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Original Article

Anaesthesia Section

Impact of Dexmedetomidine Infusion during Functional Endoscopic Sinus Surgery: A Randomised Controlled Trial

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ABSTRACT

Introduction: Functional Endoscopic Sinus Surgery (FESS) requires a surgical field with minimal bleeding, and numerous pharmacological agents have been used to achieve this. Dexmedetomidine has been widely used as a sedative, analgesic, and as a supplement to general anaesthesia. It has been found to decrease norepinephrine release, thereby decreasing Heart Rate (HR) and blood pressure. These properties, along with its opioid-sparing analgesic effects, make it an attractive drug to use during FESS.

Aim: The aim of this study was to determine if dexmedetomidine infusion during FESS improves the visibility of the surgical field, provides stable haemodynamics, and alters the consumption of sevoflurane and other anaesthetic agents.

Materials and Methods: This randomised, double-blinded controlled trial was conducted at the Otorhinolaryngology Operation Theatre, BYL Nair Charitable Hospital, Mumbai, India, from July 2018 to December 2019. The study included 100 patients of either sex, with American Society of Anaesthesiologists (ASA) I and II classification, aged 18-55 years, who were randomly divided into two groups. Group D received a dexmedetomidine infusion (0.5 mcg/kg/hour), while group C (control group) received a saline infusion. Haemodynamic parameters, Minimum Alveolar Concentration (MAC) of sevoflurane, surgeon's grading of the operative field, and the requirement of additional hypotensive agents were compared. Statistical analysis was performed using Student's unpaired t-test to evaluate the significance of normally distributed variables, Mann-Whitney U test and Chi-square test for ordinal data and categorical variables.

Results: The groups were comparable with respect to age, weight, gender, and ASA grade. The average mean MAC of sevoflurane at various time intervals was 1.135±0.664635 in group D and 1.9675±0.438 in group C, which was statistically significant. The surgeon's grading of the surgical field using the Fromme and Boezaart scale was significantly better in group D (1.53±0.45625 versus 2.907±0.5835 in the control group). Although not statistically significant, more number of patients in group C needed additional drugs to lower HR and blood pressure.

Conclusion: Dexmedetomidine infusion during FESS is effective in maintaining stable haemodynamics with a lesser need for additional agents to lower HR and Mean Arterial Pressure (MAP). It improves the visibility of the surgical field and decreases the MAC of sevoflurane required to maintain anaesthesia.

Keywords: Bloodless surgical field, Fromme and Boezaart scale, Hypotension, Minimum alveolar concentration

INTRODUCTION

The FESS requires precision and accurate identification of landmarks to avoid complications. Controlled hypotension is usually provided to minimise bleeding and improve visibility. MAP has to be maintained so that perfusion of vital organs is not compromised [1]. Methods that have been used to provide a better surgical field include local vasoconstrictors, antifibrinolytics, and various drugs that lower the MAP [2]. Pharmacological agents that have been used to reduce bleeding during FESS include esmolol, labetalol, propofol, remifentanil, magnesium sulfate, clonidine, etc. [3]. Sodium nitroprusside and nitroglycerine are favoured due to the rapid onset and termination of effect, but they are preferably used with intra-arterial blood pressure monitoring [4,5]. Inhalational agents like sevoflurane are popular due to ease of titration and rapid washout, which ensures that the patient is wide awake at the end of the procedure. However, when used in high concentrations to lower the MAP, it may be associated with haemodynamic instability and delayed recovery [6].

Dexmedetomidine, a selective alpha-2 adrenergic agonist, has favourable effects such as sedation, analgesia, anxiolysis, anaesthetic-sparing properties, and dose-dependent haemodynamic effects without producing respiratory depression [7]. It has been widely used in varying dosages from 0.2-1 mcg/kg/hour to provide hypotensive anaesthesia in endoscopic nasal and middle ear surgeries [8-10]. Decreased MAP values and a better surgical field were achieved, but higher doses of 1 mcg/kg/hr and above were associated with bradycardia in some patients [6,11-13].

Although there have been many studies that evaluated the use of dexmedetomidine in FESS and compared it with many other agents [6,8-10], the present study was performed to determine if it provided a better surgical field and reduced the MAC of sevoflurane.

