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A COMPARATIVE STUDY OF INTRATHECAL DEXMEDETOMIDINE WITH INTRATHECAL MAGNESIUM SULFATE USED AS ADJUVANTS TO BUPIVACAINE

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ABSTRACT

BACKGROUND: This prospective double blind, randomized study was conducted to compare the Dexmedetomidine with magnesium sulfate added to hyperbaric bupivacaine in Spinal Anesthesia.

Materials and Methods: A total of 50 patients ASA grade I & II were randomly assigned into one of the two groups, containing 25 patients each. Group A (n=25) consist of patients receiving 3 ml of 0.5% hyperbaric bupivacaine and 0.1 ml (10mcg) Dexmedetomidine. Group B (n=25) consist of patients receiving 3 ml of 0.5% hyperbaric bupivacaine + 0.1 ml (50 mg) Mg.sulfate.

RESULTS: The mean time of onset of sensory block in group A was 2.28+1.173 and in group B was 7.04+3.23 min with p value <.001. The mean sensory Block time to reach max in group A was 5.60+2.915 and in group B was 14.32+4.67. The mean time of the onset of motor block in Group A was 4.48+1.851 and in group B was 10.76+5.027 that was significantly higher in group B(P value <.001) means motor onset was fast in group A. A mean Duration of motor block was 312.4+116.072 in group A and in group B it was 226.60+84.960. The duration of motor block was found to be significantly longer in Group A compared to Group B (p<0.001). Total duration of analgesia was significantly higer in group A (393.40+116.072) as compare to group B (304.40+80.885). (Pvalue <.001).

Conclusion: In present study we concluded that 10 micrograms of dexmedetomidine as adjuvant to spinal bupivacaine in surgical procedures of long duration has earlier onset and prolonged duration of sensory and motor block without associated significant hemodynamic alteration and provides excellent quality of postoperative analgesia. Intrathecal Mg also prolongs the duration of spinal analgesia, but this is less than intrathecal dexmedetomidine and is with a delayed onset.

KEYWORDS : Dexmedetomidine, Magnesium sulfate, Spinal anaesthesia.

INTRODUCTION

A number of adjuvants have been studied to prolong the effect of spinal anesthesia. Examples of neuraxial adjuvants include Opioids (Morphine, Fentanyl, Nalbuphine, Buprenorphine) Sodium bicarbonate (NaHCO3), vasoconstrictors (epinephrine), N-methyl-d-aspartate (NMDA) antagonists (Ketamine) and γ-aminobutyric acid (GABA) receptor agonists (Midazolam).There is a constant search about the drug which provides early onset of sensory and motor block and prolongs the analgesia duration with minimal side effects. Dexmedetomidine when added to intrathecal bupivacaine produce fast onset and a prolonged duration of sensory block and postoperative analgesia in elderly patients for lower limb surgery. However, recovery of motor block was delayed when dexmedetomidine is added.[1] Mg is a noncompetitive antagonist to NMDA receptors and has the potential to prevent central sensitization from peripheral nociceptive stimulation.[2] The present study was conducted to compare the Dexmedetomidine with magnesium sulfate added to hyperbaric bupivacaine in Spinal Anesthesia for lower limb and lower abdominal procedures.

MATERIALS AND METHOD

The double blind, randomized, comparative, study was done in 50 patients undergoing Lower extremity and lower abdominal surgery. Due permission from the institutional ethical committee and review board and written patients informed consent was obtained. Patients aged 20-50 yr (of either gender) with Height 160 -190 cm and weight 50 -90 kg and ASA grade I-II were included in the study. Patients with history of chronic disease like hypertension, diabetes mellitus, respiratory disease, epilepsy, cardiac disease and spinal deformity or infection at the local site were excluded. Sample size was calculated using expecting difference of mean detected in group A and B was 3.19±1.33. The sample size was calculated 4 subjects in each group with α error 0.05 and power 80% so for study purpose 25 subjects in each group was taken._Group A (n=25) consist of patients receiving 3 ml of 0.5% hyperbaric bupivacaine and 0.1 ml (10mcg) Dexmedetomidine. Group B (n=25) consist of patients receiving 3 ml of 0.5% hyperbaric bupivacaine + 0.1 ml (50 mg) Mg.sulfate. After taking informed consent and confirming overnight fasting patient was taken on the operation table. Baseline vitals like B.P., pulse rate, respiratory rate recorded. After securing 18G i.v. cannula, preloading was done with 10ml/kg Lactated Ringer solution. Vitals just before lumbar puncture were noted. Patient was placed in left lateral position. Lumbar puncture was performed in left lateral position at L3-L4 interspace with 25G quincke needle under strict aseptic conditions and the drug was given intrathecally at the rate of 0.2 ml/sec according to the allocated group. After the injection patient turned supine immediately. The patient was given 4.0 L/min of oxygen by venti- mask. Vitals was checked in every 5 mins for first 20 minutes, therafter every 10 mins till the end of the surgery. Hypotension was defined as a fall in mean arterial pressure greater than 20% from the baseline value and treated by incremental doses of mephentermine 6 mg i.v.

