Section: Anaesthesiology

Original Research Article

A COMPARATIVE STUDY OF MAGNESIUM SULPHATE VERSUS DEXMEDETOMIDINE AS AN ADJUNCT TO EPIDURAL BUPIVACAINE

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ABSTRACT

Background: This prospective, randomized, double blind controlled study is undertaken to compare the efficacy of Magnesium sulphate & Dexmedetomidine as an adjuvant to epidural bupivacaine in lower abdominal and lower limb surgeries. **Objective**: To compare the time of onset and duration of sensory & motor blockade, assessing pain score during perioperative period and measure duration of analgesia, to identify and manage the adverse events during perioperative period.

Materials and Methods: A randomized prospective study was conducted over 18 months (November 2020 to June 2022) with 90 ASA grade I and II patients, aged 18-60 years, undergoing elective surgeries. Patients were randomly assigned to receive either Bupivacaine0.5% (14ml) + Magnesium sulphate 50mg in 1ml 0.9%saline (Group BM) or Bupivacaine0.5% (14ml) + Dexmedetomidine 0.5microgram/kg in 1ml 0.9% saline (Group BD) and Bupivacaine0.5%(14ml) +Saline0.9%(1ml) (Group NS), Outcomes measured included the onset and duration of prolongation of sensory and motor blockade, perioperative analgesia, any adverse events during perioperative period and monitoring of hemodynamic parameters.

Results: There was statistical significant quicker onset of sensory block and motor block in patients of group BD when compared with patients of group BM and NS. There was statistical significant longer duration of sensory block (P value <0.0001) and motor block (P value <0.0001) in patients of group BD when compared with patients of group BM and NS .There was statistical significant prolonged duration of sensory regression to L1 in patients of group BD when compared with patients of group BM and NS (P value 0.02) and longer duration of motor block in patients of group BD when compared with patients of group BM and NS (P value 0.000).There was statistical significant reduction in mean arterial pressure during 10 minutes, 15 minutes, 30 minutes and 60 minutes (P value <0.05) in patients of group BD when compared with patients of group BM and group NS. There was increased sedation score in patients of group BD and significant reduction in VAS score during 60 minutes whereas statistical significant increase in VAS score during 90 minutes (P value <0.05) in patients of group BD when compared with patients of group BM and group NS.

Conclusion: It was concluded in present study that addition of dexmedetomidine or magnesium sulfate as adjuvant to epidural bupivacaine showed significance in provision of analgesia among patients undergoing lower limb surgeries without higher incidence of adverse effects. Dexmedetomidine showed quicker onset of sensory and motor block, longer duration of sensory and motor block and stable hemodynamic parameters

when compared with magnesium sulfate when added adjuvant as bupivacaine in epidural anaesthesia.
Keywords: Magnesium sulphate, Dexmedetomidine, Bupivacaine, Abdominal Surgeries, Lower Limb Surgeries, Randomized Study, General Anaesthesia, Epidural.

INTRODUCTION

Epidural placement is the safe, effective means of providing surgical anesthesia and postoperative analgesia. No drug has yet been identified that specifically inhibits nociception without associated side effects.[1] Epidural blockade is becoming unique in that it can be placed at virtually any level of spine, allowing more flexibility in its application to clinical practice.

Magnesium is the fourth plentiful cation in the body with antinociceptive action by competitive inhibition of calcium influx through voltage gated channels and noncompetitive antagonism of NMDA receptors.[2] Dexmedetomidine is agonist of alpha-2 adrenergic receptors. Alpha-2 agonist have been used as adjuvants in epidural to increase the analgesia duration.[3] Dexmedetomidine is indicated for sedation of critically ill or injured patients in an intensive care unit setting.[4] It has also been used intravenously for postoperative pain relief as adjunct to epidural bupivacaine.[5] Intrathecal and epidural characteristics of dexmedetomidine have been studied in animals.[6]

