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Hypotensive Anaesthesia during Spine Surgery – A Comparison between Dexmedetomidine and Magnesium Sulphate

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Abstract

A good visualization of the surgical field can be achieved by controlled hypotension with various hypotensive agents. Both dexmedetomidine and Magnesium Sulphate ($MgSO_4$) has powerful analgesic effect and can induce hypotension during surgery. This study is aimed to compare the efficacy of Dexmedetomidine with Magnesium Sulphate in controlled hypotension during spine surgery. This randomized, prospective study was carried out in anesthesiology department of Combined Military Hospital, Dhaka for six-months of period following ethical approval. Total 60 patients, scheduled for spine surgery under GA were included in this study and randomly divided into Group D (Dexmedetomidine, n=30) and Group M (Magnesium sulfate, n=30). Informed written consent was taken from each subject. In every 15 mins, heart rate, systolic & diastolic blood pressure, mean arterial pressure (MAP) are assessed and the surgical field was assessed by the Boezaart surgical field bleeding score. Data were collected in separated case-record form and analyzed by the SPSS 24. Demographic characteristics were similar across the two groups in terms of age, sex, BMI, ASA grading, pre-operative systolic and diastolic blood pressure ($p>0.05$). Group D had higher mean duration of controlled hypotension (102.50±33.44 vs 85.33±20.25 minutes, $p=0.02$) and lower mean time to achieve target MAP (34.50±22.68 vs 46.00±10.37 minutes, $p=0.016$) than Group M. MAP was significantly lower for Group D patients than the Group M patients with time ($p<0.05$). Boezaart surgical field bleeding score was also significantly lower in Group D compared to Group M ($p<0.05$). In this study Dexmedetomidine is found more effective than Magnesium Sulphate in achieving controlled hypotension during spine surgery. Better haemodynamic stability is also found in Group D in comparison to Group M.

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Introduction

Now a days, increased knowledge of spinal biomechanics, introduction of modern sophisticated spine surgery devices, advancement of newer technique like; microsurgical or minimally invasive methods have made it possible to stabilize every segment of the spine successfully.[1] Success of these operations largely depends on good visualization of operative field and surgical dissection without doing any injury to the surrounding structures. In laminectomy and spinal fusion, excessive bleeding may occur from the extensive epidural venous plexuses. And there is possibility of nerve injury if the surgical field is not visualized properly but decreased hemorrhage adds safety for surgery in this area.[2] Controlled hypotension to decrease surgical field blood loss makes good visualization of operative field as well as improves surgical dissection during spine surgery. Numerous pharmacological agents effectively used for achieving controlled hypotension and to maintain mean arterial pressure (MAP) at 60–70 mmHg or to reduce 30% of baseline MAP. Vasodilators (e.g., sodium nitroprusside and nitroglycerine); beta (β)-adrenoceptor blocker (e.g., esmolol); opioids (e.g., remifentanil); inhalational anaesthetics (isoflurane and sevoflurane); alpha 2 (α 2) adrenergic agonists (clonidine and dexmedetomidine) and magnesium sulphate ($MgSO_4$)[3–7] are increasingly being used for achieving controlled hypotension during general anaesthesia (GA). Sodium nitroprusside may produce cyanmethemoglobin and cause acute cyanide toxicity and, nitroglycerine causes methemoglobinemia, while both are involved in producing tachycardia, tachyphylaxis and increased intracranial pressure.[5,6] Esmolol is an ultra-short acting beta (β)-adrenoceptor blocker drug which causes bradycardia.[5] Remifentanil is an ultra-short-acting μ-agonist opioid receptor with a dose-dependent depression effect on the sinoatrial node and causes bradycardia.[5] Isoflurane and sevoflurane both causes respiratory depression, increases intracranial pressure, potentiates neuromuscular blocking agents and triggers malignant hypertension.[3] Again, titration of these volatile agents to produce optimal hypotension may be difficult. Pharmacological differences between dexmedetomidine and magnesium sulphate suggest that these drugs clinically perform differently. Dexmedetomidine is an imidazole derivate and an active d-isomer of medetomidine, chemical structure of which is 5-[(1S)-1-(2,3-Dimethylphenyl) ethyl]-1H-imidazole.[7] It is a potent highly selective α2 adrenergic agonist, having a differential specificity for the α2 than α1 receptors. It has sedative, analgesic, anesthetic sparing effect and sympatholytic properties.[8–10]

