Original Article

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Anaesthesia Section

Efficacy of Magnesium Sulphate and Dexmedetomidine in Controlled Hypotension for Functional Endoscopic Sinus Surgery: A Randomised Clinical Study

KP NAYANTARA[1], VIJAY V KATTI[2], BASAVARAJ N PATIL[3]

ABSTRACT

Introduction: The treatment of nasal sinus diseases with Functional Endoscopic Sinus Surgery (FESS) is a well-established and popular method. This procedure is performed under general anaesthesia or local anaesthesia. Intentional induction of hypotension has helped limit intraoperative blood loss. A bloodless surgical field improves visibility and lowers the possibility of damaging nearby structures, achieved by reducing the baseline Mean Arterial Pressure (MAP) by 30% or maintaining MAP at 60-70 mmHg.

Aim: To compare the efficacy of dexmedetomidine and Magnesium Sulphate ($MgSO_4$) in producing hypotensive anaesthesia during FESS.

Materials and Methods: This randomised clinical study was conducted at BLDE Shri BM Patil Medical College and Research Centre, Vijayapura, Karnataka, India, from January 2021 to July 2022. In this study, 70 patients, aged 18 to 60 years of either sex, admitted for FESS surgeries under general anaesthesia with American Society of Anaesthesiologists (ASA) Grade 1 and 2 were randomly divided into two groups: 35 patients in the dexmedetomidine group and 35 patients in the $MgSO_4$ group. Dexmedetomidine was given to group D as a loading dose of 1 µg/kg, followed by an infusion of 0.5 µg/kg/h, and $MgSO_4$ was given to group M as a loading dosage of 40 mg/kg, followed by an infusion of 15 mg/kg/h. MAP was kept above 65 mmHg during induced hypotension. Parameters studied included Heart Rate (HR), Systolic Blood Pressure (SBP), Diastolic Blood Pressure (DBP), MAP. Data was analysed using International Business Machines (IBM) Statistical Package for Social Sciences (SPSS) Statistics Software Version 23.0. A p-value <0.05 was considered statistically significant.

Results: The demographic profiles regarding age, gender, ASA grade, and duration of surgery in both groups were comparable and showed no significant differences. At 30 minutes of surgery, MAP in group D was found to be statistically lower than that in group M with a p-value of 0.0001. Dexmedetomidine induced a significant reduction in HR, which was statistically validated with a p-value of 0.004 at 15 minutes. A statistically significant reduction in MAP was found in group D compared to group M at the time of intubation and later at 10 minutes (p-value=0.005) and 15 minutes (p-value=0.006).

Conclusion: The target MAP of 60-70 mmHg or a 30% reduction from the baseline MAP was achieved significantly earlier in group D as compared with group M. Group D had lower infusion dosages, better surgical field visibility, and caused less bleeding. The dexmedetomidine group experienced extended sedation and postoperative recovery.

Keywords: Controlled blood pressure, Intraoperative bleed, Sinus surgery, Surgical field visibility

INTRODUCTION

The FESS procedure uses a microdebriding tool to remove the diseased tissue while the surgeon preserves the healthy mucosa. Significant postoperative bleeding is the main obstacle to clear visibility and can compromise the efficiency and safety of this surgical procedure. Due to bleeding, both the anaesthesiologist and the surgeon encounter significant difficulties. It impairs vision, prolongs surgery, demands additional blood transfusions, and exacerbates oedema and ecchymosis after surgery. One can prevent the aforementioned challenges by using controlled hypotension. It most frequently refers to a drop in SBP below 80-90 mm Hg, a drop in MAP up to 60-65 mm Hg, or a 30% drop from baseline MAP [1]. Controlled hypotension, also known as hypotensive anaesthesia, is a type of anaesthesia in which SBP is purposely reduced while the patient is under anaesthesia. Instead of a predetermined target pressure, this reduction should be in accordance with the patient's baseline blood pressure to reduce surgical blood loss and problems and improve the vision of the surgical field. Hypotension lowers arterial blood pressure in a planned, yet regulated manner [2]. A technique known as controlled hypotension is the method most frequently utilised to reduce blood loss and enhance visibility in the operative field during FESS surgery. Numerous methods have been used to accomplish regulated low blood pressure. Employing pharmacological methods such as direct-acting vasodilators, volatile anaesthetics, and autonomic blockers of ganglions, α-adrenergic receptors, and beta-adrenergic prostaglandin E1, $MgSO_4$, and calcium channel blocking agents [3].