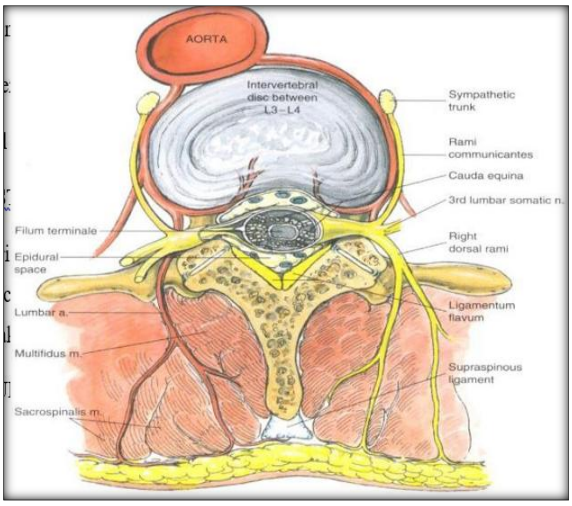

Figure 1: Spinal cord cross sectional anatomy

The spinal cord is surrounded in the bony vertebral column are three membranes. From the immediate overlay of the cord to the periphery, they are 1) the pia mater, 2) the arachnoid mater, and 3) the dura mater.

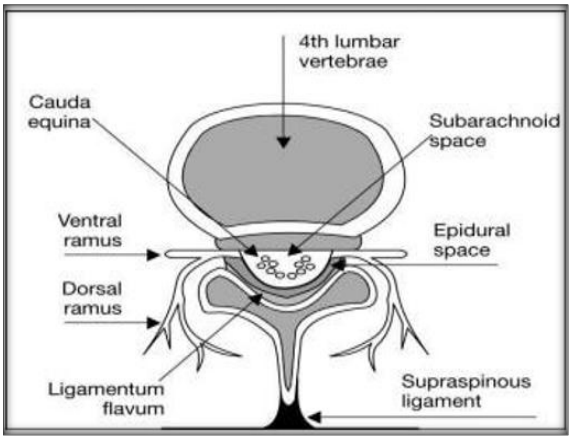

Figure 2: Epidural Space

It is a potential space extending from foramen magnum to coccyx. It is a part of vertebral canal lying between spinal duramater and periosteal lining of the vertebral canal.

Boundaries of Epidural space:

Above: At the foramen magnum where the periosteal layer of the spinal vertebral canal fuse with the dural layer.

Below: The sacrococcygeal membrane.

Anterior: fibrous extension of periosteum over the posterior longitudinal ligament.

Posterior: fibrous extension of periosteum over the ligamentum flavum.

Lateral: Intervertebral foramina and the pedicles of vertebra.

EPIDURAL ANAESTHESIA AND FATE OF LOCAL ANAESTHETICS

Bromage has summarized the fate of epidurally introduced local anaesthetics agents. Absorption of local anaesthetics from the epidural space is biphasic. The initial absorption phase is characterized by short peak plasma time, rapidly attained, and high peak concentration. As peak lines declines, their continues a slower second phase of absorption

STANDARD EPIDURAL ANAESTHESIA TECHNIQUE

With the patient in the sitting or lateral position, local anaesthetic is infiltrated into the skin and subcutaneous tissue over the site of intervertebral space. A 16- or 18-G Tuohy needle is inserted at the L2 to L3 interspace and the epidural space is identified by loss of resistance technique. Next, a catheter is introduced about 4 cm into the epidural space through the Tuohy needle. The catheter is secured firmly by tape and the patient placed supine

TECHNIQUE OF EPIDURAL ANAESTHESIA

Magnesium sulphate

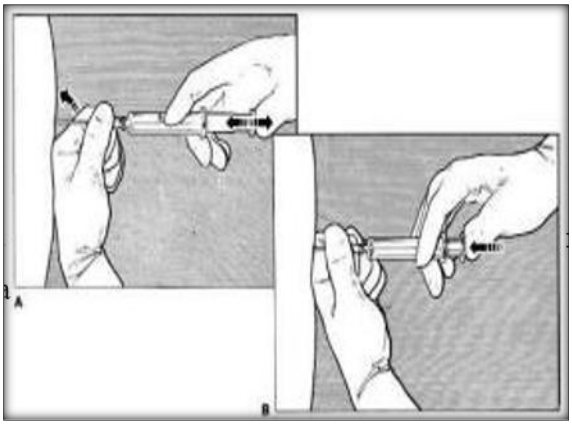

Figure 3

Magnesium is a nutrient and is the 4th most abundant mineral in the body after sodium, potassium, and calcium. It's the 2nd most abundant intracellular cation after potassium. It's a physiological antagonist of calcium at different voltage – gated channels.