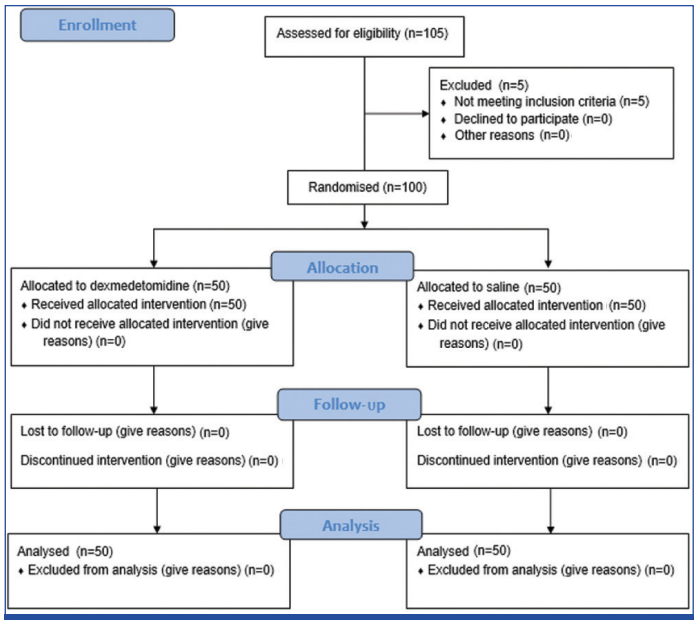
The present study was initiated after dexmedetomidine was available in the medical store of the institution. Experience with dexmedetomidine was limited as prescribing drugs was not permitted as per institutional norms. The objective of the present study was to ascertain if dexmedetomidine infusion during FESS provided a better operative field and if it made a difference to the MAC of sevoflurane used to maintain anaesthesia compared to the control group. The need for additional agents like nitroglycerine and esmolol to lower the MAP and HR and maintain a relatively bloodless field was also compared. The primary outcome measure was the quality of the surgical field graded by the operating surgeon. The secondary outcome measures were the MAC of sevoflurane used and the number of times bolus doses of esmolol and nitroglycerine were given to achieve the target haemodynamic parameters.

MATERIALS AND METHODS

The present randomised, double-blinded controlled study was conducted in the Otorhinolaryngology Operation Theatre, BYL Nair Charitable Hospital, Mumbai, India, from July 2018 to December 2019. It was initiated after obtaining permission from the Institutional Ethics and Research Committee (ECARP/2018/20). CTRI registration was not done. A pilot study using dexmedetomidine 1 mcg/kg

as a bolus over 10 minutes followed by an infusion of 0.5 mcg/kg/hour was performed. This was associated with significant bradycardia in some patients, probably due to the combined effect of dexmedetomidine and fentanyl. While most studies have used a loading dose, the current study was conducted with the infusion of dexmedetomidine started after intubation [2,3,5,6]. Written informed consent was obtained from all patients.

Sample size calculation: The sample size was calculated using the quality of the surgical field from a previous study as the primary outcome measure [14]. To achieve a power of 80%, an error of 0.05, and a confidence interval of 95%, the sample size was estimated to be 45 patients in each group. Considering the possibility of dropouts, 50 cases per group were included. Out of the 105 patients who were assessed for eligibility, five had to be excluded as they did not meet the eligibility criteria [Table/Fig-1].



[Table/Fig-1]: Consolidated Standards of Reporting Trials (CONSORT) flow chart.

Inclusion criteria: Patients belonging to ASA grade I and II, aged 18-55 years, of both genders, undergoing elective FESS under general anaesthesia were included in the study. A detailed history was taken to rule out co-morbid illnesses, and blood investigations, Electrocardiogram (ECG), and X-ray were done to rule out any abnormalities in the biochemical profile and systemic disorders.

Exclusion criteria: Patients with a baseline HR less than 55 beats/min, rhythm disturbances, uncontrolled hypertension, coagulation disorders, hepatic, renal, and cerebral insufficiency were excluded from the study.

Study Procedure

Patients were randomly assigned by computer-generated numbers to receive either dexmedetomidine (study group or group D) or saline (control group or group C) [Table/Fig-1]. Pre-anaesthetic evaluation was conducted, and written informed consent was obtained from the patients by the investigator one day prior to surgery. In the operating theatre, two intravenous lines were secured: one for the infusion of dexmedetomidine or saline, and the other for fluids and drugs. Monitoring included a five-lead electrocardiogram, non-invasive blood pressure monitor, pulse oximetry, and capnography.