$MgSO_4$ is an effective medication for controlled hypotension. It also acts as a mediating agent for the activation of the enzymes Na^+-K^+ATPase and Ca^{++}ATPase, which are involved in transmembrane ion exchange during the depolarisation and repolarisation phases of cell membrane stability [4]. $MgSO_4$ has also been shown to lower HR and arterial pressure by preventing norepinephrine from being released [5]. A highly selective α2 adrenoreceptor agonist, dexmedetomidine possesses sedative, analgesic, and anaesthetic-sparing properties. Because of central sympatholysis, it causes a dose-dependent reduction in cardiac output, HR, and arterial blood pressure [5]. It also holds potent analgesic (opioid-sparing) and calming properties. It is approved for use in both adult and paediatric patients as a complete anaesthetic and/or sedative-analgesic. It works by binding to imidazoline type 1 and central α-2A receptors [6].

The present study aimed to compare the efficacy of dexmedetomidine and $MgSO_4$ in producing hypotensive anaesthesia during FESS.

MATERIALS AND METHODS

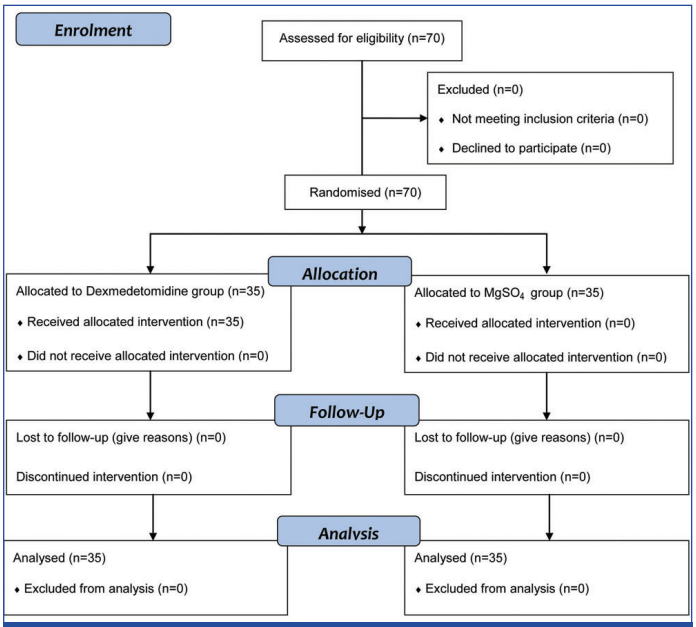
The randomised clinical trial was conducted in the Department of Anaesthesiology, BLDE (Deemed to be University) Shri BM Patil Medical College, Hospital and Research Centre, Vijayapura, Karnataka, India from January 2021 to July 2022, with a total of 70 patients posted for FESS surgery under general anaesthesia. Written informed consent was obtained from each patient after obtaining clearance from the ethical committee (IEC/No 09-2021). This study was registered with the clinical trial registry of India (CTRI/2022/09/045365).

Inclusion criteria: Patients belonging to either sex in the age group of 18-60 years, who were scheduled to undergo FESS under general anaesthesia, and belonging to ASA grade 1 and 2 were included in the study.

Exclusion criteria: Individuals who were hypersensitive to the medication, those with concurrent severe cardiovascular and respiratory conditions, general haematological and neuromuscular diseases, hypotension, sinus bradycardia, chronic hypertension, and expected difficult airway were excluded from the study.

Sample size: The study had a sample size of 35 subjects in each group with a 95% level of significance and 90% power.

Seventy patients were enrolled in the trial and randomly divided into two equal groups: the dexmedetomidine group (n=35) and the $MgSO_4$ group (n=35). Using sealed, opaque, sequentially-numbered envelopes with a 1:1 random distribution, randomisation was carried out [Table/Fig-1]. Patients in group D were administered inj. dexmedetomidine 1 µg/kg i.v. over 10 minutes loading dose, followed by a maintenance dose of 0.5 µg/kg/h i.v. throughout the surgery. Patients in group M were given a loading dose of 40 mg/kg i.v. followed by a maintenance dose of 15 mg/kg/h i.v. throughout the surgery [7].



