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ORIGINAL ARTICLE

Effect of Intrathecal Hyperbaric Bupivacaine with Midazolam and Hyperbaric Bupivacaine alone in Lower Limb Orthopaedic Surgery

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***ABSTRACT*:**

Background: Spinal anesthesia is successful in alleviating postoperative pain which stretches out for long in postoperative period. Various methods have been attempted with a specific goal to make postoperative period free from agony. In this study anaesthetic properties of 0.5% hyperbaric bupivacaine with 0.4 ml saline and 0.5%hyperbaric bupivacaine with 2 mg of midazolam given intrathecally were compared. **Materials and Methods:** Patients of either sex (male = 44, female = 16), aged between 25-60 years, were randomly allotted to two groups (30 each). Group 1 patients were given 0.5% hyperbaric bupivacaine with saline intrathecally, and Group 2 patients were administered 0.5% hyperbaric bupivacaine with preservative free midazolam 2 mg intrathecally. Peak sensory level, motor blockade, duration of analgesia, pain score (on VisualAnalogue Scale), heart rate and blood pressure were monitored.**Results:** The duration of analgesia was higher in Group 2 (321 ± 25.5 minutes) versus Group 1 (157 ± 17.4minutes), and the pain score was less in Group 2 when compared with Group 1. The time of onset of sensory and motor block was longer in group 1. Hemodynamic changes did not vary in patient of either group. The side effects were negligible in both the groups. **Conclusion:** Intrathecal administration midazolam in with hyperbaric bupivacaine 0.5% delivers better quality of analgesia, longer span of absence of pain, with mellow sedation and negligible adverse symptoms.

Key Words: Hyperbaric bupivacaine, intrathecal midazolam, spinal anesthesia, postoperative analgesia.

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INTRODUCTION:

One of the essential points of anesthesia is to relieve patient's pain and anguish allowing execution of surgical techniques with no distress. Relief of postoperative agony has increased in significance considering immunological reaction to anxiety & detrimental effects of tissue damage.[1] Analgesia obtained in surgical field intra-operatively should be stretched into postoperative period, which is the time of extreme torment requiring consideration. So there is need to extend absence of pain with no adverse reactions in postoperative period. To accomplish this objective spinal anesthesia is unparalleled in a way that a little mass of medication can create significant reversible surgical anesthesia achieving all intents and purposes with desirable pharmacologic impact.[2] The primary explanations behind popularity of spinal block is that the block has all requisite characteristics that anesthesiologist can deliver dependably with a solitary injection. The variety of spinal anesthesia is managed by a number of local anesthetics and additive substances that permit control over level, onset and duration of spinal anesthesia. The appropriation of local analgesic arrangements inside the subarachnoid space decides the degree of neural blockade created by spinal anesthesia.[3] Lignocaine had been the only local anesthetic for spinal anesthesia for a considerable length of time. Its favorable properties are quick onset and greater motor block but its utilization has been embroiled in controversy & restricted by transient neurologic manifestations and cauda equina disorder following intrathecal administration.[4,5] Bupivacaine is three to four times more potent than lignocaine and has longer duration of action. Its disadvantages are slow onset of action and decreased motor blockade.Hyperbaric bupivacaine 0.5% is commonly used for spinal anesthesia. Despite the fact that the duration of action of bupivacaine is long, it does not deliver prolonged postoperative analgesia

beyond its duration of action. Hence an adjuvant is desirable for creating prolonged absence of pain in postoperative period. The discovery of opioid receptors and endorphins in spinal and supra-spinal areas soon prompted the utilization of spinal sedatives.[6] Midazolam is a benzodiazepine with remarkable properties compared to other benzodiazepines. It is water soluble at lower pH at which it is supplied. It becomes profoundly lipid soluble in vivo where the Ph is more. It has been found to have a spinally mediated anti-nociceptive impact.[7] The subarachnoid midazolam potentiates the blocking activities of local analgesics. It enhances the nature of sensory and motor block, without prolonging the time of recovery. It provides delayed postoperative pain alleviation without causing undue sedation. The subarachnoid midazolam is without unwelcome symptoms like bradycardia, hypotension, postoperative nausea, vomiting, pruritus, urinary retention and neurotoxicity.[8] A dose of 2 mg midazolam intrathecally has been observed to be suitable for easing postoperative agony with no adverse reactions. In this study we tried to assess pain relieving ability of intrathecal midazolam with bupivacaine in contrast with bupivacaine alone in postoperative period in patients undergoing elective lower limb surgery under spinal anesthesia.