Patients were premedicated with fentanyl 2 mcg/kg and midazolam 0.03 mg/kg. Propofol 1-2 mg/kg was administered until loss of verbal response. Neuromuscular blockade was achieved with vecuronium 0.1 mg/kg, and the airway was secured with an appropriate size endotracheal tube. Following intubation, the infusion of dexmedetomidine or saline was initiated according to the group allocation. An anaesthesiologist not involved in the study prepared the infusions. Both the patient and the anaesthesiologist who conducting the case and recording the study parameters were unaware of the group allocation. Anaesthesia was maintained with sevoflurane and a 50% air/Oxygen (O_2) mixture.

The present study did not target a specific Mean Arterial Pressure (MAP) value but aimed to lower it by up to 20% of the baseline value when necessary. Mechanical ventilation was adjusted to provide an end-tidal carbon dioxide level of 30 to 35 mmHg. Additional doses of vecuronium were administered based on the train-of-four counts on neuromuscular monitoring. Patients were placed in a 15-degree reverse Trendelenburg position to improve venous drainage, and an oropharyngeal pack was used. Ringer's lactate solution was infused at a rate of 2-3 mL/kg/hour.

The two study groups included were as follows:

Group D: Received an intravenous infusion of dexmedetomidine at 0.5 mcg/kg/hr, prepared in a 50 mL syringe containing 4 mcg/cc.

Group C: The control group received an intravenous infusion of saline at a similar volume.

The anaesthesiologist preparing the infusions was not involved in the data collection. Once the acceptable level of MAP was achieved and maintained for approximately ten minutes, the surgeon assessed the quality of the surgical field. A predefined category scale, adapted from Fromme GA et al., and Boezaart AP et al., was used [15,16]:

Grade 0: No bleeding.

Grade 1: Slight bleeding. No suctioning of blood needed.

Grade 2: Slight bleeding. Occasional suctioning of blood required. Surgical field not threatened.

Grade 3: Slight bleeding. Frequent suctioning required. Bleeding threatens surgical field a few seconds after suction is removed.

Grade 4: Moderate bleeding. Frequent suctioning required. Bleeding threatens surgical field directly after suction is removed.

Grade 5: Severe bleeding. Constant suctioning required. Bleeding appears faster than can be removed by suction. Surgical field severely threatened, and surgery not possible.

The HR and MAP were recorded every 15 minutes until extubation, and the quality of the surgical field was graded by the surgeon every 15 minutes during the procedure. If the HR and MAP increased beyond 20% of the baseline values, fentanyl 1 mcg/kg was administered. The depth of anaesthesia was increased by escalating the concentration of sevoflurane up to a MAC of 2. In case of no response and tachycardia (>100 beats/min), esmolol was administered in 10 mg bolus increments. Nitroglycerin boluses were used if the desired blood pressure level was still not achieved. If the MAP dropped below 60 mmHg, fluid boluses were given, followed by mephenteramine 6 mg if needed. The infusion was discontinued if hypotension persisted.

Bradycardia (<50 beats/min) was treated with atropine 0.6 mg, and if it was not resolved, the drug infusion was discontinued. Paracetamol 1 gm i.v. was administered half an hour before the estimated end of surgery. Ondansetron 0.1 mg/kg was given to treat postoperative nausea or vomiting. The study drug infusions were stopped 10 minutes before the anticipated end of the procedure, and sevoflurane was discontinued when nasal packing was completed. The return of neuromuscular function was confirmed using train-of-four peripheral nerve stimulation, and residual neuromuscular blockade was antagonised with glycopyrrolate 0.008 mg/kg and neostigmine 0.05 mg/kg. Extubation was performed once the patient was fully awake, breathing spontaneously, and able to respond to verbal commands.

STATISTICAL ANALYSIS

The data were analysed using the Statistical Package for the Social Sciences (SPSS) version 20.0 (IBM SPSS Statistics for Windows, version 20.0, IBM Corp., Armonk, NY, USA). A p-value <0.05 was

considered statistically significant. Graphical representation was performed using Microsoft Excel software 2010.

Patient demographic variables were presented as mean±Standard Deviation (SD). The chi-square test was applied to assess the statistical significance of discrete and categorical data. The independent samples t-test was used for continuous data. The association between qualitative variables was assessed using the chi-square test. Ordinal qualitative data, such as the grading of the surgical field, were represented using mean±SD and median.