Uses of magnesium

Magnesium has been used intravenously as magnesium sulphate especially in obstetrics to prevent convulsions while lowering the blood pressure, used in Intravenous regional anesthesia (IVRA) to reduce pain and prolong the effects of lidocaine. Spinal and epidural use of magnesium with opioids and local anesthetics to reduce anesthetic requirements.[7] Magnesium has been used as local infiltration drug with local anesthetics, that intrathecal and epidural magnesium sulfate potentiated and prolonged motor block.[8] Caudal use, patches and pumps are other possibilities for routes of magnesium use.

DEXMEDETOMIDINE

Dexmedetomidine is a highly selective α2 adrenergic agonist that produces sedation, hypnosis and analgesia. The analgesic effects of Dexmedetomidine are complex. They have an analgesic effects when injected through the intrathecal or epidural route.[9] The primary site of action is thought to be the spinal cord. Systemic use of Dexmedetomidine reduces narcotic requirements. It was reduced by 50% in patients receiving Dexmedetomidine. But the effects are in consistent.[10]

Importance of the Study

This prospective, randomized, double blind controlled study is undertaken to compare the efficacy of Magnesium sulphate & Dexmedetomidine as an adjuvant to epidural bupivacaine in lower abdominal and lower limb surgeries.[12]

The results of this study could provide valuable guidance to anaesthesiologists in selecting the most appropriate method based on patient characteristics, clinical context, and the specific surgical procedure. Moreover, this research will contribute to the growing body of evidence on the use of anesthetics in in lower abdominal and lower limb surgeries.

Objective of the Study

To compare the time of onset and duration of sensory & motor blockade, Assessing pain score during perioperative period and measure duration of analgesia, to identify and manage the adverse events during perioperative period. This prospective, randomized, double blind controlled study is undertaken to compare the efficacy of Magnesium sulphate & Dexmedetomidine as an adjuvant to epidural bupivacaine in lower abdominal and lower limb surgeries..

MATERIALS AND METHODS

This study was conducted as a randomized prospective trial at the Department of Anaesthesiology & Critical Care, Gandhi Medical College, Secunderabad, over a period of 18 months, from November 2020 to June 2022. A total of 90 patients were enrolled in the study, with an equal distribution of 30 patients in each of the three study groups. Patients were aged between 18 to 60 years Patients were randomly assigned to receive either Bupivacaine0.5% (14ml) + Magnesium sulphate 50mg in 1ml 0.9%saline (Group BM) or Bupivacaine0.5% (14ml) + Dexmedetomidine 0.5microgram/kg in 1ml 0.9% saline (Group BD) and Bupivacaine0.5%(14ml) +Saline0.9%(1ml) (Group NS), Outcomes measured included the onset and duration of prolongation of sensory and motor blockade, perioperative analgesia, any adverse events during perioperative period and monitoring of hemodynamic parameters.

Inclusion criteria for the study were patients who were willing to provide written informed consent, had no contraindications to Magnesium sulfate, Bupivacaine, Dexmedetomidine and were undergoing elective surgeries. Patients belonging to ASA grade I and II. Exclusion criteria included Patient's refusal, Patients with coagulation abnormalities, Patients with cardiac or renal disease, Patients with spinal column deformities, Patients are allergic to any of the drugs used in the study, Patients for whom central neuraxial block is contraindicated, Patients in whom we get communication difficulties to prevent reliable assessment, like in whom visual analog scale cannot be analyzed.

90 patients coming to Gandhi Hospital electively posted for various lower abdominal and lower limb surgeries under epidural anaesthesia and fulfilling the inclusion criteria will be taken up for the study and randomly divided using computer generated randomization into three groups having 30 patients each and administered medication by epidural route as follows.