MATERIALS AND METHODS:

60 patients, aged between 25-60 years of either sex undergoing elective lower limb surgery were included in the study. Patients with contraindications to central neuraxial blockade for instance gross spinal deformity, known sensitivity to medications utilized or the presence of peripheral neuropathy, were excluded from the study. Institutional morals board of trustees endorsement and informed educated consent for taking part in study was taken. A detailed pre anesthetic assessment of the patients included in the study was carried out. Routine examinations like hemoglobin, total leucocytecount, differential leucocyte count, ESR, complete urine examination, random blood sugar, electrocardiogram, chest x-ray, blood urea, serum creatinine were done. The patients were acquainted with theVisual Analogue Scale (VAS) and were explained how to respond to it. Patient's weight and stature was recorded. Only ASA-1,2 & ASA-3 patients were included in the study. Once the patient was moved to the operating room, multi-parameter monitors monitoring pulse, respiration, oxygen saturation, B.P., and electrocardiogram were connected. All resuscitation equipment & drugs were prepared anesthesia machine& oxygen supply checked. All patients were kept nil per oral for six hours for solids and three hours for liquids. No sedative premedication was given. Group 1 patients were given 0.5%hyperbaric bupivacaine (3ml) + 0.4 ml normal saline intrathecally. Group 2 patients were given 0.5% hyperbaric Bupivacaine (3ml) + 2mg (0.4ml) of preservative free Midazolam intrathecally. Spinal anesthesia was performed in sitting position under aseptic technique at L3-L4 interspace using 27G spinal needle with the distal port facing sideways. When free stream of cerebrospinal liquid was obtained the study drug was infused at a rate of 0.2 ml/s. The patient was then put in supine position without any tilt.Heart rate, blood pressure, and oxygensaturation (SpO2) were recorded at baseline, after intrathecal infusion, and afterward every 5 min until the motor effect started wearing. The duration of post-operative analgesia was counted from time of onset to administration of the first rescue analgesia (primary outcome).

RESULT:

The duration of analgesia was higher in Group 2 (321 ± 25.5 minutes) versus Group 1 (157 ± 17.4 minutes), and the pain score was less in Group 2 when contrasted with Group 1. The time of onset of sensory and motor block was essentially longer in group1. Hemodynamic changes did not vary in patient of either group. The side effects were negligible in both the groups. VAS score was found to be significantly higher in group 1.

Table 1: Demographic profile

Variable	Group 1 (n=30)	Group 2 (n=30)
Age (years)	35.7 ± 5.7	36.8 ± 4.8
M:F	22:8	24:6
Weight (kg)	55.9 ± 4.3	57.3 ±5.4
Height (cm)	163.7 ±6.2	162.3. ± 4.7
Total duration of analgesia (mins)	157 ± 17.4	321 ± 25.5
VAS score	54.5 ± 7.7	35.4 ± 4.5

Table 2: Result of study

Characteristics (mins)	Group 1	Group 2
Time taken for onset of sensory blockade	2.69 ± 0.74	2.14 ± .0 64
Time taken for regression of two segments	72.5 ± 8.6	89.8 ± 7.9
Time taken for onset of motor blockade	3.97 ± 0.89	3.21 ± 0.76
Duration of motor blockade	167 .7 ± 11.2	176 .6 ± 10.8

DISCUSSION:

Spinal anesthesia is the most utilized regional anesthesia technique. Local anaesthetic agents utilized for this regional anesthesia produce great intraoperative analgesia. But without addition of additives they are constrained in postoperative period of analgesia. Keeping in mind the goal of prolonging postoperative analgesia numerous Additives have been added to local anesthetic drug used in spinal anesthesia e.g. opioids, neostigmine, ketamine, clonidine etc. All of these have been used progressively over the last two decades to relieve postoperative pain.[9] Reactions in the postoperative period, for example, sickness, nausea, vomiting, pruritus, urinary retention and respiratory depression, render most adjuvants far from ideal. Reason for choosing intrathecal midazolam lies in our quest for ideal. The fact that it is an agonist at the benzodiazepine receptor site, a subunit of the pentameric gamma aminobutyric corrosive (GABA) receptor, agonist inhabitance of which improves the action of GABA at the GABA receptor. This receptor is a chloride ionophore that, when actuated, ordinarily settles the transmembrane potential at, or close to, the resting potential. In neurons, this commonly serves to diminish volatility.[10] Intrathecal benzodiazepine-initiated analgesia is spinally mediated. Restricting locales are GABA receptors, richly distributed in the dorsal root nerve cells, where the most fixation is found inside lamina II of the dorsal nerve cells, an area that assumes important role in preparing nociceptive and thermoceptive incitement.[11] Total involvement with intrathecal midazolam crosswise over species comprehensively affirms its safety, the pain relieving action and the absence of irreversible impacts.

This study was planned to investigate postoperative analgesia through intrathecal bupivacaine and bupivacaine with midazolam in lower limb surgery. The patients were chosen randomly to avoid any predisposition or to avoid any bias in results. Study was a two fold blinded controlled investigation where neither the patient nor the person who recorded the parameters knew about the group distribution of drug. The patients included in both groups were statistically matched in age, sex, height, weight & Vital parameters. Drug combination used in present study has been tested in past for their haemodynamic stability Goodchild CS,[12] Noble J Bahar M et al[13] and Batra Y.K et al.[14]

The duration of analgesia was significantly higher in patients given bupivacaine and midazolam (321 ± 25.5)in contrast with bupivacaine alone (157 ± 17.4) which is similar to previous studies.[15] VAS score was observed to be higher among the patients who received just bupivacaine in 0, first, second, third, and fourth hours in the postoperative period. In the present study onset of sensory blockade in group 1 was 2.69 ± 0.74 minutes in contrast with 2.14 ± .064 minutes in group 2 which was statistically significant. It demonstrates that addition of midazolam to local anesthetic decreases onset time & increases duration of analgesia. Onset of motor blockade in group 1 was 3.97 ± 0.89 minutes in contrast with 3.21 ± 0.76 minutes in group 2. Yegin et al[16] have found in their investigation that addition of 2 mg of midazolam to hyperbaric bupivacaine in spinal anesthesia does not delay onset of sensory and motor blockade in contrast with hyperbaric bupivacaine alone in patients undergoing perianal surgery. In studies by Gupta et al no significant difference was found in time of onset of sensory block(Gupta et al., 2007).[17] Variation in onset of sensory & motor blockade is well established through various studies. In the present study two segment regression of sensory level in group 1was 72.5 ± 8.6 minutes in contrast with 89.8 ± 7.9 minutes in group 2 which was significant. This demonstrates that midazolam mainly expands the term of sensory blockade. Bharti N and et al found that duration of sensory block was essentially longer in the midazolam group than the control (218 min versus 165 min, P< 0.001).[15] Accordingly we can reason that intrathecal midazolam builds the length of sensory blockade. In the present investigation, the span of motor blockade ingroup 1 was 167 .7 ± 11.2 minutes in contrast with 176 .6 ±10.8 minutes in group 2 which though statistically significant (P<0.001) has lesser clinical implication when compared with advantage of postoperative analgesia for longer duration. This demonstrates that addition of preservative free Midazolam with hyperbaric 0.5% Bupivacaine intrathecally prolongs postoperative analgesia without much delay in motor recovery.

CONCLUSION:

Taking everything into account, the postoperative analgesia is prolonged and is of enhanced quality when Midazolam is added to spinal Bupivacaine. Increase in duration of motor blockade being less than increase in sensory it is beneficial to use such a mix for comfort of patients in appropriate clinical settings.

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