RESULTS

A total of 100 patients who consented to the study were divided into two groups using computer-generated randomisation. The demographic parameters [Table/Fig-2], baseline HR, and MAP were comparable between the two groups. In the dexmedetomidine group, two patients and in the saline group, three patients had controlled blood glucose levels and were diabetic. The biochemical profiles, ECG, and X-ray findings did not reveal any abnormalities in either group.

Variables	Group D (n=50)	Group C (n=50)	p-value
Age (years), Mean±SD	39.98±13.176	39.70±15.288	0.801
Weight (kg), Mean±SD	61.28±6.845	62.10±5.751	0.518
Male/Female, (n)	30/20	33/17	0.534
ASA I/II, (n)	34/16	39/11	0.260

[Table/Fig-2]: Demographic variables of the study groups.
Chi-square test was used

The patients who received dexmedetomidine infusion showed significantly lower HRs [Table/Fig-3] and MAP [Table/Fig-4] at 15, 30, 45, 60, 75, 90, 105, and 120-minute intervals after the start of surgery. The MAC of sevoflurane required to maintain MAP and HR within 20% of the baseline values was higher in the control group compared to the dexmedetomidine group [Table/Fig-5]. The average mean MAC at various time intervals was 1.9675±0.438 in group C and 1.135±0.664635 in group D.

The visibility of the surgical field was significantly better in the dexmedetomidine group [Table/Fig-6] with an average of 1.53±0.45625, while it was 2.907±0.5835 in the control group.

Heart Rate (HR) at minutes	Groups	Mean	Standard deviation	p-value
0	Group D	86.98	7.862	0.570
	Group C	86.08	7.936	
15	Group D	81.50	6.970	**0.0002**
	Group C	87.88	9.523	
30	Group D	79.78	11.424	**0.0001**
	Group C	90.36	8.390	
45	Group D	78.82	9.178	**0.0001**
	Group C	91.48	7.118	
60	Group D	77.78	8.447	**0.0001**
	Group C	91.60	8.192	
75	Group D	75.92	8.960	**0.0001**
	Group C	88.06	6.726	
90	Group D	74.64	8.346	**0.0001**
	Group C	86.54	5.984	
105	Group D	74.24	8.007	**0.0001**
	Group C	85.90	6.944	
120	Group D	73.66	7.708	**0.0001**
	Group C	86.04	7.284	

[Table/Fig-3]: Comparison of Heart Rate (HR) in beats/minute at various time intervals.
Independent sample t-test; The p-value in bold font indicates statistically significant values

Mean arterial pressure at minutes	Groups	Mean	Standard deviation	p-value
0	Group D	80.58	9.154	0.296
	Group C	82.32	7.297	
15	Group D	74.36	8.783	**0.0001**
	Group C	84.98	9.690	
30	Group D	72.64	10.119	**0.0001**
	Group C	86.94	8.044	
45	Group D	71.64	10.236	**0.0001**
	Group C	87.72	8.864	
60	Group D	70.62	9.306	**0.0001**
	Group C	87.36	7.918	
75	Group D	69.12	8.206	**0.0001**
	Group C	84.40	7.497	
90	Group D	68.28	6.709	**0.0001**
	Group C	82.64	5.984	
105	Group D	67.82	8.407	**0.0001**
	Group C	81.72	6.383	
120	Group D	66.82	7.153	**0.0001**
	Group C	81.18	6.177	

[Table/Fig-4]: Comparison of mean arterial pressure (in mmHg) at various time intervals.
Independent sample t-test; The p-value in bold font indicates statistically significant values

Minimum Alveolar Concentration (MAC) at minutes	Groups	Mean	Standard deviation	p-value
15	Group D	1.18	0.202	**0.0001**
	Group C	1.85	0.172	
30	Group D	1.19	0.310	**0.0001**
	Group C	1.92	0.140	
45	Group D	1.33	1.482	**0.002**
	Group C	1.99	0.042	
60	Group D	1.06	0.042	**0.0001**
	Group C	1.99	0.254	
75	Group D	1.06	0.254	**0.0001**
	Group C	1.99	0.042	
90	Group D	1.00	0.190	**0.0001**
	Group C	2.00	0.000	
105	Group D	1.19	1.568	**0.0001**
	Group C	2.00	0.000	
120	Group D	1.12	1.143	**0.0001**
	Group C	1.99	0.042	