Group BM: Bupivacaine0.5%(14ml) + Magnesium sulphate 50mg in 1ml0.9%saline

Group BD: Bupivacaine0.5%(14ml) + Dexmedetomidine 0.5microgram/kg(in 1ml 0.9%saline)

Group NS: Bupivacaine0.5%(14ml) +Saline0.9%(1ml)

The onset and duration of prolongation of sensory and motor blockade, perioperative analgesia were notice and any adverse events during perioperative period were notice and monitoring of hemodynamic parameters.

Pre-Anaesthetic Evaluation: During preoperative visit patient detailed history, general physical examination and systemic examination were carried out. Basic demographic data like age, sex, height and weight were recorded. During pre-anaesthetic checkup the linear visual analogue scale (VAS) was explained to all patients using 10 scale. Informed consent was obtained from all the 90 patients after the detailed explanation of the procedure to be performed.

Procedure: The pulse rate, respiratory rate, blood pressure and SpO2 were recorded before starting the case. Peripheral venous cannulation was done with 18G IV cannula and all the patients were preloaded with 10ml/kg Ringer Lactate solution. Patients were placed in left lateral position and under strict aseptic precautions, after local infiltration with 1% Lignocaine hydrochloride the epidural space was identified with a 18G Tuohy needle at L3-L4 interspace, by loss of resistance technique. 18G epidural catheter was threaded through the needle in to the epidural space for 3-4cms and secured with adhesive tapes to the back. After negative aspiration for blood and CSF, 3ml of 2 % Lignocaine with 15µgm of adrenaline was given as test dose and the patient was turned to supine position. After 5 minutes if there is no adverse reaction for the test dose, intravascular and intrathecal placement were ruled out and the study drugs were administered. Group BM, n=30, were given 15ml of 0.5% Bupivacaine and Inj.magnesium sulphate 50mg epidurally. Group BD, n=30 were given 15ml of 0.5% bupivacaine and inj. Dexmedetomidine 0.5µg/kg epidurally. Group NS, n=30, were given 15ml of 0.5% Bupivacaine and 0.9% Normal saline. The level of sensory block was assessed by bilateral pinprick method, quality of motor blockade assessed by BROMAGE SCALE at 5, 10, 15, 20, 25,30 minutes interval.

Time of injection was recorded as 0 hour, In the three groups the following are noted:

1. The onset of sensory blockade,
2. Maximum sensory level achieved,
3. Time to attain maximum sensory level,
4. Onset of motor blockade,
5. Two segment regression time,
6. Duration of sensory block,
7. Duration of motor block,
8. Duration of analgesia were recorded; continuously SpO2, respiratory rate, heart rate, were monitored.
9. Hemodynamic variables like systolic BP, diastolic BP, Mean Arterial Pressure, heart rate were recorded every 5 minutes until 30 minutes and at 15 minutes interval thereafter upto 90 minutes and then at 30 minutes interval till the end of surgery.
10. Sedation scores were recorded just before the initiation of surgery and thereafter every 20 minutes during surgical procedure.
11. Side effects like nausea, vomiting, bradycardia, hypotension, respiratory depression, dry mouth and shivering were noted in all three groups. Onset of sensory blockade is taken from the completion of injection of study drug till the patient does not feel the pin prick. Onset of motor blockade- is taken from the completion of injection of study drug till the patient is unable to move feet.
12. Duration of motor blockade- is taken from the completion of injection of study drug till motor block regresses to bromage scale 1.

Duration of sensory block- is taken from the completion of injection of study drug till sensory block regression to L1 dermatomal level.

Duration of analgesia – is taken from the completion of injection of study drug till the patient has VAS (Visual Analogue Scale) score ≥ 4.

MODIFIED BROMAGE SCALE SCORE CRITERIA

0 No motor block

1 Inability to raise extended leg; able to move knees and feet.

2 Inability to raise extended leg and knees ;able to move feet

3 Complete motor blockade of limb

If there was fall in blood pressure more than 30% below the baseline value, even after intravenous fluids administration, inj. Phenyl ephrine was given in titrated doses. If the pulse rate was less than 30% of baseline, inj. Atropine 0.6mg IV was given. If respiratory rate was less than 10/min respiratory depression was diagnosed. At the end of the surgery the patients were shifted to post- operative ward, they were monitored for every 30 minutes for the first six hours and there after every hour for 24 hours period.

