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A Comparative Clinical Study of Effect of Hyperbaric Levobupivacaine & Bupivacaine for Spinal Anaesthesia in Patients Undergoing Elective Lower Abdominal & Limb Surgeries

KEYWORDS

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introduction

spinal anaesthesia defined as regional anaesthesia obtained by blocking nerves in the subarachnoid space was introduced in clinical practice by karl august bier in 1898. spinal anaesthesia using local anaesthetics, like hyperbaric bupivacaine is one of the most popular drug for both elective and emergency surgical procedures.

hyperbaric bupivacaine in 8% glucose is often used. bupivacaine has been in clinical use for more than 30 years. in 1957, ekenstam and his colleagues synthesized bupivacaine hydrochloride which was clinically introduced in 1963 . bupivacaine rapidly gained popularity for surgeries of longer duration. although it has slow onset of action, it produces good muscle relaxation, prolonged sensory and motor blockade. duration and quality of motor and sensory blockade is dose dependant . but increasing the doses of this hyperbaric bupivacaine leads to increased cephalad spread of drug which accounts for more incidences of hypotension, bradycardia and in some cases, respiratory difficulty and cardio-respiratory arrest. cardiovascular and central nervous system toxicity resulted in continuing search for new and safer local anesthetic agents.

levobupivacaine is the relatively new amino amide local anaesthetic agent that was introduced in the market in 1999. levobupivacaine is the pure s (-) enantiomer of racemic bupivacaine . Protein binding of levobupivacaine is more (97%) than that of racemic bupivacaine (95%). LesS than 3% of the drug circulates free in plasma. The free proportion of the drug can have an action on the other tissues, causing unwanted side-effects and toxic manifestations but due to less free volum of drug there is less toxicity to CVS and CNS. its use in subarachnoid block may there offer special advantages because this property may translate to a more pre-dictable spread & less side effects. in this study, we evaluated the influence of levobupivacaine on onset & duration of motor & sensory block ,effects on cardiovascular system & incidence of side effects, like hypotension & bradycardia & compare with clinical effect of hyperbaric bupivacaine in spinal anesthesia for lower abdominal & lower limb surgery.

Material & Methods:

This study was conducted at Dhiraj General Hospital in Department of Anaesthesiology in 2013-2015. we conducted a study on 60 patients of ASA-I and II of American Society of Anesthesiologists' classification between the ages of 20-60 years, who were admitted for lower abdominal or lower limb surgeries under spinal anaesthesia. The patients were randomly divided into two equal groups.

INCLUSION CRITERIA

Patients in the age range 20-60 years.

ASA risk category I and II.

No known history of allergy, sensitivity or other form of reaction to local anesthetics of the amide type.

Patients were divided into two groups:

Group B - Patient received intrathecally hyperbaric bupivacaine 3.2ml (inj.bupivacaine 15 mg(3ml) + 1ml 0.9% NS)

Group L - Patient received intrathecally hyperbaric lecobupivacaine 3.2 ml (inj levobupivacaine 15mg (3ml) +1 ml 25% dextrose)

Anaesthetic technique:

On arrival of patient in the operating room - An intravenous line was secured with 18G canula. Preloading with ringer lactate at 10ml/kg was started. All the patients were pre medicated with Inj. Ondensetron 4mg and Inj. Ranitidine 50 mg and inj. Glycopyrolate 0.2mg intravenously.

Standard monitors were applied - ECG , NIBP, and oxygen saturation were monitored via multi para monitor and vital parameters (pulse, blood pressure, respiratory rate, SpO_2 and temperature) were recorded.

The spinal technique used:

Under strict aseptic and antiseptic precaution, standard subarachnoid block was performed in the sitting position Skin & subcutaneous infiltration was done with 2 ml of 2 % Lignocaine. Spinal needle was inserted in the midline with the bevel facing upwards at L3-4 or L4-5 inter-space. correct needle placement was identified by free flow of cerebrospinal fluid. Drugs for spinal anaesthesia were prepared under aseptic precautions. For (group B) 3 ml of bupivacaine(H) 3 ml was mixed with 1 ml of 0.9% NS & for (group L) 3 ml of leconupivacaine was mixed with 1 ml of 25D. Solutions were made in such a way that baricity and osmolarity of both the drugs were made similar. 3.2-3.4 ml of total study drug was injected over 5-10 seconds as per the group. The patient was placed supine immediately after injection to achieve at least T10 level of sensory block & Bromage scale of 3 for motor blockade. When the sensory block of T_{10} & Bromage scale of 3 was achieved surgeon was allowed to start with the surgery.

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Sensory block assessment
The onset of sensory block was measured from the time of injection till T_{10} dermatome was achieved which was determined bilaterally using pin prick test and cold test using spirit.