The central and peripheral sympatholytic action of dexmedetomidine is mediated by α2 adrenergic receptors and is manifested by dose-dependent decrease in arterial blood pressure, heart rate, cardiac output and norepinephrine release.[8,10] Magnesium sulphate causes hypotension by limiting the outflow of calcium from the sarcoplasmic reticulum and by acting as a vasodilator by increasing the synthesis of prostacyclin, as well as inhibiting angiotensin converting enzyme activity. It also has a small, dose-dependent myocardial depressant effect. Magnesium sulphate also has analgesic action which is explained by its antagonistic effect at N-methyl D-aspartate receptors. Because it inhibits norepinephrine release by blocking N-type and partially L-type calcium channels, magnesium

administration is a promising strategy for inducing controlled hypotension.[11,12] This trial was designed with the aim of obtaining clinical evidence on a potentially different effect of dexmedetomidine versus magnesium sulphate in hypotensive anaesthesia during spine surgery.

Methods

This prospective, randomized study was conducted at Combined Military Hospital (CMH) Dhaka from January 2022 to June 2022. Patients who are scheduled to undergo spine surgery under GA within this study period were included in the study. Total number of study population was 60 in this trial. They were divided into two groups with 1:1 ratio, Group D (Dexmedetomidine, n=30) and Group M (Magnesium sulfate, n=30)

Inclusion criteria

- Patients who were scheduled to undergo elective spine surgery under general anaesthesia in Combined Military Hospital (CMH), Dhaka.
- ASA physical status I and II.
- Sex: Both male and female.
- Age: 18-50 years.

Exclusion criteria

Before enrollement:

1. Known history of hypersensitivity to study drugs
2. Patients with chronic disease:
    - History of coronary artery disease.
    - Uncontrolled hypertension and diabetes
    - Severe renal impairment (serum creatinine >1.6 mg/dl)
    - Severe liver disease (liver enzymes more than two times normal values)
    - History of psychiatric and neurological illness
3. Recent respiratory tract infection (<1 month).
4. Anticipated difficult airway

After Enrollment:

1. Difficult Airway (more than two laryngoscopic attempts by the attending anaesthesiologist).

Permission of the study was taken from ethical committee of Combined Military Hospital, Dhaka. After obtaining the informed written consent of the patient, this randomized prospective study was carried out in anesthesiology department of Combined Military Hospital, Dhaka. Patients were randomized using a random number table into two groups: Group D (Dexmedetomidine) and Group M (Magnesium sulphate). Group assignments were sealed in sequentially numbered opaque envelops that were opened by a research nurse not involved with the subject`s care. Among the study drugs, in dexmedetomidine group (Group D), patients were administered 1µg/kg dexmedetomidine in 100 mL saline solution as the loading dose 10 min before surgery and 0.5-1 µg/kg/h dexmedetomidine during surgery. In the magnesium sulfate group (Group M), patients were administered 40 mg/kg magnesium sulfate in 100 mL saline solution over 10 min as the intravenous loading dose 10 min before induction, with a subsequent 10-15 µg/kg/h infusion during surgery. The anaesthesia and surgical team were blinded to group allocation.

All subjects after arrival at operation theatre baseline parameters like heart rate (HR), systolic blood pressure (SBP), diastolic blood pressure (DBP), mean arterial pressure (MAP) were measured noninvasively. An intravenous cannulation (16G or 18G) was done. All the patients were premedicated with intravenous Midazolam (02 mg), Ondansetron (8mg) and

Omeprazole (40 mg) before surgery. Hydration with 10 ml/kg crystalloids in all subjects were done. Similar procedure for general anaesthesia was followed in both groups. Surgical field bleeding was evaluated by both the operating surgeon and anaesthesiologist who reviewed the complete records of the surgical intervention. In every 15 mins, the surgical field was assessed by the Boezaart surgical field bleeding score[13] (0-5), where

0- No bleeding, virtually bloodless field
1- Bleeding, so mild it was not even a surgical nuisance
2- Moderate bleeding, a nuisance but without interference with accurate dissection
3- Moderate bleeding that moderately compromised surgical dissection
4- Bleeding, heavy but controllable, that significantly interfered with dissection
5- Massive uncontrollable bleeding