Statistical Data: At the end of the study all the data is compiled and statistically analyzed using Diagrammatic representation, Descriptive data presented as mean ±SD. Continuous data analyzed by paired or unpaired 't' test. Chi – square test to analyze statistical difference between the two groups.

The study was approved by the Institutional Ethics Committee of Gandhi Medical College, Secunderabad, and informed consent was obtained from all participants before enrolment.

RESULTS

There was statistical significant quicker onset of sensory block and motor block in patients of group BD when compared with patients of group BM and NS. There was statistical significant longer duration of sensory block (P value <0.0001) and motor block

(P value <0.0001) in patients of group BD when compared with patients of group BM and NS .There was statistical significant prolonged duration of sensory regression to L1 in patients of group BD when compared with patients of group BM and NS (P value 0.02) and longer duration of motor block in patients of group BD when compared with patients of group BM and NS (P value 0.000).There was statistical significant reduction in mean arterial pressure during 10 minutes, 15 minutes, 30 minutes and 60 minutes (P value <0.05) in patients of group BD when compared with patients of group BM and group NS. There was increased sedation score in patients of group BD and significant reduction in VAS score during 60 minutes whereas statistical significant increase in VAS score during 90 minutes (P value <0.05) in patients of group BD when compared with patients of group BM and group NS.

Table 1: Comparison of age of the patients among the study groups (n=90)

Age (years)	Group BD		Group BM		Group NS	
	N	%	N	%	N	%
≤ 20	3	10.0	2	6.7	3	10.0
21 – 30	13	43.3	8	26.7	12	40.0
31 – 40	5	16.7	13	43.3	9	30.0
41 – 50	7	23.3	5	16.7	4	13.4
51 – 60	2	6.7	2	6.7	2	6.7
Total	30	100.0	30	100.0	30	100.0
Mean ± SD	33.57 ± 10.45		35.23 ± 9.63		33.30 ± 9.76	
Range	20 – 53 years		18 – 60 years		16 – 55 years	
P value	0.718					

Table 2: Comparison of gender of patients among the study groups (n=90)

	Group BD		Group BM		Group NS	
	N	%	N	%	N	%
Male	25	83.3	23	76.7	28	93.3
Female	5	16.7	7	23.3	2	6.7
Total	30	100.0	30	100.0	30	100.0
Chi square	3.21					
P value	0.201					

There was no statistical significance (P value 0.201).

Table 3: Comparison of level of maximum sensory block in patients among the study groups (n=90)

Level of maximum sensory block	Group BD		Group BM		Group NS	
	N	%	N	%	N	%
T4	2	6.7	2	6.7	1	3.3
T6	6	20.0	7	23.3	7	23.3
T8	15	50.0	16	53.3	13	40.0
T9	7	23.3	3	10.0	4	15.3
T10	0	0.0	2	6.7	5	18.1
Total	30	100.0	30	100.0	30	100.0
Chi square	10.56					
P value	0.393					

Table 4: Comparison of mean time of occurrence of complete motor block in patients among the study groups (n=90)

Parameter	Group BD		Group BM		Group NS	
	Mean	SD	Mean	SD	Mean	SD
Occurrence of complete motor block (min)	7.20	1.77	7.63	1.94	8.53	1.43
P value	0.012					

Table 5: Comparison of mean duration of sensory block in patients among the study groups (n=90)

Parameter	Group BD		Group BM		Group NS	
	Mean	SD	Mean	SD	Mean	SD
Duration of sensory block (min)	251.70	16.25	203.77	9.18	196.10	8.33
P value	<0.0001					

Table 6: Comparison of mean time for regression to grade 1 motor block in patients among the study groups (n=90)

Parameter	Group BD		Group BM		Group NS	
	Mean	SD	Mean	SD	Mean	SD
Duration of motor block	185.67	15.19	174.43	6.98	164.20	16.23

(min)						
P value	<0.0001					

Table 7: Comparison of mean time for sensory regression to L1 in patients among the study groups (n=90)

Parameter	Group BD		Group BM		Group NS	
	Mean	SD	Mean	SD	Mean	SD
Sensory regression to L1 (min)	206	44.47	186.67	32.77	164.83	37.64
P value	0.02					