[Table/Fig-1]: CONSORT flow diagram.

Nil per mouth status was confirmed, i.v. access was secured using an 18 gauge i.v. cannula, and was started on 10 mL/kg of ringer lactate. An Electrocardiogram (ECG), pulse oximetry, Non Invasive Blood Pressure (NIBP), capnography was attached, and baseline measurements were noted. The patient was given a premedication of inj. glycopyrrolate 0.2 mg i.v. and inj. midazolam 1 mg i.v. After preoxygenation with 100% oxygen for three minutes, the patient was given inj. fentanyl 2 mcg/kg i.v. The patient was then induced with inj. propofol 2 mg/kg i.v. and tracheal intubation was facilitated with i.v. vecuronium 0.08 mg/kg. Subsequently, anaesthesia was maintained with oxygen and nitrous oxide (50:50) and sevoflurane (1-3%).

Following a loading dose of dexmedetomidine 1 µg/kg diluted in 100 mL of 0.9% normal saline provided over 10 minutes, an infusion of 0.5 µg/kg/h was administered using an infusion pump. To prepare the medicine for infusion, dilute 100 mcg (1 ampoule) in 49 mL of 0.9% normal saline to a final volume of 50 mL with a final concentration of 2 mcg/mL. A loading dose of $MgSO_4$ 40 mg/kg diluted in 100 mL of 0.9% normal saline was administered over 10 minutes. The baseline parameters, including pulse rate, SBP, and DBP of the patient, were noted down, and the infusion was started before the induction of anaesthesia and endotracheal intubation. An an infusion of 15 mg/kg/h was then administered using an infusion pump. For infusion, to get 50 mL of the final volume and 100 mg/mL of the final concentration, 5 gm (i.e., 10 mL) was diluted in 40 mL of 0.9% NS [5]. In cases where the target MAP was not achieved after 15 minutes of maximum dose administration, nitroglycerine infusion was started intravenously to achieve the desired MAP. The surgeon's satisfaction score and bleeding score were also assessed and recorded. The surgeon's satisfaction was assessed by the surgeon at the end of the surgery as 1=poor, 2=moderate, 3=good, 4=excellent [4]. The bleeding score was assessed using the Boezaart scale (0-5) [8,9].

STATISTICAL ANALYSIS

The results are presented as mean±SD, counts, percentages, and diagrams. Normally distributed continuous variables between two groups were compared using an independent t-test. For not normally distributed variables, the Mann-Whitney U test was used [10]. Categorical variables between the two groups were compared using the Chi-square test. The $p<0.05$ is considered statistically significant.

RESULTS

There were no significant statistical differences in this study regarding gender, age, weight, ASA grade, or surgery duration between both groups. In ASA group 1, there were 47 patients, and in ASA grade 2, there were 23 patients [Table/Fig-2]. There was no statistical significance in the reduction in HR between the groups at baseline, after premedication, post-administration of the study drug, on induction, or intubation and up to 10 minutes after administration. HR was significantly reduced at 15 minutes after administration of the drug and later [Table/Fig-3].

Variables	Group	Mean±SD	Mann-Whitney U test value	p-value
Age (years)	DEX	36.429±11.793	720	0.208
	$MgSO_4$	33.086±13.832		
Sex (M:F)	DEX	19:16		
	$MgSO_4$	18:17		
Weight (kg)	DEX	59.543±7.34	708	0.255
	$MgSO_4$	57±6.791		
Height (cms)	DEX	158.057±6.78	761	0.080
	$MgSO_4$	155.029±7.312		
Duration of surgery (mins)	DEX	144.286±6.721	578.5	0.682
	$MgSO_4$	124.981±7.210		

[Table/Fig-2]: Demographics value among the groups.
p-value >0.05 statistically Non-significant

Heart Rate (HR)	Group	Mean±SD (Standard deviation)	SE (Standard error)	p-value
Baseline	DEX	89.712±16.570	2.801	0.146
	$MgSO_4$	84.057±12.968	2.192	
After premedication	DEX	88.343±18.727	3.165	0.099
	$MgSO_4$	82.543±14.902	2.519	