Other secondary outcomes included the duration of surgery and anesthesia, and safety assessments including hemodynamic parameters [systolic and diastolic blood pressure (SBP and DBP)], mean arterial pressure (MAP) and heart rate (HR) were measured every 15 min interval. Collected data were recorded into the case-record form. After collection of all the required data, these were checked, verified for consistency and tabulated using the SPSS version 24. Statistical significance was set as 95% confidence level at 5% acceptable error level ($p<0.05$). Continuous data were expressed as mean and standard deviation and categorical data were expressed as frequency and percentage. To determine the association between categorical variables, chi square test was done. To determine the difference between continuous variables, independent sample t test was done.

Result

The mean age for the Group D patients was 41.73±4.57 (SD) in years and for Group M 43.77±5.06 (SD). The majority of the studied patients were male from both the groups (60.0% of Group D and 66.7% of Group M). There wasn't any significant difference regarding age and gender between groups when compared as the p-value was >0.05. (Table-1)

Table-1: Age and gender distribution of the studied patients between groups (n=60)

Variables	Group D (n=30) (Dexmedetomidine)	Group M (n=30) ($MgSO_4$)	p-value
Mean age	41.73±4.57	43.77±5.06	0.108*
Gender			0.592**
Male	18 (60.0)	20 (66.7)	
Female	12 (40.0)	10 (33.3)	

***Unpaired t-test was performed, **Chi-square test was performed**

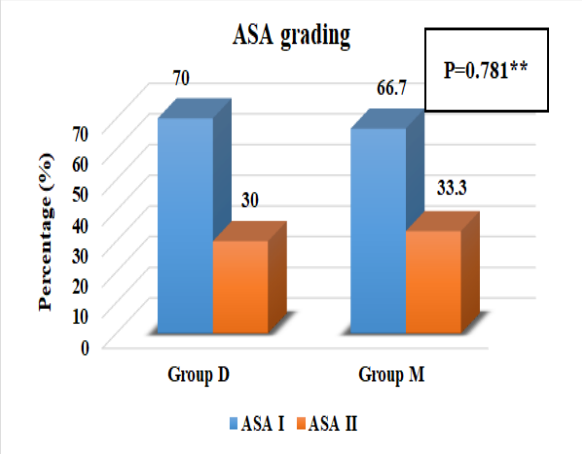
The mean weight (in Kg) was 74.70±7.59 (SD) for Group-A and 75.20±4.99 (SD) for Group M. The mean height (in m) was 1.69±0.09 (SD) for Group D and 1.69±0.06 (SD) for Group M. Besides, the mean BMI was 26.07±1.11 (SD) for Group D and 26.09±1.28 (SD) for Group M patients. No significant difference was seen regarding height, weight and BMI between groups when compared as the p-value was >0.05. (Table-2)

Table-2: Distribution of the studied patients by BMI between groups (n=60)

Variables	Group D (n=30) (Dexmedetomidine)	Group M (n=30) ($MgSO_4$)	p-value*
Weight in kg	74.70±7.59	75.20±4.99	0.764
Height in m	1.69±0.09	1.69±0.06	0.763
BMI in kg/m^2	26.07±1.11	26.09±1.28	0.930

*Unpaired t-test was performed

The majority of the studied patients from both groups belonged to ASA grade I (70.0% of Group D and 66.7% of Group M). No significant difference was seen regarding ASA grading between groups when compared as the p-value was >0.05. (Figure-1)



**Chi-square test was performed

Figure-1: Distribution of the studied patients by ASA grading (n=60)

No significant difference was seen in terms of pulse, SBP and DBP between groups when compared as the p-value was >0.05. (Table-3)

Table-3: Distribution of the studied patients by the vital signs (n=60)

Vital signs	Group D (n=30) (Dexmedetomidine)	Group M (n=30) ($MgSO_4$)	p-value*
Pulse (in beats/minute)	77.0±7.24	77.0±7.63	1.0
SBP in mmHg	130.60±13.83	132.63±11.75	0.624
DBP in mmHg	77.20±8.29	80.90±10.67	0.902

* Unpaired t-test was performed

All the patients of both groups had low back pain and the duration of present illness (in years) was 2.30±0.47 (SD) for Group D and 2.38±0.82 (SD) for Group M patients. No significant difference was seen between groups when compared as the p-value was >0.05. (Table-4)