Table 8: Comparison of mean duration of motor block in patients among the study groups (n=90)

Parameter	Group BD		Group BM		Group NS	
	Mean	SD	Mean	SD	Mean	SD
Duration motor block (min)	274.03	23.71	252.37	36.52	234.43	31.23
P value	0.000					

Table 9: Comparison of side effects in patients among the study groups (n=90)

Side effects	Group BD		Group BM		Group NS		P value
	N	%	N	%	N	%	
Nausea	7	23.3	4	13.3	4	13.3	0.487
Hypotension	8	26.7	6	20.0	5	16.7	0.627
Bradycardia	9	30.0	5	16.7	3	10.0	0.131
Shivering	3	10.0	4	13.3	1	3.3	0.383

DISCUSSION

In current study, 66.7% of patients belong to ASA grade I and 33.3% of patients belong to ASA grade II in group BD, 73.3% of patients belong to ASA grade I and 26.7% of patients belong to ASA grade II in group BM whereas 63.3% of patients belong to ASA grade I and 36.7% of patients belong to ASA grade II in group NS. There was no statistical significance (P value 0.701).

In a study done by Mathur V et al showed that 85% of patients belong to ASA grade I and 15% of patients belong to ASA grade II in group BM whereas 87.5% of patients belong to ASA grade I and 12.5% of patients belong to ASA grade II where there was no statistical significance (P value >0.05).

Duration of surgery: In current study, the mean duration of surgery in the patients of group BD was 154.23 ± 15.77 minutes, of the patients in group BM was 153.03 ± 11.54 minutes whereas of the patients in group NS was 155.13 ± 12.26 minutes. There was no statistical significance (P value 0.829).

In a study done by Mathur V et al showed that the mean duration of surgery in patients of group BM was 53.62 ± 11.93min whereas the mean duration of surgery in patients of group BD was 55.75 ± 19.4min where there was no statistical significance (P value >0.05).

Onset of sensory block: In current study, the mean time of onset of sensory block was 6.33 ± 1.27 minutes in group BD, the mean time of onset of sensory block was 7.63 ± 1.43 minutes in group BM and the mean time of onset of sensory block was 8.53 ± 1.36 minutes in group NS. There was statistical significant quicker onset of sensory block in patients of group BD when compared with patients of group BM and NS (P value <0.0001).

In a study done by Shahi V et al showed that the mean time for onset of T10 block was 14.6 ± 1.9min in patients of group D, the mean time for onset of T10 block was 15.4 ± 2.1min in patients of group M and the mean time for onset of T10 block was 19.7 ± 2.1min where there was significantly longer duration of onset in patients of group C (P value <0.05) whereas there was no significant difference in patients of group D and group M (P value >0.05).

Level of maximum sensory block: In current study, majority of patients (50%) had maximum sensory block till level T5 followed by 23.3% till level T6, 20% of patients till T4 level and 6.7% of patients till level T3 in group BD. Majority of patients (53.3%) had maximum sensory block till level T5 followed by 23.3% till level T4, 10% of patients till T6 level and 6.7% of patients till level T2 and T3 in group BM. Majority of patients (40%) had maximum sensory block till level T5 followed by 23.3% of patients till level T4, 13.3% of patients till levels T6 and T7 each, 6.7% of patients till level T2 and 3.3% of patients till level T3. There was no statistical significance (P value 0.393).

In a study done by Sarkar A et al showed that majority of patients (43.3%) of group I and majority of patients (43.3%) of group II had highest level of sedation in T2 level where there was no statistical significance (P value 0.074).

Time to achieve maximum sensory block: In current study, the mean time to achieve maximum sensory block was 22.5 ±7.39 minutes in group BD, the mean time to achieve maximum sensory block was 24.63 ± 6.05 minutes in group BM and the mean time to achieve maximum sensory block was 40.63 ± 9.06 minutes in group NS. There was statistical significant quicker time to achieve maximum sensory block in patients of group BD when