Bradycardia defined as fall in heart rate below 50 beats per min or below 20% from the baseline value and treated with incremental doses of atropine 0.4-0.6 mg i.v.Other adverse effect (if any) just after intrathecal injection or in peri-operative period noted and treated accordingly. The level of sensory block assessed in every 2 minuts after intrathecal injection of the study drug by using 20G hypodermic needle (pin prick method) on midclavicular line on both sides until the level had stabilized for 4 consecutive tests. The onset of sensory block defined as the time from the intrathecal injection of the study drug to the time taken to achieve anesthesia to pin prick at T10 dermatomal level.

Grading of sensory blockade:
0-Sharp pain.
1-Touch sensation only.
2-Not even touch sensation.

Postoperatively sensory block was tested in every 10 minutes until it regresses upto S2 dermatome. Onset of motor block defined as the time taken for motor block to reach Bromage 3. Duration of sensory block defined as the time taken for the sensory block to regress upto S2 dermatome from the highest level achieved. Degree of motor block assessed in every 5 minutes till highest Bromage score is achieved and every 30 mins postoperatively. Duration of motor block assessed by recording the time elapsed from the maximum to the lowest Bromage score. Any adverse effects like nausea and vomiting was noted.

The qualitative data were presented as proportion and percentage and the quantitative data were presented as mean and standard deviation. Student's t test was used to find out the significance of study parameters on continuous scale (intergroup analysis) in means between two groups and the difference were analyzed by using chi square test. Significance is assessed at 5% level of significance. P value <0.05 was consider significant. Statistical software: The statistical software SPSS 20 and primer were used for the data analysis.

RESULTS

There were no statistically significant differences in the demographic data among all the groups. The mean age of the patients in group A was 41.8 years and in group B was 39.08 years. The mean weight of the patients in group A was 62.4 kg and in group B was 59.64 kgs. The duration of surgery was different in both groups but statistically not significant (p>0.05). The mean time of onset of sensory block in group A was 2.28+1.173 min and in group B was 7.04+3.23 min with p value <.001.(Fig:1) The mean sensory Block time to reach max in group A was 5.60+2.915 min and in group B was 14.32+4.67 min.(Fig: 2) The mean time of the onset of motor block in Group A was 4.48+1.851 min and in group B was 10.76+5.027 min that was significantly higher in group B(P value <.001) means motor onset was fast in group A.(Fig: 3) A mean Duration of motor block was 312.4+116.072 min in group A and in group B it was 226.60+84.960 min.(Fig: 4) The duration of motor block was found to be significantly longer in Group A compared to Group B (p<0.001). Total duration of analgesia was significantly higer in group A (393.40+116.072) as compare to group B (304.40+80.885). (Pvalue <.001).(Fig: 5) In group A hypotension was in 9 cases, in group B hypotension in 3, although incidence of hypotension was more in group A than group B but difference was not significant as P value was .098.The mean of MBP was not significantly different among the groups initially but at 15 min onwards mean was significantly lower in group A as compared to group B. In group A bradycardia was in 9 cases and in group B was in 2 cases. Although no significant difference was observed according to mean difference in pulse rate ± s.d. (per min.) in both the groups but incidence of bradycardia was significant high in group A as compare to group B(Pvalue <.05). Incidence of nausea /vomiting was more in group A and shivering was more in group B but the difference was not significant.(P value for nausea was 0.415 and for shivering was 0.346).(Fig:6)

DISCUSSION

It is well recognized that the post operative pain is being under treated and the conventional therapy of providing intermittent analgesics on patient demand is an ineffective method of pain relief. The routine use of regional anaesthesia for lower abdominals surgeries is associated with a short duration of analgesia post operatively which can be extended by i.m and i.v analgesics once patient experiences pain and demands for its relief. This causes intermittent and relatively ineffective analgesia, demands more patient care and provides least patient satisfaction. This problem is circumvented by giving analgesics prior to occurrence of pain. The pre-emptive mixing of analgesics with local anaesthetics for regional anaesthesia provides a better alternative. Dexmedetomidine is the most recent agent in the group of alpha-2 adrenoceptor agonist approved by FDA in 1999 for use in humans for analgesia and sedation. Addition of Dexmedetomidine also helps reduce the dose of Bupivacaine required intrathecally, thus reducing the incidence of cardiotoxicity reported by bupivacaine.
In our study there was no significant differences in the demographic data (age,weight,sex) among all the groups.

