ORIGINAL RESEARCH PAPER

Volume-8 | Issue-2 | February-2019 | PRINT ISSN No 2277 - 8179

INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

COMPARATIVE CLINICAL STUDY OF MAGNESIUM SULPHATE AND FENTANYL AS ADJUVANT TO INTRATHECAL BUPIVACAINE IN PATIENTS WITH PREGNANCY INDUCED HYPERTENSION UNDERGOING CAESAREAN SECTION

Anesthesiology

Ajeet Jyotipurkar Senior Resident, E6 PG Resident Boys Hostel GMC Bhopal,

Rajni Thakur* Associate Professor (Designated) , F-94/23 Tulsinagar, Near J.P. Hospital, Bhopal, *Corresponding Author

ABSTRACT

Introduction: To study effect of magnesium sulphate and fentanyl as adjuvant to intrathecal bupivacaine (0.5%) in patients with pregnancy induced hypertension undergoing caesarean section.

Method: 64 pregnant patients with pregnancy induced hypertension undergoing caesarean section divided into group MB (magnesium sulphate) and FB (fentanyl) with 0.5 % bupivacaine for spinal anaesthesia and patients outcome were studied.

Result : There were no significant differences in patient demographics, surgery time , perioperative hemodynamic parameters and APGAR score in both groups. The onset and mean duration of motor block was found prolonged with magnesium compared to fentanyl group. Side effects were seen more in FB compared to group MB.

Conclusion: Addition of magnesium sulphate to intrathecal bupivacaine delays the onset of motor blockade but prolongs the duration of analgesia and reduces postoperative analgesic requirements without much side effects and any adverse effect on APGAR score.

KEYWORDS

Pregnancy induced hypertension, Magnesium, Fentanyl

INTRODUCTION:

Pain is an unpleasant sensation which only the individual can appraise.1 By rendering the patient pain free perioperatively, anesthesiologists have succeeded to a considerable extent, but once the luxury of pain free surgery is over, the patient has to face misery of postoperative pain. Relief from the perioperative pain is important because of its interferes with respiration, bowel movements and micturition.[1,2]

Regional anaesthesia is effective and safe for patients with pregnancy induced hypertension undergoing caesarean section 3,4,5 but with certain limitations like postoperative analgesia with short duration. Adjuvants like opioids (such as fentanyl, sufentanil and morphin) and alpha 2 agonists (clonidine & dexmedetomidine), other drugs such as magnesium sulphate , neostigmine, ketamine and midazolam has been added and reported to improve quality of subarachnoid block.

Opioids when given intrathecaly increase the analgesia quality and reduces requirements of local anesthetic, with hemodynamics stability6.7.8.9 but with some side effects as pruritus, nausea and vomiting.

Release of catecholamines, neuroendocrine responses, increased morbidity all are associated with postoperative pain10. Neurotransmitter release like glutamate and aspartate due to a noxious stimulus causes activation of NMDA receptors (N-methyl-D-aspartate) leading to central sensitization of pain, which may be important in determining the duration and intensity of postoperative pain.10,11

Adequate perioperative analgesia is associated with better patient outcome facilitates newborn care and decreased morbidity. Intrathecal magnesium , an antagonist at NMDA, has been shown to prolong duration of analgesia without significant side effects. Our study aims at onset, duration , level of sensory and motor block with hemodynamic variations and incidence of side effects.

METHOD:

After study approval from Institutional Ethics Committee, written informed consent was obtained from all patients after explaining the nature of the clinical study and the drugs to be used.

64 pregnant patients with pregnancy induced hypertension (systolic pressure 140-160 mmHg, diastolic pressure 90-110 mmHg) undergoing Caesarean section ASA I and II between the age group of 20-35 under subarachnoid block were randomly divided into two groups.

Patient refusal, local skin infection, patient with allergy to study medication, ASA III and IV, thrombocytopenia, HELLP syndrome, parturient receiving magnesium therapy, fetal distress were excluded from the study.