After study drug	DEX	85.429±17.095	2.890	0.320
	$MgSO_4$	81.343±13.911	2.351	
After induction	DEX	82.029±12.332	2.085	0.462
	$MgSO_4$	79.371±10.605	1.793	
After intubation	DEX	81.886±11.227	1.898	0.654
	$MgSO_4$	80.714±10.280	1.738	
After 5 mins	DEX	77.600±11.698	1.977	0.564
	$MgSO_4$	77.829±10.168	1.719	
After 10 mins	DEX	72.686±11.866	2.006	0.073
	$MgSO_4$	75.829±10.473	1.770	
After 15 mins	DEX	68.057±11.662	1.971	0.004
	$MgSO_4$	74.314±10.432	1.664	
After 30 mins	DEX	67.253±11.450	1.935	0.065
	$MgSO_4$	72.693±12.860	2.173	
After 60 mins	DEX	67.025±11.862	2.005	0.021
	$MgSO_4$	73.132±9.759	1.649	
After 120 mins	DEX	70.625±11.432	1.932	0.503
	$MgSO_4$	72.512±12.021	2.031	

[Table/Fig-3]: Comparison of Heart Rates (HR) between the two groups.
p-value <0.05 statistically significant. Independent t-test

At baseline, prior to the loading dose, at induction, and at five minutes postintubation, there were no significant differences between the two groups' MAP, but at intubation (p-value=0.04), 10 minutes (p-value=0.005), 15 minutes (p-value=0.006), 30 minutes (p-value=0.0001), 60 minutes (p-value=0.006), and 120 minutes (0.006) after intubation, the MAP in group D was statistically lower than that in group M [Table/Fig-4].

MAP	Group D Mean/median±SD	Group M Mean/median±SD	p-value
Baseline	95.6±5.22	94.886±7.653	0.497
Premedication	93.886±7.263	92.886±11.628	0.925
Study drug	88.4±7.064	88.6±7.597	0.471
Induction	86±8.788	87.571±8.552	0.096
Intubation	86.457±9.992	91.114±8.348	0.040*
5 mins	80±8.36	83.4±7.785	0.096
10 mins	75.429±7.747	80.8±8.217	0.005*
15 mins	73.771±7.570	79.2±7.348	0.006*
30 mins	76.210±7.213	83.5±7.820	0.0001*
60 mins	74.321±7.851	79.78±8.32	0.006*
120 mins	75.140±8.10	80.310±7.413	0.006*

[Table/Fig-4]: Comparison of MAP between the two groups.
p-value <0.05 statistically significant. Independent t-test

Dexmedetomidine induced a significant reduction in HR, which was statistically validated. No patient in this group required the usage of nitroglycerine. When it came to the usage of nitroglycerin, which was only necessary in eight cases for group M, there was a statistically significant difference between the two groups (p-value=0.008). The group M used a total dose of 145.48 g of nitroglycerin. A statistical difference between the groups was found at 10, 15, 30 and 60 minutes regarding SBP [Table/Fig-5]. DBP showed a statistical difference between the groups at 30, 60, and 120 minutes [Table/Fig-6]. Group M was greatly outperformed by group D in terms of bleeding score [Table/Fig-7]. Group D had higher surgeon satisfaction than group M [Table/Fig-8]. Sedation in group D was significantly higher than group M [Table/Fig-9]. Group D patients took a longer time for recovery compared to group M [Table/Fig-10]. In comparison to the group M, there was a statistically significant reduction in blood loss in group D (p-value=0.017).