Table-4: Distribution of the studied patients by the present illness (n=60)

H/O present illness	Group D (n=30) (Dexmedetomidine)	Group M (n=30) ($MgSO_4$)	p-value
Low back pain	30 (100.0)	30 (100.0)	1.0**
Duration of present illness (in years)	2.30±0.47	2.38±0.82	0.630*

* Unpaired t-test was performed, **Chi-square test was performed

The loading dose for Group D patients was 1 µg/kg body weight and for Group M was 40 mg/kg body weight. The maintenance dose was 0.5-1 µg/kg/h body weight for Group D and 10-15 µg/kg/h body weight for Group M patients. (Table-5)

Table-5: Distribution of the studied patients by the loading dose and maintenance dose (n=60)

Dose (in mg/kg body weight)	Group D (n=30) (Dexmedetomidine)	Group M (n=30) ($MgSO_4$)
Loading dose	1 µg/kg	40 mg/kg
Maintenance dose	0.5-1 µg/kg/h	10-15 µg/kg/h

The mean duration of operation (in hours) was 2.54±0.47 (SD) for Group D and 2.64±0.39 (SD) for Group M patients. The mean duration of controlled hypotension (in minutes) was 102.50±33.44 (SD) for Group D and 85.33±20.25 (SD) for Group M patients. The mean time to achieve target MAP (in minutes) was 34.50±22.68 (SD) for Group D and 46.00±10.37 (SD) for Group M patients. Duration of controlled hypotension and the time to achieve target MAP was significantly different between Group D patients than the Group M patients when compared as the p-value was >0.05. (Table-6)

Table-6: Comparison of duration of controlled hypotension (in minutes) and mean time to achieve target MAP (in minutes) between groups (n=60)

Variables	Group D(n=30) (Dexmedetomidine)	Group M (n=30) ($MgSO_4$)	p-value*
Duration of operation (in hours)	2.54±0.47	2.64±0.39	0.421
Duration of controlled hypotension (in minutes)	102.50±33.44	85.33±20.25	0.020
Time to achieve target MAP (in minutes)	34.50±22.68	46.00±10.37	0.016

*** Unpaired t-test was performed**

At the baseline, HR was almost similar for both groups. With time HR was less for Group D patients than Group M. (Table-7)

Table-7: Heart rate (in beats/minute) in study groups with time (n=60)

Heart rate (in beats/ minute)	Group D(n=30) (Dexmedetomidine)	Group M (n=30) ($MgSO_4$)	p-value*
At baseline	77.0±7.24	77.0±7.63	1.0
After 15 minutes	66.0±5.23	69.27±5.32	0.011
After 30 minutes	61.40±4.37	64.70±4.38	0.005
After 45 minutes	59.40±3.50	63.90±4.09	<0.001
After 60 minutes	58.67±2.67	61.33±2.32	<0.001
After 75 minutes	58.30±3.31	60.47±3.88	0.024
After 90 minutes	59.40±3.29	57.90±3.23	0.080
After 105 minutes	59.20±3.31	57.80±1.42	0.039
After 120 minutes	59.50±3.13	57.70±2.14	0.012
After 135 minutes	58.80±3.13	59.47±1.995	0.330
After 150 minutes	59.73±2.28	60.0±3.52	0.729
After 165 minutes	61.10±2.59	63.97±2.76	<0.001
After 180 minutes	78.60±15.81	79.40±11.60	0.039

*** Unpaired t-test was performed**

At baseline no significant different was seen regarding SBP (in mmHg) in both groups (p>0.05). But, with time SBP (in mmHg) was significantly lower for the Group D patients than Group M when compared as the p-value was <0.05. (Table-8)

Table-8: Comparisons of SBP (in mmHg) in study groups with time (n=60)