The mean time of onset of sensory block in group A was 2.28+1.173 and in group B was 7.04+3.23 min which was similar to Seyed Hamid Reza Faiz, Poupak Rahimza deh and Pooya Derakhshan et al.[3]

Onset of motor block was defined as the time taken for motor block to reach Modified Bromage score 3.The mean time of the onset of motor block in Group A was 4.48+1.851min and in group B was 10.76+5.027 min that was significantly higher in group B(P value <.001) means motor onset was fast in group A. Duration of motor block mean time to achieve complete recovery of motor block and assessed by recording the time elapsed from the maximum to the Modified Bromage score 6. In group A mean Duration of motor block was 312.4+116.072 min and in group B it was 226.60+84.960 min. The duration of motor block was found to be significantly longer in Group A compared to Group B (p<0.001).

The quality of Intraoperative analgesia was quite good in all patients. No patient of any group complained of discomfort on skin incision. The total duration of analgesia was defined as time from the intrathecal injection to the first feeling of pain (complete analgesia). In our study total duration of analgesia was significantly higher in group A (393.40+116.072) as compare to group B (304.40+80.885).(Pvalue <.001)

For dexmedetomidine group Our result coincides with Al-Mustafa MM et al,[4] Safiya I. Shaikh et al,[5] Rajni Gupta et al[6] and Deepika Shukla et al.[7]

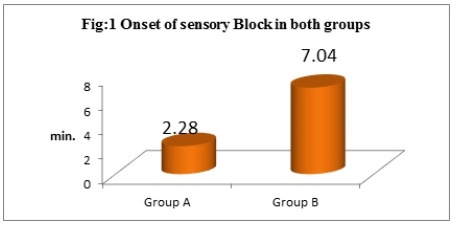
For magnesium sulfate group our result coincides with Seyed Hamid Reza Faiz, et al,[3] Deepika Shukla et al[7] and Sapna Shashni et al.[8]

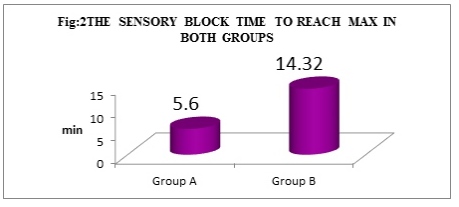
In our study group A hypotension was in 9 cases, in group B hypotension in 3, although incidence of hypotension was more in group A than group B but difference was not significant as P value was .098.The mean of MBP was not significantly different among the groups initially but at 15 min onwards mean was significantly lower in group A as compared to group B.

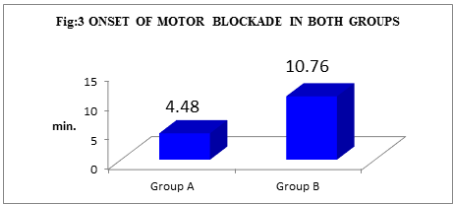
Incidence of nausea /vomiting was more in group A and shivering was more in group B but the difference was not significant. In our study, respiratory depression was not observed in any of the cases.

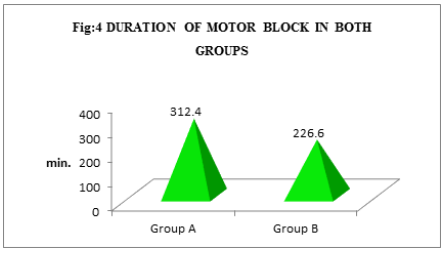
CONCLUSION

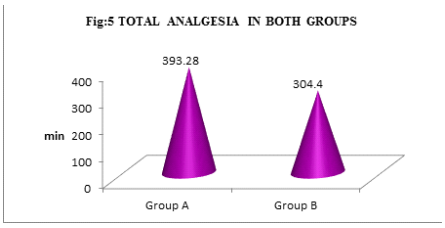
In present study we concluded that 10 micrograms of dexmedetomidine as adjuvant to spinal bupivacaine in surgical procedures of long duration has earlier onset and prolonged duration of sensory and motor block without associated significant hemodynamic alteration and provides excellent quality of postoperative analgesia. Intrathecal Mg also prolongs the duration of spinal analgesia, but this is less than intrathecal dexmedetomidine and is with a delayed onset.

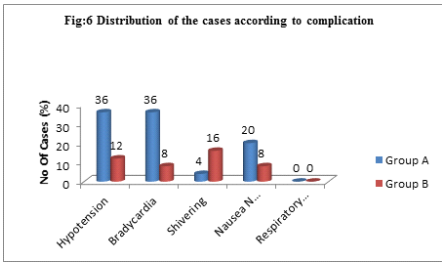












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