SBP	Group D Mean (median)±SD	Group M Mean (median)±SD	p-value
Baseline	89.714±16.570	84.057±12.968	0.063
Premedication	88.629±18.985	82.543±14.902	0.074
After study drug	77.138±2.897	81.343±13.911	0.084
After induction	78.315±2.082	79.371±10.605	0.565
After intubation	83.343±11.178	80.714±10.280	0.058
5 mins	78.743±11.604	77.829±10.168	0.727
10 mins	76.286±11.631	75.829±10.473	0.004
15 mins	72.743±10.587	74.314±9.845	0.001
30 mins	68.380±8.436	75.256±10.204	0.003
60 mins	70.738±10.630	77.280±9.982	0.009
120 mins	72.830±10.623	75.512±9.325	0.2656

[Table/Fig-5]: Comparison of SBP between the two groups.
p-value <0.05 statistically significant. Independent t-test

DBP	Group D Mean (median)±SD	Group M Mean (median)±SD	p-value
Baseline	81.6±6.687	80.286±8.824	0.676
Premedication	80.4±9.23	78.057±11.943	0.256
Study drug	76.171±8.723	73.714±9.433	0.254
Induction	74.257±8.586	73.457±10.242	0.791
Intubation	74.6±11.094	75.143±10.33	0.725
5 min	68.486±8.545	68.029±9.015	0.912
10 mins	64.829±7.656	66.886±8.92	0.244
15 mins	62.771±7.967	66.571±8.125	0.033
30 mins	60.272±7.33	66.273±8.21	0.001
60 mins	61.142±8.01	67.223±8.89	0.0008
120 mins	62.548±7.945	66.892±8.34	0.029

[Table/Fig-6]: Comparison of Diastolic Blood Pressure (DBP) between the groups.
p-value <0.05 statistically significant. Independent t-test

Bleeding score	Group D (n=35), n (%)	Group M (n=35), n (%)	p-value
0	3 (3.3)	0	0.212
1	5 (10.0)	0	0.217
2	15 (50.0)	9 (20.0)	0.039*
3	8 (26.7)	6 (13.3)	0.017*
4	2 (6.7)	12 (40.0)	0.028*
5	2 (3.3)	8 (26.7)	0.031*

[Table/Fig-7]: Comparison of bleeding scores between the two groups.
p-value <0.05 statistically significant. Mann-Whitney U test

Surgeon satisfaction	Group D (n=35), n (%)	Group M (n=35), n (%)	χ^2	p-value
Bad	5 (3.3)	9 (20.0)	5.249	0.022
Moderate	6 (16.7)	16 (46.7)	9.053	0.003*
Good	9 (30.0)	7 (23.3)	3.481	0.049*
Excellent	15 (50.0)	3 (10.0)	17.190	0.001*

[Table/Fig-8]: Comparison of surgeon satisfaction between the two groups.
p-value <0.05 statistically significant

RSS	Group D (n=35)	Group M (n=35)	p-value
15 mins postoperative	5.025±0.31	2.302±0.163	<0.001*
30 mins postoperative	4.68±0.320	2.68±0.182	<0.001*
60 mins postoperative	3.48±0.29	2.24±0.13	<0.001*

[Table/Fig-9]: Comparison of Ramsay sedation score between the groups.
p-value <0.05 statistically significant. Independent t-test

Time	Group D (n=35)	Group M (n=35)	p-value
Recovery time (minutes)	30.21±6.38	22.48±6.95	<0.001*

[Table/Fig-10]: Comparison of postoperative recovery time as mean±SD.
p-value <0.05 statistically significant. Independent t-test

DISCUSSION

The FESS is performed using a fiberoptic endoscope, which uses a bright camera. During FESS, a dry operating field has been secured using a variety of techniques. Local vasoconstrictors and hypotension are two ways to reduce capillary bleeding, which is the main factor affecting the visibility of the operating field [11]. A drop of blood can effectively block the surgical area. A number of techniques have been employed to minimise this, including topical vasoconstriction agents, Fowler position, alpha 2 adrenergic and beta adrenergic inhibitors, as well as preoperative steroids, but these methods come with considerable adverse effects [4]. Intentional hypotension has been induced using a variety of pharmaceuticals. Dexmedetomidine and $MgSO_4$ were employed in the current investigation. Dexmedetomidine, a selective α2 adrenoceptor agonist, causes a reduction in blood pressure, slowing of HR, sedation, and analgesia. The fall in blood pressure is mainly due to the inhibition of central sympathetic outflow [12]. Dexmedetomidine is a highly potent and selective central 2-receptor agonist that binds to transmembrane G protein-binding adrenoreceptors. It is different from other sedatives because it has analgesic effects that are known as opioid-sparing, anxiolytic, and sympatholytic properties in anaesthesia [2]. It also produces sedation without causing respiratory depression.