compared with patients of group BM and NS (P value <0.0001).
In a study done by Sarkar A et al showed that the mean time to achieve maximum sensory block in patients of group I was 13.23 ± 1.43min whereas the mean time to achieve maximum sensory block in patients of group II was 20.8 ± 1.85min where there was statistical significance (P value <0.001).
Onset of complete motor block: In current study, the mean time of onset of complete motor block was 7.20 ± 1.77 minutes in group BD, the mean time of onset of complete motor block was 7.63 ± 1.94 minutes in group BM and the mean time of onset of complete motor block was 8.53 ± 1.43 minutes in group NS. There was statistical significant quicker onset of complete motor block in patients of group BD when compared with patients of group BM and NS (P value 0.012).
In a study done by Sarkar A et al showed that the mean onset of motor block was 15.1 ± 1.49min whereas the mean onset of motor block was 22.77 ± 1.41min where there was no statistical significance (P value <0.001).
Duration of sensory block: In current study, the mean duration of sensory block was 251.70 ± 16.25 minutes in group BD, the mean duration of sensory block was 203.77 ± 9.18 minutes in group BM and the mean duration of onset of sensory block was 196.10 ± 8.33 minutes in group NS. There was statistical significant longer duration of sensory block in patients of group BD when compared with patients of group BM and NS (P value <0.0001).
In a study done by Mathur V et al showed that the mean duration of sensory block in patients of group BM was 240.4 ± 28.75min and the mean duration of sensory block in patients of group BD was 306.1 ± 15.32min where there was longer duration of sensory block in patients of group BD when compared with patients of group BM (P value 0.001).
Duration of motor block: In current study, the mean duration of motor block was 185.67 ± 15.19 minutes in group BD, the mean duration of motor block was 174.43 ± 6.98 minutes in group BM and the mean duration of onset of motor block was 164.20 ± 16.23 minutes in group NS. There was statistical significant longer duration of motor block in patients of group BD when compared with patients of group BM and NS (P value <0.0001).
In a study done by Sarkar A et al showed that the mean duration of complete motor block was 176 ± 1.65min in patients of group I whereas the mean duration of complete motor block was 262 ± 1.37min in patients of group II where there was statistical significance (P value <0.001).
VAS score: In current study, the VAS score was recorded during baseline, 5 minutes, 10 minutes, 15 minutes, 30 minutes, 60 minutes and 90 minutes. There was statistical significant reduction in VAS score during 60 minutes whereas statistical significant increase in VAS score during 90 minutes (P value <0.05) in patients of group BDBD 3 when compared with patients of group BM and group NS.
In a study done by Gupta M et al showed that there was significantly higher VAS in patients of group F when compared with patients of group FM during 10min (1.36 ± 0.85 vs 0.33 ± 0.54) and 15min (0.73 ± 0.78 vs 0.03 ± 0.18) (P value <0.05). VAS was comparable among the patients of study groups during 0min, 5min and 30min (P value>0.05).
Side effects: In current study, 23.3% of patients in group BD, 13.3% of patients in group BM and 13.3% of patients of group NS had nausea or vomiting where there was no statistical significance (P value 0.487). 26.7% of patients in group BD, 20% of patients in group BM and 16.7% of patients in group NS had hypotension which was not statistical significance (P value 0.627). Hypotension was managed using vasopressors. 30% of patients in group BD, 16.7% of patients in group BM and 10% of patients of group NS had bradycardia which was not statistically significant (P value 0.131). Bradycardia was managed by IV atropine. 10.0% of patients of group BD, 13.3% of patients in group BM and 3.3% of patients in group NS had shivering which was not statistical significance (P value 0.383).

Future Directions

Future research should focus on larger, multicenter trials to validate these findings across diverse patient populations. Exploring to compare the efficacy of Magnesium sulphate & Dexmedetomidine as an adjuvant to epidural bupivacaine in lower abdominal and lower limb surgerie. Furthermore, studies evaluating the long-term outcomes of these methods in terms of patient satisfaction and recovery would be valuable.

CONCLUSION

It was concluded in present study that addition of dexmedetomidine or magnesium sulfate as adjuvant to epidural bupivacaine showed significance in provision of analgesia among patients undergoing lower limb surgeries without higher incidence of adverse effects. Dexmedetomidine showed quicker onset of sensory and motor block, longer duration of sensory and motor block and stable hemodynamic parameters when compared with magnesium sulfate when added adjuvant as bupivacaine in epidural anaesthesia.

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