SBP (in mmHg)	Group D(n=30) (Dexmedetomi-dine)	Group M(n=30) ($MgSO_4$)	p-value*
At baseline	130.60±13.83	132.63±11.75	0.624
After 15 minutes	100.30±12.45	113.20±12.94	<0.001
After 30 minutes	103.06±3.97	106.06±9.63	<0.001
After 45 minutes	101.23±2.48	106.20±3.89	<0.001
After 60 minutes	101.36±3.53	106.60±3.03	<0.001
After 75 minutes	102.86±2.85	106.67±1.63	<0.001
After 90 minutes	100.50±5.73	106.93±5.53	<0.001
After 105 minutes	99.53±4.08	105.86±6.06	<0.001
After 120 minutes	100.36±2.48	101.13±8.15	0.001
After 135 minutes	90.50±4.18	94.80±8.28	0.034
After 150 minutes	90.80±4.16	95.33±9.85	0.025
After 165 minutes	93.33±4.88	96.57±7.36	0.043
After 180 minutes	93.73±5.06	99.27±10.40	0.011

* **Unpaired t-test was performed**

SBP- Systolic Blood Pressure

At baseline no significant different was seen regarding DBP (in mmHg) in both groups (p>0.05). But, with time DBP (in mmHg) was significantly lower for the Group D patients than Group M when compared as the p-value was <0.05. (Table-9)

Table-9: Comparisons of DBP (in mmHg) in study groups with time (n=60)

DBP in mmHg	Group D(n=30) (Dexmedetomi-dine)	Group M(n=30) ($MgSO_4$)	p-value*
At baseline	77.20±8.29	80.90± 10.61	0.138
After 15 minutes	63.60±6.67	71.60± 9.92	0.001
After 30 minutes	58.10±2.89	64.60± 5.21	<0.001
After 45 minutes	56.80±2.79	60.0± 4.92	0.003
After 60 minutes	56.60±1.61	58.93± 3.32	0.004
After 75 minutes	56.90±1.522	57.93± 3.08	0.040
After 90 minutes	57.10±1.954	61.93± 4.842	<0.001
After 105 minutes	58.20±2.79	63.03± 4.92	<0.001
After 120 minutes	59.80±1.42	59.87± 5.39	<0.001
After 135 minutes	58.53±3.55	63.17± 4.83	<0.001
After 150 minutes	59.20±2.98	63.57± 4.58	<0.001
After 165 minutes	58.60±3.96	62.87± 3.84	0.001
After 180 minutes	58.77±5.29	63.67± 8.36	0.009

* **Unpaired t-test was performed**

DBP-Diastolic Blood Pressure

At baseline, the MAP (in mmHg) wasn't significantly different between groups (p>0.05) but with time, MAP was significantly lower for Group D patients than the Group M patients when compared (p<0.05). (Table-10)

Table-10: Comparisons of MAP (in mmHg) in study groups with time (n=60)

MAP (in mmHg)	Group D(n=30) (Dexmedetomi-dine)	Group M(n=30) ($MgSO_4$)	p-value*
At baseline	95.60±10.45	99.43±11.33	0.107
After 15 minutes	75.83±7.49	85.47±10.81	<0.001
After 30 minutes	72.20±9.98	76.40±6.49	0.043
After 45 minutes	67.27±2.53	71.0±4.32	<0.001
After 60 minutes	67.17±2.01	68.37±1.38	0.015
After 75 minutes	67.20±1.42	67.33±1.17	0.693
After 90 minutes	67.43±1.53	71.03±5.24	0.001
After 105 minutes	68.453±2.37	73.29±4.77	0.014
After 120 minutes	69.80±1.46	70.19±4.79	0.673
After 135 minutes	69.19±3.09	73.04±3.92	<0.001
After 150 minutes	69.73±2.22	74.16±4.75	<0.001
After 165 minutes	70.58±3.78	74.10±3.23	<0.001
After 180 minutes	70.42±4.57	75.53±7.12	0.002

* **Unpaired t-test was performed**

MAP- Mean Arterial Pressure

At 15 minutes, no-significant difference was seen in terms of Boezaart surgical field bleeding score by operative surgeon score (p>0.05). But with time, operating surgeon score was significantly lower for Group D patients than the Group M patients (p<0.05). (Table-11)

Table-11: Comparisons of Boezaart surgical field bleeding score by the operative surgeon between study groups with time (n=60)