$MgSO_4$ reduces blood pressure by blocking N-type Ca^{++} channels at nerve endings, which prevents norepinephrine from being released [4,13]. The significant analgesic impact of magnesium during surgery also explains why it causes hypotension. The antagonistic activity of magnesium on N-methyl D-aspartate receptors accounts for its analgesic effects [13]. It was discovered in this study that dexmedetomidine was superior to $MgSO_4$ in attaining targeted hypotension in the subjects undergoing FESS. Dexmedetomidine and magnesium have been used in several other studies for controlled hypotension. In a study by Bayram A et al., it was found that controlled hypotension can be achieved more successfully using dexmedetomidine [14]. In Patel DD et al., a controlled hypotension experiment, dexmedetomidine and nitroglycerin were evaluated; dexmedetomidine had the benefit of improved cardiovascular stability [11]. In numerous other studies also, controlled hypotension has been induced with dexmedetomidine and magnesium [9,15,16]. Dexmedetomidine is superior to $MgSO_4$ in achieving target MAP in lesser time with a minimum infusion dose [4,15].

This study found that Dexmedetomidine improved the surgical field's quality more than the $MgSO_4$ group. Similar results were found in a study by Soliman R and Fouad E and in a study by Eghbal A et al., [9,17]. In a study by Moshiri E et al., it was shown that the desired surgical field is made possible by reducing the HR rather than through vasoconstriction [18]. In a study by Bafna U et al., it was found that both dexmedetomidine and $MgSO_4$ are safe agents for controlled hypotension for improving surgical field quality [6]. Dexmedetomidine provided better surgical field quality. It has been demonstrated that in animal models of neuropathic and inflammatory pain, magnesium has an antinociceptive effect. It has also been demonstrated to have analgesic properties for humans [19]. This contributes to the hypotensive effect of $MgSO_4$, which in turn reduces the bleeding and thereby improves the surgical field quality.

Group D showed increased surgeon satisfaction and reduced bleeding compared to group M. Similar results were seen in a study by Gunda S et al., [16]. These results correlate with the findings of other studies [4,7]. Dexmedetomidine provides an additional benefit of reducing analgesic requirements and providing postoperative sedation [5,20]. In the study by Faranak R et al., the dexmedetomidine group had a lower bleeding score and higher surgeon satisfaction compared to the magnesium group, producing similar results [15]. Additionally, dexmedetomidine provided higher surgeon satisfaction than magnesium in a study by Bayram A et al., [14]. This study concluded that dexmedetomidine provided better haemodynamic stability than in patients receiving $MgSO_4$. Similar results were found in another study by Gupta KK et al., where dexmedetomidine provided better haemodynamic control and was associated with lesser blood loss without any significant adverse effects [21].

Dexmedetomidine and nitroglycerin were tested in a study by Patel DD et al., to create controlled hypotension; the former had the advantage of retaining greater haemodynamic stability compared to the latter [11]. Dexmedetomidine and esmolol were tested in a study by Bajwa SJ et al., as hypotensive medications; when compared to esmolol, dexmedetomidine reduced heart rate and blood pressure while also enhancing the operating room environment [12]. Both dexmedetomidine and magnesium produced regulated hypotension in the current trial, and the surgery's hypotensive result was satisfactory. In the study by Ghodraty MR et al., magnesium and remifentanil were contrasted. Both medications have similar haemodynamic qualities and similar effects on controlling hypotension [13]. Patients in group D in the current study had lower heart rates compared to those in group M during the procedure, which would have contributed to a better surgical field condition in group D. These results are similar to the ones in the study by Soliman R and Fouad E [9]. Only one patient in group M required atropine administration, whereas five patients in group D did. In a study by Byram and colleagues, four patients in the dexmedetomidine group experienced bradycardia, as opposed to one patient in the magnesium group [14]. In addition to the reduced effects of blood pressure and heart rate, the decreased bleeding and improved surgical site in group D may have also been caused by peripheral vasoconstriction [15].

