Original Research Paper

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A RANDOMISED CONTROLLED STUDY COMPARING THE EFFICACY OF 0.5% BUPIVACAINE WITH 0.75% ROPIVACAINE IN FIELD BLOCK FOR HERNIA REPAIR SURGERY.

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ABSTRACT **Background:** This study was done to compare the efficacy and advantages of the drugs 0.5% Bupivacaine and 0.75% Ropivacaine for field block in inguinal hernia repair.Study was conducted on 60 patients posted for elective inguinal hernia repair , dividing into 2 groups – Bupivacaine (B) and Ropivacaine (R). Field block was instituted with mean volume of 35ml to block ilioinguinal, iliohypogastric, genital branch of genitofemoral nerve along with subcutaneous infiltration. Patients were observed for onset, adequacy, duration of post-operative analgesia, side effects and surgeon satisfaction as well. **Methods:** Onset of block is assessed on visual analogue scale (VAS) by pin prick test from 3rd minute , then every 30 seconds(sec). Adequacy of block was judged by the need for supplementary analgesics. Post recovery status was assessed every 15 mins by verbal rating score(VRS) for an hour and every hour by the unit intern in the ward. Rescue analgesia were given if complained of pain. **Results:** The onset of blockade was around 3-6min in Bupivacaine whereas Ropivacaine takes 7-15min average which is less significant. The adequacy of block requiring no supplementation, is 63.3% in B group and 56.7% in R group which is statistically insignificant. With respect to the duration of post operative pain relief in B group 66.7% needed analgesic after 5 hrs of the block whereas in R group it is 73.3%. Both groups had good haemodynamic and respiratory stability throughout the study**. Conclusion:** Inguinal field block is found to be safe and fulfils the requirements of adequate analgesia and relaxation with haemodynamic and respiratory stability ,with minimal or no side effects. Ropivacaine compared with Bupivacaine is less cardiotoxic, also providing efficient analgesia, adequate relaxation with good post operative pain relief , hence safe to use in patients with respiratory and cardiovascular compromise.

KEYWORDS : Inguinal field block, Ropivacaine, Bupivacaine.

INTRODUCTION:

Hernia repair is one of the commonest surgery among worldwide operations. Herniorraphy and Hernioplasty are the techniques for Inguinal hernia repair. Newer techniques of laparoscopic mesh repair are also into practice.

Hernia repair can be performed under spinal, epidural, general anaesthesia and local anaesthesia[1,2,3]. And postoperative analgesia is now regarded as an integral part of the surgical care[8,9,10]. Insufficient analgesia can have significant pathophysiological and psychological effects manifesting as haemodynamic changes , tachypnea , altered gastrointestinal motility, impaired urinary tract function.

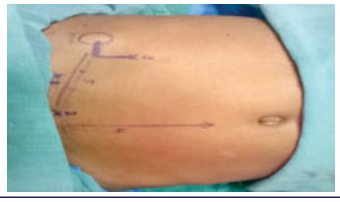
Compared to the techniques of spinal / General anaesthesia , field block does not provide a satisfactory level[5,6,7], but provides prolonged postoperative analgesia, reduced urinary retention and early ambulation. Also being a cost effective method and preferred anaesthesia in geriatric patients with underlying systemic pathology, finds useful in day care surgery warranting a speedy recovery[11,12].

The introduction of Bupivacaine and Ropivacaine , other amide local anaesthetic agents with longer duration of action when compared with lignocaine has an added advantage of providing prolonged post op analgesia[16]. Ropivacaine compared with bupivacaine has better cardiac stability with comparable analgesia[14]. Hence this study is undertaken to objectively test the efficacy of block and compare between the two drugs

- The onset of analgesia
- The adequacy of block
- The duration of postoperative pain relief
- Side effects if any,
- Haemodynamic changes

METHODOLOGY

Nerves of interest for the inguinal field block are the ilio inguinal, ilio hypogastric, genitofemoral and lateral cutaneous nerves of thigh.



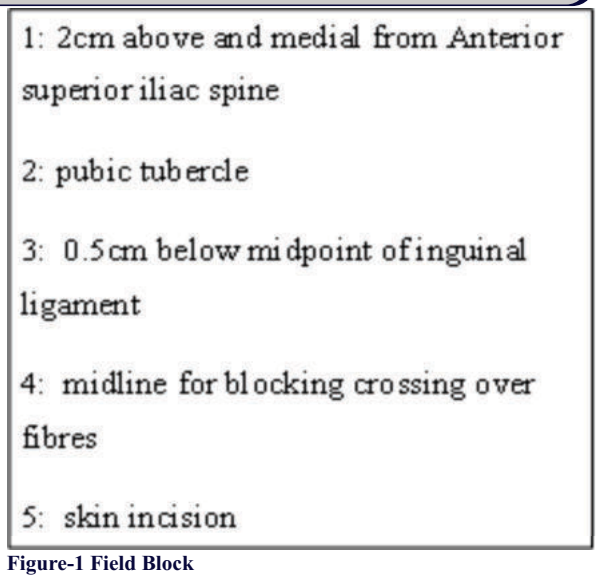


Figure-1 Field Block

Procedure Of Field Block For Inguinal Hernia Repair:

The block was done using the technique described by Pinnock et al[13] (fig-1). Under strict aseptic precautions, 40 ml of solution for the block (20ml of LA + 20ml of distilled water) was prepared by the researcher who is blinded further in the study. A skin wheal is made half an inch medial and superior to anterior superior iliac spine (ASIS). A 22G hypodermic needle was fixed to a syringe containing 10 ml of the local anaesthetic, was directed perpendicular to the skin. The needle was placed above the Internal oblique aponeurosis piercing the External oblique aponeurosis and 2 ml of local anaesthetic was given and 4 ml was given in a fan shaped manner at 45 degree. (Total = 2+2+2ml) . The Internal oblique aponeurosis pierced and local anaesthetic injected in a fan shaped manner over the Transversalis fascia (TF). (Total = 2+2+2ml) . A second wheal was made over the pubic tubercle (PT) and 5 ml of local anaesthetic was injected . A third skin wheal was raised 0.5 cm above the midpoint of inguinal ligament (MIL) and 5 ml of local anaesthetic deposited .Then by using 23G spinal (quincke's) needle, a subcutaneous infiltration was done along the midline to block the crossing over fibres. (8ml) . A 5 ml of local anaesthetic was infiltrated

along the line of incision . So a total of 35ml was given for the block and 5ml was reserved to be given at the neck of the sac , if needed during the traction.

Dosing Of Local Anaesthetics:
Maximal dose of Bupivacaine is 2 mg/kg and Ropivacaine is 3 mg/kg .The mean weight of the patients in the study is 60.0 kg and mean volume of LA used is 35 ml (20ml LA +20ml distilled water). The equipotent dosing of Ropivacaine and Bupivacaine is 1.5:1. It becomes clear that the total dose of local anaesthetic used lies within the recommended safe dosage[15].

MATERIALS & METHODS:

This Prospective Double blinded study was conducted at Mahatma Gandhi Memorial Government Hospital, Trichy, undertaking 60 patients aged 18-60 years under ASA 1 & II within BMI 18-25 during June 2021 to January 2022. They are posted for elective, unilateral, reducible inguinal hernia repair, agreeing and co-operative for inguinal field block. Patients who refuse to cooperate, allergic to local anaesthetics or with uncontrolled systemic diseases, also with huge or strangulated hernias were excluded. 30 cases with Bupivacaine (Group B) and 30 cases with Ropivaciane (Group R) were randomised by coin toss method. Pre-anaesthetic evaluation was done a day prior to surgery with the procedure explained and consent obtained.

An intravenous line was secured with 18G IV cannula and were given maintenance I.V fluid 20ml/kg 4hours before the procedure and they were asked to void. Pre-medication with injection midazolam 1mg iv before performing the block. The pulse rate, oxygen saturation , blood pressure and a continuous ECG tracing were monitored continuously throughout the study every 5min during the procedure and then at an interval of 15min until the patient is shifted to the general ward.

Onset of block was assessed on VAS by pin prick test (22G hypodermic needle) at the skin dermatomes involved in the surgical field from 3rd min and every 30 seconds. Adequacy of the block is assessed by the subjective pain perception by VAS score, relaxation level by the surgeon's verdict and mobility of the patient. Accordingly the adequacy of the block is graded from 3 to 0 as adequate with no supplementation, adequate with minimal supplementation, inadequate or failed. The patients are supplemented with local infiltration for mild pain, a narcotic (inj. fentanyl 2mcg/kg iv) for moderate pain and GA for the block failure patients.

At the end of surgery , patients were observed in the recovery room for 60min and assessed by recovery room nurse every 15 min by VRS (table-1) before discharging to ward.

Table –1 Verbal Rating Score

VRS	VAS	PAIN
0	0-1	NO PAIN
1	2-4	MILD
2	5-7	MODERATE
3	8-10	SEVERE

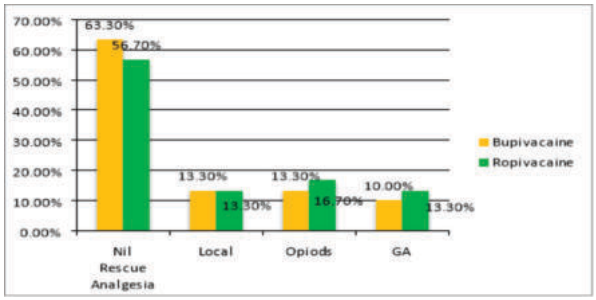
The surgeon satisfaction were also assessed by surgeon's satisfaction scale of 0 to 6 based on comfortness (0- good, 1- adequate, 2- inadequate), field clarity (0- clear, 1-messy, 2- bloody), patient's movements (0 - nil, 1- fidgety, 2- gross movements) and a satisfaction score of 0 to 6 from dissatisfied to very satisfied.

