	274.50 $\pm$ 66.3	224.33 $\pm$ 60.2	0.003*

*Statistically significant

GRAPH SHOWING THE NUMERICAL RATING SCALE (NRS) SCORES FOR POST-OPERATIVE PAIN ASSESSMENT AMONG THE STUDY GROUPS:

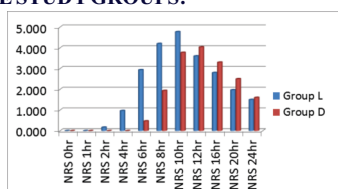


TABLE 2 SHOWING STATISTICAL ANALYSIS OF SIDE EFFECTS AMONG STUDY GROUPS:

Complications	Group L		Group D		P Value
	No.	%	No.	%	
Nausea	6	20	1	3.33	0.044*
Vomiting	2	6.66	0	0	0.15
Respiratory depression	0	0	0	0	0
Dyspnea	0	0	0	0	0
Bradycardia	0	0	0	0	0
Hypotension	0	0	0	0	0
Shivering	1	3.33	0	0	0.31

*Statistically significant

DISCUSSION:

Inguinal hernia is the most common general surgical day care procedure worldwide. It has a significant male preponderance ratio of 10:1 (male: female). Inguinal hernias are mostly indirect while that recurrence is associated with direct hernias. Post-operative pain associated with any inguinal hernia surgery can be associated with the nerve fibres arising from anterior abdominal wall and parietal peritoneum but not viscera. The pain management techniques should be focussed and precise to attenuate such noxious responses occurring following wound inflicted during hernia repair.

Adequate pain relief following inguinal hernia repair enables early ambulation of patient with less hospital stay and promotes early resumption of daily activities. Prolonged immobilization due to pain in the postoperative period, predisposes the patient to the risk of developing deep vein thrombosis and pulmonary thromboembolism. If the postoperative analgesia is prolonged by administering TAP block, pain free postoperative period is achieved with minimal side effects due to opioid usage. Transversus Abdominis Plane (TAP) block is a regional anaesthetic technique in which anterior abdominal wall muscles are pierced by a needle and drug deposited in the plane between internal oblique and transversus abdominis muscle either by landmark technique or by ultrasonography (USG) guidance.

The exact perineural infiltration dose of Dexamethasone in peripheral nerve blocks has not been described elsewhere. Safe range of dose for Dexamethasone used in previous studies was found out to be 4-8 mg. According to Desmet et al⁷, claimed in their study that both intravenous and perineural Dexamethasone had comparable action on prolonging the duration of analgesia and also doses <0.1 mg/kg had failed to cause any opioid sparing effect. The proposed dose of Levobupivacaine for peripheral nerve blockade is 150mg. In the present study 0.25% Levobupivacaine has been used (28ml + 2ml Dexamethasone/saline) instead of 0.5%. Other studies with 0.5% Levobupivacaine has been done earlier as 0.5% Levobupivacaine is having more motor blockade & denser analgesia and in our study we are using Levobupivacaine for post-operative analgesia.

In the present study TAP block was given before induction of anaesthesia and start of surgery. Multiple studies performed TAP block immediately after induction of general anaesthesia and before the start of skin incision.⁷⁻¹⁶ Some of the studies performed TAP block at the end of the surgery induced under spinal anaesthesia.¹¹⁻¹³ Few studies performed TAP block at the end of the surgery or before extubation under general anaesthesia.^{2,14-16} While Aveline C et al¹⁷ performed TAP block before induction of anaesthesia similar to our study.

Addition of Dexamethasone as an adjuvant not only prolonged the duration of analgesia but also minimised the consumption of tramadol as rescue analgesia which was in concordance with various studies.^{7,12,18} Also, Time for First Rescue Analgesia (TFA) was significantly increased due to Dexamethasone addition and same finding was upheld by similar studies.^{19,20}

LIMITATIONS AND SCOPE OF OUR STUDY:

Limitation of our study was that use of sub-arachnoid block for induction of anaesthesia. TAP block potentiation of spinal anaesthesia could not be denied as TAP block was administered just before induction of spinal anaesthesia. Also higher dose of Dexamethasone had no effect on adjuvant action. Hence lower doses of Dexamethasone could be considered for further studies as there is no significant difference between different doses of Dexamethasone used in peripheral nerve blocks.

CONCLUSION:

In the inguinal hernia repair surgeries performed under spinal anaesthesia with ultrasonography-guided transversus abdominis plane block addition of dexamethasone was superior to levobupivacaine alone in providing better and prolonged post-operative analgesia with minimal post operative nausea and vomiting.

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