Dexmedetomidine appears to have a more potent analgesic effect than magnesium. Dexmedetomidine is a highly selective α2 adrenergic receptor agonist in the locus coeruleus and spinal cord, which has sedative, analgesic, and anti-anxiety properties but does not produce respiratory depression, whereas $MgSO_4$ is an NMDA receptor antagonist that has analgesic effects [17]. Magnesium has been demonstrated to operate on various ion channels and NO pathways to produce both pronociceptive and antinociceptive effects in animal models of pain [19].

Compared with magnesium, the overall tendency regarding the effects of dexmedetomidine in producing lower values of both MAP and HR was observed. Dexmedetomidine regulates blood pressure better than $MgSO_4$, resulting in a better surgical field, higher surgeon satisfaction, and less bleeding [16]. Analgesia induced by $MgSO_4$ may also play a role in controlling hypertension and tachycardia [17]. The results were consistent with the assessment of the bleeding score [20]. Clonidine premedication given before FESS was shown to reduce surgical time and improve the quality of the surgical field [8]. With fewer adverse effects and improved haemodynamic regulation, dexmedetomidine was associated with decreased blood loss [21].

The dexmedetomidine group also showed higher postoperative sedation, as assessed by the Richmond Sedation Score. Patients in group D had a longer recovery time compared to the magnesium group. In a study by Bajwa SJ et al., similar results were obtained where it was found that dexmedetomidine provided an additional benefit of postoperative sedation as assessed by the Richmond Sedation Score [12].

Limitation(s)

Surgeon satisfaction score is subjective and varies from surgeon to surgeon. The bleeding can vary according to the surgical technique and expertise of the surgeon.

CONCLUSION(S)

Dexmedetomidine provides controlled hypotension more effectively and with better haemodynamic stability in patients undergoing FESS compared with $MgSO_4$. The key finding is that dexmedetomidine

is superior to $MgSO_4$ in inducing controlled hypotension in FESS surgeries. The surgical field was of greater quality, the surgeon satisfaction was better, and there was less bleeding with dexmedetomidine than with $MgSO_4$, which required more nitroglycerine. Dexmedetomidine also provided a stronger analgesic effect than magnesium and required less postoperative analgesic requirement.