To assess the maximum level of the block; sensory block was assessed at 2 and 5 min post-injection and at 5-min intervals thereafter until two consecutive levels of sensory block were identical , after which assessment was done every 30 minutes till the completion of surgery.

Motor block assessment
The onset of motor block was assessed by using a Modified Bromage scale.

The degree of motor block was assessed from the time of injection at 2 and 5 min and at 5-min intervals thereafter until two consecutive degree of motor block was identical, after which assessment was done every 30 minutes till the completion of surgery.

Duration of motor block assessment was done from the time of onset of modified Bromage scale ≥3 till normal motor function returned.

Haemodynamic changes:
If the systolic blood pressure (SBP) decreased more than 30% below the pre-anesthetic value, it was to be considered significant hypotension and ephedrine 6 mg was given intravenously along with increasing the speed of infusion of intravenous fluid.

Significant bradycardia i.e. H.R. less than 20% of pre anaesthetic value or not less than 60/min, was treated with atropine sulphate 0.6 mg intravenously.

Intra-operative monitoring:
All patients of both groups were monitored for Heart rate (HR). Blood pressure (SBP&DBP), and Oxygen Saturation (SpO2) at 2, 5, 10,15,20,30 minutes and then half hourly till the surgery was completed and then every hour till the block regressed fully.

All pateients were shifted to ot recovery after aseesing the block & level of consiousness

Complications or Side effects:
all patient were monitered for complications like nausea, vomiting, bradycardia, hypotension, rigors Intra and postoperatively and treated accordingly if any. Patients were also observed for delayed side effects like headache & backache for 3 days.

Post operative analgesia:
Post operative pain was assessed by VAS(Visual Analogue Scale) to which , the patient was familiarized

RESULT
The study was conducted to compare the effect of intrathecal hyperbaric bupivacaine verses levobupivacaine in lower abdominal and limb surgeries.

60 patients belonging to ASAI/II, aged between 20 years and 60 years, posted for elective lower abdominal and lower limb surgeries were randomly allocated for the study.

group B: 30 patients received intrathecal 3.2ml of bupivacaine (15mg) + 1ml of 9% noarmal saline.

group L: 30 patients received intrathecal 3.2ml of levobupivacaine (15mg) + 1ml 25%dextrose.

the patients studied across the group didn't vary much with respect to age, sex, weight, height and ASA classification (p value >0.05) non significant.

the mean onset of sensory blockade was faster in group B was 1.53±0.507 minutes compared to group L (2.4+0.498 minutes) (p value <0.001) highly significant.

the mean onset of motor block was faster in group B (4.2+0.407 minutes) compared to group L (4.77+0.43 minutes) (p value <0.001) highly significant.

the maximum level of sensory block in group B and group L was T6 & T8 respectively, maximum patients had block upto T8 (group B- 46.7% 14/30 ptn & group l - 53.3% 16/30 ptn with p value > 0.05) non significant.

maximum degree of motor block attained in all patients was 3 MBS which was comparable (p value>0.05) non significant.

the mean duration of sensory block for group B was much longer 270+12.2 minutes than in group L 220+10.9 minutes p value 0.0525 which was statistically & clinically non significant .

the mean duration of motor block for group b was much longer 174.13+12.426 minutes than in group l 149.30+10.127 minutes p value < 0.001 which was statistically & clinically highly significant.

significant fall in systolic blood pressure in group b (9%,15%,18%,20% from baseline value)compared to group l(3%,5%,8%,12% from baseline value) at 5,10,15,30 min with (p value > 0.01) which was statistically significant.

the hemodynamic parameters were comparable amongst the two groups both intra operatively and post-operatively. oxygen saturation, respiratory rate were maintained in both groups intra operatively and post-operatively(p value >0.05) non significant..

VAS >3 was present in 10 & 15% (3 & 4 ptn) in group B & 20% & 35% (6 & 11ptn) of group L at 300 & 360 min respectively with p value<0.05. rescue analgesia was given in form of inj diclofenac sodium 75 mg.

2 (6%) patients in group B had bradycardia p value 0.15 non significant , 1(3%)patient in group L had hypotension and five (15%) patients in group B had fall in B.P >25% & required treatment. 2(6%) patients in both groups had nausea & vomiting (p >0.56) non significant . there were no other side effects/complications in either of the groups.

conclusion
we conclude that spinal anaesthesia performed with both local anaesthetic drug provides effective surgical anaesthesia. levobupivacaine provides satisfactory anaesthesia with slow onset & shorter duration of motor & sensory block with better haemodynamic stability .inj.bupivacaine has less vas score & longer duration of action. from our study we concluded that levobupivacaine can be used as a better & safer alternative to inj bupivacaine in spinal anaesthesia for elective lower abdomen & lower limb surgery.

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