Postoperative pain relief is defined as time lasting from completing the block to the first requirement of analgesia. The pain score was assessed on VRS by the unit intern every 30min. Rescue analgesia was given with I.M. Diclofenac for severe pain and oral paracetamol 1gm for mild to moderate pain.

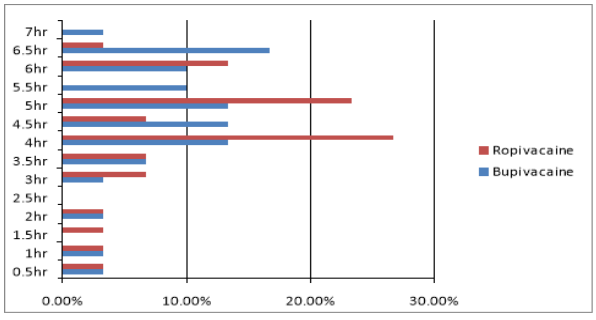
OBSERVATION & RESULTS:

The results are analysed statistically using SPSS (Statistical presentation system software) for Windows, version16.0 Patient in R group had an onset of block in the first 5min inferring ropivacaine has slower onset compare with bupivacaine. The average onset of block in the Bupivacaine group was 5.7min whereas the Ropivacaine group 11.3min which is statistically significant

Regarding the adequacy of block, 13.3% are graded in mild pain in both groups. With inadequate analgesia and relaxation 13.3% in B group and 16.7 % in R group required a narcotic supplementation. 10% in B group and 13.3 % in R group were block failures.



Graph-1 Comparison Of Adequacy Of Analgesia



Graph- 2 Post Op Analgesia Duration

The block failure patients were excluded from the study. The average duration of pain relief in Bupivacaine group is 4.71 and Ropivacaine is 4.15. A significance was noted between the two groups regarding the post-operative analgesic duration (Graph - 2) in the 5.5th hour and 6.5th hour. But the average duration not show a significance.

Comparison Of Surgeon Satisfaction
In both the groups (66.7% in B group & 63.3% in R group) the surgeons were quite satisfied with field block technique.The haemodynamics monitored throughout the study found to have no significant difference between the groups

DISCUSSION:

Inguinal hernia repair is one of the commonest surgeries in the world. In the advent of administering anaesthesia for the surgical correction, the technique of field block is safe, simple, cost effective, prolonged analgesia, speedy recovery with no or minimal side effects[4,5,6] . Since local anaesthetics do not hinder the respiratory and cardiovascular system in allowed dosage, good respiratory stability and haemodynamic stability were maintained. Hence it can be employed in the day care set up[10,11,12].

The advantage of field block over local anaesthesia is the almost complete coverage of the skin dermatomes involved in the surgical area; which is sometimes spared in local infiltration[7,10]. The precise blocking of the nerves in the field, avoiding multiple pricks provides good co-operation from the patients a well. Since Bupivacaine has cardiotoxic[15] properties even at a lower dosage, Ropivacaine was studied and compared for its potency and efficacy[16].

It was observed that the onset of block is slower in Ropivacaine yet comparable with Bupivacaine. The adequacy of the block and a good post operative pain relief duration showed no significance proving that ropivacaine is as good as bupivacaine. The haemodynamics were stable throughout the study. There were few side effects in both the groups like nausea, headache and a wound hematoma but poses no significance &even the surgeon satisfaction level was at the happy side.

Thus, it is inferred that the inguinal field block is adequate for hernia repairs and ropivacaine proves to be a better alternative for bupivacaine in view of adequate analgesia as well a longer post operative pain relief with a low threshold for cardiac toxicity.

CONCLUSION:

Inguinal field block is found to be safe as par with GA/ neuraxial blockade and fulfills the requirements of adequate analgesia and relaxation with better haemodynamic and respiratory stability, with

minimal or no side effects providing a longer postoperative pain relief. Thus field block can be a preferred choice for the day care inguinal hernia repair as it reduces the narcotic usage post operatively facilitating early ambulation .

Ropivacaine being cost effective provides comparable onset, efficient analgesia, with good postoperative pain relief and with its lower cardiac toxicity property makes it a better alternative for bupivacaine.

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