All eligible patients were assigned into two groups of 32 each. Group MB (n=32) : 9 mg of 0.5% hyperbaric bupivacaine (1.8 ml) with 50 mg Inj.MgSO4 (50%) (0.1ml + 0.3ml normal saline). Group FB (n=32) : 9 mg of 0.5% hyperbaric bupivacaine (1.8 ml) with 20 mcg Inj.Fentanyl (0.4 ml). Total volume administrated was 2.2 ml in both the groups.

In the operation theatre through I.V. cannula (18G or 16G) each patient received intravenous ringer lactate solution 10 ml/ kg before induction of subarachnoid block and infusion continue during surgery.

Before starting the procedure all the monitoring equipments (NIBP Cuff, Pulse Oxymeter, ECG) were attached to the patient and baseline values of Heart rate, BP, SpO2 and Respiratory rate were recorded.

A Subarachnoid block was performed after all aseptic precaution and a 25 gauge Quinke spinal needle was inserted in left lateral position between the L2-L3 or L3-L4 inter vertebral space. After confirmation of CSF flow study drugs were administered slowly, Time zero was noted i.e placement of drug in the subarachnoid space. The spinal needle was removed and patient was immediately turned to supine position with left uterine displacement using a wedge under the right hip and onset of sensory, motor block and sensory block level was checked.

Motor block was assessed using a modified Bromage score :
0 = no motor loss
1 = inability to flex hip
2 = inability to flex hip and knee
3 = inability to flex hip, knee and ankle

with motor recovery assumed when the score was zero
Pain intensity was evaluated using a 10 cm visual scale, one end ('0'point of VAS) of which shows no pain and other end ('10' point of VAS) shows worst possible pain. The patients were asked to grade the severity of their pain using this scale.

The level of sedation was assessed using Ramsay sedation score:
Grade 0: Wide awake.
Grade 1: Calm and comfortable, responding to verbal commands.
Grade 2: Sleeping but arousable.
Grade 3: Deep sleep, not arousable

Statistical analysis was done using Statistical Package of Social Science (SPSS Version 20; Chicago Inc., USA). Statistical comparison

was evaluated using the Chi-square or Fisher's exact tests. A value of P < 0.05 was considered statistically significant. The results were expressed as mean and standard deviation.

RESULT:

A total of 64 pregnant patients with pregnancy induced hypertension were involved in this study.

The two groups were comparable with respect to demographic data and there were no significant differences in patient demographics and surgery time in both groups (Table 1).

Table 1 : Patients characteristics

Demographic data (Mean ± SD)	MB	FB	P value
Patients	32	32	
Age (years)	28.21 ± 2.40	28.40 ± 2.09	0.7367
Heght (cm)	157.59 ± 1.603	157.03 ± 1.874	0.2037
Weight (kg)	63.62 ± 2.225	63.56 ± 2.184	0.9137
Gestational age (weeks)	36 ± 1	36 ± 1	1.000
Surgery time (min)	63.97 ± 4.755	65.18 ± 3.855	0.2678

MB:Magnesium-Bupivacaine group, FB:Fentanyl-Bupivacaine group Values in mean ± standard deviation.,P > 0.05 Not significant The onset of sensory blockade was found delayed with magnesium (MB 1.195±0.2102) compared to fentanyl group (FB 0.7468±0.0718) P<0.0001. In our study the maximum sensory block achieved was T4 level in both the groups.The onset of Motor block was significantly more in MB (7.437±1.134) as compared to FB (5.312 ± 1.090) p<0.0001.

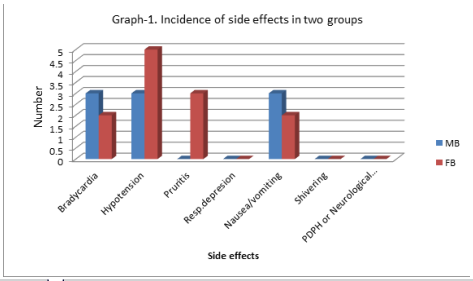
Mean duration of motor block was prolonged with magnesium (MB 191.8±13.27) compared to fentanyl group (FB 129.5 ± 7.658) p<0.0001.Mean Duration of Analgesia also was significantly more among Group MB (404.37±21.39) as compared to Group FB (291.4±16.85) p<0.0001.