Operating surgeon score	Group D(n=30) (Dexmedetomidine)	Group M(n=30) ($MgSO_4$)	p-value*
After 15 minutes	3.00±0.00	3.03±0.183	0.326
After 30 minutes	2.40±0.498	3.0±0.0	<0.001
After 45 minutes	2.20±0.407	2.60±0.498	0.001
After 60 minutes	2.0±0.00	2.30±0.466	0.001
After 75 minutes	2.0±0.0	2.10±0.305	0.078
After 90 minutes	2.0±0.0	2.07±0.254	0.078
After 105 minutes	1.90±0.305	1.93±0.365	0.703
After 120 minutes	1.70±0.466	1.90±0.305	0.055
After 135 minutes	1.40±0.498	1.80±0.807	0.001
After 150 minutes	1.23±0.504	1.60±0.498	0.006
After 165 minutes	0.93±0.450	1.20±0.407	0.019
After 180 minutes	0.70±0.55	1.03±0.32	0.010

*** Unpaired t-test was performed**

At 15 minutes, no-significant difference was seen in terms of Boezaart surgical field bleeding score by the anesthesiologist (p>0.05). But with time, anaesthesiologist score was significantly lower for Group D patients than the Group M patients (p<0.05). (Table-12)

Table-12: Comparisons of Boezaart surgical field bleeding score by the anesthesiologist between study groups with time (n=60)

Anesthesiologist scoring	Group D(n=30) (Dexmedetomidine)	Group M(n=30) ($MgSO_4$)	p-value*
After 15 minutes	3.0±0.0	3.07±0.254	0.161
After 30 minutes	2.50±0.51	3.0±0.0	<0.001
After 45 minutes	2.30±0.47	2.70±0.45	0.002
After 60 minutes	1.87±0.35	2.40±0.49	<0.001
After 75 minutes	1.63±0.49	2.20±0.41	<0.001
After 90 minutes	1.40±0.498	2.07±0.254	<0.001
After 105 minutes	1.33±0.48	2.00±0.0	<0.001
After 120 minutes	1.20±0.48	1.90±0.31	<0.001
After 135 minutes	0.97±0.40	1.80±0.41	<0.001
After 150 minutes	0.73±0.58	1.57±0.504	<0.001
After 165 minutes	0.70±0.59	1.13±0.34	0.001
After 180 minutes	0.50±0.57	0.83±0.45	0.016

* **Unpaired t-test was performed**

Discussion

Present study designed to compare the effect of Dexmedetomidine with magnesium sulphate in controlled hypotension in Spine Surgery. The mean age for the Group-D patients was 41.73±4.57 (SD) in years and for Group M 43.77±5.06 (SD). The majority of the studied patients were male from both groups (60.0% of Group D and 66.7% of Group M). There wasn't any significant difference regarding age and gender between groups when compared as the p-value was >0.05. Ahmed *et al.*[2] also found no significant difference regarding age and gender distribution among the groups (n>0.05).

The mean weight (in Kg) was 74.70±7.59 (SD) for Group D and 75.20±4.99 (SD) for Group M. The mean height (in m) was 1.69±0.09 (SD) for Dexmedetomidine and 1.69±0.06 (SD) for Magnesium sulphate. Besides, the mean BMI was 26.07±1.11 (SD) for Dexmedetomidine and 26.09±1.28 (SD) for Magnesium sulphate patients. No significant difference was seen regarding height, weight and BMI between groups, when compared as the p-value, was >0.05. A comparative study was done to see the effects of Magnesium sulphate and dexmedetomidine in controlled hypotension during functional endoscopic sinus surgery and they showed the mean weight for the patients received Magnesium sulphate was 75.71±18.17 (SD) kg and 74.68±17.92 (SD) kg for the patients received Dexmedetomidine.[14]

The majority of the studied patients from both groups belonged to ASA grade I (70.0% of Dexmedetomidine and 66.7% of Magnesium sulphate). No significant difference was seen regarding ASA grading between groups when compared as the p-value was >0.05. Another similar study found that the majority of the patients from both groups had ASA grade I, 80% of the patients from Dexmedetomidine 73.3% patients of Magnesium sulphate group, but the difference wasn't significant between groups (p>0.05).[14]

All the patients of both groups had low back pain and the duration of present illness (in years) was

2.30±0.47 (SD) for Dexmedetomidine and 2.38±0.82 (SD) for Magnesium sulphate patients in this present study. No significant difference was seen between groups when compared as the p-value was >0.05. Usually, 90% of the PLID patients become symptom-free by conservative treatment in the form of pelvic traction and exercise. If conservative treatment fails, the next consideration becomes surgical intervention.[15]