REFERENCES

[1] Kapoor C, Sundar SN, Kumar DA, Rajkumari SD. Comparison between magnesium sulphate and dexmedetomidine in controlled hypotension during functional endoscopic sinus surgery. MedPulse Int J Anaesthesiol. 2020;16(3):71-75.
[2] Khalifa OS, Awad OG. A comparative study of dexmedetomidine, magnesium sulphate, or glyceryl trinitrate in deliberate hypotension during functional endoscopic sinus surgery. Ain-Shams J Anaesthesiol. 2015;8(320)6.
[3] Coursin DB, Coursin DB, Maccioli GA. Dexmedetomidine. Curr Opin Crit Care. 2001;7:221-26.
[4] Bayoumy AA, Abo Zeid GS, El Deek AM, Elbeialy MA. Comparative study between magnesium sulphate and dexmedetomidine in controlled hypotension during functional endoscopic sinus surgery: A prospective randomised study. J Anaesthesiol. 2020;12:29. https://doi.org/10.1186/s42077-020-00078-7.
[5] Chhabra A, Saini P, Sharma K, Chaudhary N, Singh A, Gupta S. Controlled hypotension for FESS: A randomised double-blinded comparison of magnesium sulphate and dexmedetomidine. Indian J Anaesth. 2020;64(1):24-30.
[6] Bafna U, Gurjar SS, Nagal JB. Dexmedetomidine versus magnesium sulphate for induced hypotension during functional endoscopic sinus surgery: A randomised, double-blind study. Bali J Anaesth. 2020;4:S39-43.
[7] Karthik KJS, Kundhavi DR, Pradeep S. A study on comparison between dexmedetomidine and magnesium sulphate in controlled hypotension during functional endoscopic sinus surgery under general anaesthesia. Int J Contemp Med Res. 2018;5(11):K7-K11.
[8] Wawrzyniak K, Kusza K, Cywinski JB, Burduk PK, Kazmierczak W. Premedication with clonidine before TIVA optimizes surgical field visualization and shortens duration of endoscopic sinus surgery-results of a clinical trial. Rhinology. 2013;51(3):259-64.
[9] Soliman R, Fouad E. The effects of dexmedetomidine and magnesium sulphate in adult patients undergoing endoscopic transnasal transsphenoidal resection of pituitary adenoma: A double-blind randomised study. Indian J Anaesth. 2017;61(5):410-17.
[10] Hassanien A, Talaat M. Oral nifedipine as a premedication for induced hypotension in FESS. Egyptian J Anaesth. 2020;12:291-95.
[11] Patel DD, Singh A, Upadhyay M. Dexmedetomidine versus nitroglycerin for controlled hypotensive anaesthesia in functional endoscopic sinus surgery. J Anesth Clin Res. 2018;9(5):822.
[12] Bajwa SJ, Kaur J, Kulshrestha A, Haldar R, Sethi R, Singh A. Nitroglycerine, esmolol and dexmedetomidine for induced hypotension during functional endoscopic sinus surgery. A comparative evaluation. J Anaesthesiol Clin Pharmacol. 2016;32(2):192-97.
[13] Ghodraty MR, Homaee MM, Farazmehr K. Comparative induction of controlled circulation by magnesium and remifentanil in spine surgery. World J Orthop. 2014;5(1):51-56.
[14] Bayram A, Ulgey A, Gunes I, Ketenci I, Capar A, Esmaoglu A. Comparison between magnesium sulphate and dexmedetomidine in controlled hypotension during functional endoscopic sinus surgery. Rev Bras Anestesiol. 2015;65(1):61-67.
[15] Faranak R, Soudabeh DM, Mohamadreza G, Alireza P, Mojtaba MD, Arash TB, et al. Controlled hypotension during rhinoplasty. A comparison of dexmedetomidine with magnesium sulphate. Anesth Pain Med. 2017;7(6):e64032.
[16] Gunda S, Suddapally S, Bekkam GJ. Comparison between magnesium sulfate and dexmedetomidine in controlled hypotension during functional endoscopic sinus surgery. Euro Journal Molecular & Clinical Med. 2022;09 (04):506-10.
[17] Eghbal A, Modir H, Moshiri E, Khalili M, Barsari F, Mohammadbeigi A. Hypotension effect of labetalol and dexmedetomidine for intraoperative blood loss and surgical conditions in functional endoscopic sinus surgery; A double blind randomised clinical trial. Formos J Surg. 2018;51(3):98-104.
[18] Moshiri E, Modir H, Yazdi B, Susanabadi A, Sa N. Comparison of the effects of propofol and dexmedetomidine on controlled hypotension and bleeding during endoscopic sinus surgery. Ann Trop Med Public Health. 2017;10(3):721-25.
[19] Srebro D, Vuckovic S, Milovanovic A. Magnesium in pain research: State of the art. Curr Med Chem. 2017;24(4):424-34.
[20] Lang B, Zhang L, Lin Y, Zhang W, Li FS, Chen S. Comparison of effects and safety in providing controlled hypotension during surgery between dexmedetomidine and magnesium sulphate: A meta-analysis of randomised controlled trials. PLoS ONE. 2020;15(1):e0227410.
[21] Gupta KK, Kumari V, Kaur S. Comparative evaluation of propofol versus dexmedetomidine infusion for hypotensive anaesthesia during functional endoscopic sinus surgery: A prospective randomised trial. Anesth Pain Med. 2022;17(3):271-79.

PARTICULARS OF CONTRIBUTORS:
1. Junior Resident, Department of Anaesthesiology, BLDE Deemed to be University, Shri B.M. Patil Medical College Hospital and Research Centre, Vijayapura, Karnataka, India.
2. Associate Professor, Department of Anaesthesiology, BLDE Deemed to be University, Shri B.M. Patil Medical College Hospital and Research Centre, Vijayapura, Karnataka, India.
3. Associate Professor, Department of Anaesthesiology, BLDE Deemed to be University, Shri B.M. Patil Medical College Hospital and Research Centre, Vijayapura, Karnataka, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:
Dr. Vijay V Katti,
Associate Professor, Department of Ananesthesiology, BLDE Deemed to be University,
Shri B.M. Patil Medical College Hospital and Research Centre,
Vijayapura-586103, Karnataka, India.
E-mail: drvijaykatti@gmail.com

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