Table 2 : Characteristics o Sabarachnoid blockade

Characteristics	MB	FB	P value
ONSET OF SENSORY BLOCK (min)	1.195±0.2102	0.7468±0.0718	P<0.0001
ONSET OF MOTOR BLOCK (min)	7.437±1.134	5.312 ± 1.090	P<0.0001
LEVEL OF SENSORY BLOCK	T4	T4	P=0.005
DURATION OF MOTOR BLOCK(min)	191.8±13.27	129.5 ± 7.658	P<0.0001
DURATION OF ANALGESIA(min)	404.37±21.39	291.4±16.85	P<0.0001

MB:Magnesium-Bupivacaine group, FB:Fentanyl-Bupivacaine group Values in mean ± standard deviation. P > 0.05 Not significant, P < 0.05 significant Preoperative hemodynamic parameters (HR, systolic pressure, diastolic pressure and MAP) were similar in both the groups and all decreased 5-15 min after spinal blockade without much difference between them.

Side effects were seen more in group FB as compared to group MB. There was statistically significant difference in incidence of side effects in two groups.



There was no statistical significance in the APGAR score between the groups.

Table 3: APGAR 5 min

	Mean	S.D	P value
MB	8.406	0.498	0.4404
FB	8.312	0.470	

MB:Magnesium-Bupivacaine group, FB:Fentanyl-Bupivacaine group

Values in mean ± standard deviation. P > 0.05 Not significant

DISCUSSION :

The present study establishes that both Magnesium and Fentanyl as an adjuvant provided satisfactory anaesthetic requisites in patients with pregnancy induced hypertension undergoing caesarean section .Most features of subarachnoid blockade being comparable, there was significant early motor recovery with FB whereas MB provided prolonged postoperative analgesia.

Intrathecal magnesium , an antagonist at NMDA, has been shown to prolong duration of analgesia without significant side effects. A study conducted by Simpson et al and Kroin et al in animals demonstrated that intrathecal magnesium sulphate has a safety profile12,13 In human a study done by Ozalevli et al demonstrated no deleterious on intrathecal magnesium sulphate[14]

Mean onset of sensory blockade in our study was delayed in MB group which was 1.19 min compared to FB group which was 0.74 min and it is statistically significant (P < 0.0001).A study conducted by Tanmoy Ghatak et al concluded that epidural magnesium sulphate when added to bupivacaine reduces the onset of both sensory and motor block.[15]

In our study there was delayed onset of motor blockade in MB group (7.43 min) when compared to FB group (5.31 min) which was significant statistically (P < 0.0001). These findings were similar to the study conducted by Buvanendran et al found that the onset time in the magnesium sulphate group was delayed.[16]

There was prolonged duration of analgesic and motor blockade in MB group compared to FB group which is statistically highly significant (p Value < 0.0001). An infusion of magnesium sulphate in Perioperative period is related with smaller analgesic requirement, less discomfort without any adverse effects, concluded by a study done by Tramer MR et al and Kara H 17,18.Arcioni et al. also observed that intrathecal and epidural magnesium sulfate potentiated and prolonged motor block19 A study Malleswaran S. et al found that there was prolongation in analgesic and motor blockade duration with magnesium sulphate[20]

There was no significant difference among both the groups in hemodynamic parameters in our study. There was statistically significant difference in incidence of side effects in two groups as lesser side effects were seen in group MB compared to group FB.

APGAR score in 5 min in both the groups was statistically insignificant (p value = 0.4404) Thus present study showed adjuvants offers prolong duration , excellent sensory & motor blockade with comparatively fewer side effects when used intrathecaly.

CONCLUSION :

In patients with pregnancy induced hypertension undergoing caesarean section ,addition of magnesium sulphate to intrathecal bupivacaine delays the onset of motor blockade but prolongs the duration of analgesia and reduces postoperative analgesic requirements without much side effects and any adverse effect on APGAR score.