The loading dose for Dexmedetomidine group patients was 1 µg/kg body weight and for Magnesium sulphate group the loading dose was 40 mg/kg body weight. The maintenance dose was 0.5-1 µg/kg/h body weight for Dexmedetomidine group and 10-15 µg/kg/h body weight for Magnesium sulphate group patients. A loading dose of 1 µg/kg for dexmedetomidine group and 40 mg/kg of Magnesium sulphate group followed by maintenance dose of 0.4-0.6 µg/kg/hour for Dexmedetomidine group and 10-15 mg/kg/hour for Magnesium sulphate group was used by Rokhtabnak *et al.*[16]

The mean duration of operation (in hours) was 2.54±0.47 (SD) for Group D and 2.64±0.39 (SD) for Group M patients. But the duration of surgery was statistically similar between groups when compared (p>0.05). Study by Bayoumy *et al*.[14] describes no statistically significant differences regarding duration of surgery between magnesium sulphate and dexmedetomidine group in controlled hypotension during functional endoscopic sinus surgery.

The mean duration of controlled hypotension (in minutes) was 102.50±33.44 (SD) for Dexmedetomidine group and 85.33±20.25 (SD) for Magnesium sulphate group. The mean time to achieve target MAP (in minutes) was 34.50±22.68 (SD) for Dexmedetomidine group and 46.00±10.37 (SD) for Magnesium sulphate group. Duration of controlled hypotension is greater and the time to achieve target MAP was significantly lower for Group D (Dexmedetomidine) patients than the Magnesium sulphate patients when compared as the p-value was <0.05. Similar findings were seen by an another study by Lang *et al.*[17]

At the baseline, HR was statistically nearly similar for both groups. With time HR was less for Group D (Dexmedetomidine) patients than Magnesium sulphate. In this current study, heart rate was lower for the patients from Dexmedetomidine groups at all levels but at 15 minute, 30 minutes 45 minutes, 75 minute, 105 minutes, 120 minutes, after 165 minutes and after 180 minutes HR was significantly lower for Dexmedetomidine groups as the p-value was <0.05. Some other studies showed that patients of Dexmedetomidine group exhibited lower HR values. They also showed that, administration of Dexmedetomidine was associated with lower HR.[14,18-22]

At baseline no significant different was seen regarding SBP (in mmHg) in both groups (p>0.05). But, with time SBP (in mmHg) was significantly lower for the Group D (Dexmedetomidine) patients than Group M (Magnesium sulphate) when compared as the p-value was <0.05. At baseline no significant different was seen regarding DBP (in mmHg) in both groups (p>0.05). But, with time DBP (in mmHg) was significantly lower for the Dexmedetomidine group patients than Magnesium sulphate group when compared as the p-value was <0.05. Study by Ahmed *et al.*[2] also showed that SBP (mmHg) and DBP (in mmHg) was significantly lower for the patients

from Dexmedetomidine group than the patients from Magnesium sulphate group (p<0.05).

At 15 minutes, no-significant difference was seen in terms of Boezaart surgical field bleeding score by the anesthesiologist and by the operative surgeon between study groups with time (n=60) But with time, bleeding score was significantly lower for Dexmedetomidine group patients than the Magnesium sulphate patients (p<0.05). A study by Rokhtabnak *et al.*[16] showed that, bleeding score was significantly more for the patients from Magnesium sulphate group than the patients from Dexmedetomidine group when compared (p<0.05) and also they showed that surgeons satisfaction score was significantly higher for the patients from Dexmedetomidine group than the patients from Magnesium sulphate group when compared (p<0.05).

This present study found that at baseline, the MAP (in mmHg) wasn't significantly different between groups (p>0.05) but with time, MAP was significantly lower for Dexmedetomidine patients than the Group M (Magnesium sulphate) patients when compared (p<0.05). Some other studies showed that MAP was significantly lower for the patients from Dexmedetomidine group than the patients from Magnesium sulphate group (p<0.05).[14,18-22]

Conclusion

Study results conclude that Dexmedetomidine is more effective than Magnesium sulphate in achieving controlled hypotension, which causes less bleeding and provides favorable surgical field conditions for spine surgery. So, by using dexmedetomidine as hypotensive agent, successful spine surgery can be done with better patient outcome.

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