REFERENCES:

1. Levin A, Datta S, Camann WR. Intrathecal ropivacaine for labour analgesia: A comparison with bupivacaine. Anesth Analg 1998;87:624-7.
2. Van Kleef JW, Veering BT, Burm AG. Spinal anesthesia with ropivacaine: A double-blind study on efficacy and safety of 0.5% and 0.75% solutions in patients undergoing minor lower limb surgery. Anesth Analg 1994;78:1125-30.
3. Wallace DH, Leveno KJ, Cunningham FG, Giesecke AH, Shearer VE, Sidawi JE. Randomized comparison of general and regional anesthesia for cesarean delivery in pregnancies complicated by severe preeclampsia. Obstet Gynecol 1995;86:193-9.
4. Karinen J, Räsänen J, Alahuhta S, Jouppila R, Jouppila P. Maternal and uteroplacental haemodynamic state in preeclamptic patients during spinal anaesthesia for Caesarean section. Br J Anaesth 1996;76:616-20.
5. Hood DD, Curry R. Spinal versus epidural anesthesia for Cesarean section in severely preeclamptic patients: A retrospective survey. Anesthesiology 1999;90:1276-82.
6. Courtney MA, Bader AM, Hartwell B, Hauch M, Grennan MJ, Datta S. Perioperative

analgesia with subarachnoid sufentanil administration. Reg Anesth 1992;17:274-8.
7. Dahlgren G, Hultstrand C, Jakobsson J, Norman M, Eriksson EW, Martin H. Intrathecal sufentanil, fentanyl, or placebo added to bupivacaine for cesarean section. Obstet Anesth 1997;85:1288-93.
8. Hamber EA, Viscomi CM. Intrathecal lipophilic opioids as adjuncts to surgical spinal anesthesia. Reg Anesth Pain Med 1999;24:255-63.
9. Hunt CO, Naulty JS, Bader AM, Hauch MA, Vartikar JV, Datta S, et al. Perioperative anal9.gesia with subarachnoid fentanyl-bupivacaine for cesarean delivery. Anesthesiology 1989;71:535-40.
10. Liu HT, Hollmann MW, Hoenemann CW, Liu WH, Durieux ME. Modulation of NMDA receptor function by ketamine and magnesium. Part II. Anesth Analg 2001;92:1173-81. 11.Woolf CJ, Chong MS. Preemptive analgesia-treating postopera-tive pain by preventing the establishment of central sensitization. Anesth Analg 1993;77:362.
12. Simpson Thomas. Intrathecal magnesium sulphate protects the spinal cord from ischaemic injury during thoracic aortic cross clamping. Anaesthesiology.1994; 81(6);1493-98.
13. Kroin JS, McCarthy RJ, Von Roenn N, Schwab B, Tuman KJ, Ivankovich AD. Magnesium sulphate potentiates morphine anti-nociception at spinal level. Anaesth Analg 2000; 90:913-7.
14. Unlugenc H, Ozalevli M et al. Comparison of intrathecal magnesium, fentanyl, or placebo combined with bupivacaine 0.5% for parturients undergoing elective cesarean delivery. Acta Anaes Scandi 2009;53(3):346-53.
15. Tanmoy Ghatak et al. Evaluation of the effect of magnesium sulphate vs clonidine as adjunct to epidural bupivacaine. Indian J Anaesth 2010 Jul-Aug; 54(4):308-313
16. Buvanendran A et al. Intrathecal magnesium prolongs fentanyl analgesia: a prospective randomized controlled trial. Anaesth Analg 2002; 95:661-7.
17. Tramer MR, Scheneider J, Marti RA, Kaplan R. Role of magnesium sulphate in postoperative analgesia.Anaesthesiology 1996; 84:340-7.
18. Kara H, Sahin N, Ulusan V, Aydogdu T. Magnesium infusion reduces postoperative pain. Eur J Anaesthesiol.2002 Jan; 19(1):52-6.
19. Arcioni R, Palmisoni S, Tigano S, et al. Combined intrathecal and epidural magnesium sulfate supplementation of spinal anesthesia to reduce post-operative analgesic requirements: a prospective, randomized, double-blind,controlled trial in patients undergoing major orthopedic surgery. Acta Anaesthesiol Scand 2007;51:482-9
20. Malleeswaran S, Panda N, Mathew P, Bagga R. A randomized study of magnesium sulphate as an adjuvant to intrathecal bupivacaine in patients with mild preeclampsia undergoing caesarean section. International Journal of Obstetric Anesthesia (2010); 19:161-166.