[Table/Fig-5]: Comparison of Minimum Alveolar Concentration (MAC) of sevoflurane.
Independent sample t-test; The p-value in bold font indicates statistically significant values

Surgical field grade at minutes	Groups	Mean	Standard deviation	p-value
0	Group D	2.14	0.606	**0.0001**
	Group C	3.04	0.493	
15	Group D	2.06	0.550	**0.0001**
	Group C	3.48	0.544	
30	Group D	1.76	0.591	**0.002**
	Group C	3.38	0.725	
45	Group D	1.58	0.575	**0.0001**
	Group C	3.32	0.621	
60	Group D	1.46	0.503	**0.0001**
	Group C	3.00	0.606	
75	Group D	1.16	0.370	**0.0001**
	Group C	2.60	0.670	

90	Group D	1.06	0.314	**0.0001**
	Group C	2.26	0.527	
105	Group D	1.02	0.141	**0.0001**
	Group C	2.18	0.482	

[Table/Fig-6]: Comparison of surgical field grade.
Independent sample t-test; The p-value in bold font indicates statistically significant values

The number of patients who needed Nitroglycerine (NTG) for hypertension control [Table/Fig-7] and esmolol [Table/Fig-8] for HR control was lower in the group receiving dexmedetomidine.

Time (minutes)	Group D, n (n=50)	Group C, n (n=50)	p-value
0	0	2	0.153
15	0	8	**0.003**
30	0	24	**0.0001**
45	0	26	**0.0001**
60	0	24	**0.0001**
75	0	20	**0.0001**
90	0	16	**0.0001**
105	1	3	0.307

[Table/Fig-7]: Comparative use of nitroglycerine to treat hypertension at various time intervals during surgery.
The p-value in bold font indicates statistically significant values

Time (minutes)	Group D, n (n=50)	Group C, n (n=50)	p-value
15	0	1	0.315
30	1	2	0.344
45	0	4	**0.041**
60	0	6	**0.012**

[Table/Fig-8]: Comparative use of esmolol to treat tachycardia during surgery.
The p-value in bold font indicates statistically significant values

DISCUSSION

The findings of the present study were that patients who received a dexmedetomidine infusion had significantly lower values of HR, MAP, and the MAC of sevoflurane needed to maintain these parameters within the acceptable range. The study group also had a better quality of the surgical field. The need for additional drugs like nitroglycerin and esmolol was lower when dexmedetomidine was used. FESS, although a minimally invasive procedure, can be associated with complications such as optic nerve and orbital injury, cerebrospinal fluid leak, etc. [17]. Lowering the MAP can reduce capillary bleeding to a large extent. Some studies have found that achieving a clear surgical field is more effective by lowering the HR rather than through vasoconstriction [18-21].

An advantage of dexmedetomidine is that it lowers blood pressure without causing tachycardia. Emergence agitation, which is common after ENT surgeries (55.4%), is likely due to a sense of suffocation [22]. Dexmedetomidine is known to decrease the occurrence of emergence delirium, although this aspect was not covered in the current study. Sharma P et al., reported a 41% decrease in sevoflurane consumption, while Harsoor SS et al., observed a 28% reduction in the utilisation of sevoflurane with dexmedetomidine infusions [23,24]. Both of these studies maintained adequate depth of anaesthesia using state entropy and response entropy. Since the facility for measuring entropy or Bispectral Index (BIS) was not available when the present study was initiated, the dial setting of the sevoflurane vaporiser was adjusted according to the patients' haemodynamic parameters. The mean MAC of sevoflurane in group D was consistently lower at all time intervals, with an average MAC value of 1.135±0.664635, while the average MAC value in the control group was 1.967±0.438. In a similar study by Mahendran K and Priya R, it was found that patients who received dexmedetomidine infusion had a significantly lower mean requirement of isoflurane, with the MAC being (0.387±0.102) compared to the placebo group (1.7±0.211) [25].

Patients who were given dexmedetomidine had lower HR and MAP at all measured time intervals, and this difference was statistically significant [2]. Bajwa SJ et al., compared nitroglycerine, esmolol, and dexmedetomidine for induced hypotension during FESS. All three drugs achieved the desired levels of MAP, but the dexmedetomidine group had a significantly lower mean HR [2]. Gupta K et al., compared dexmedetomidine (maintenance dose of 0.4-0.8 mcg/kg/hr) with propofol (100-200 mcg/kg/min) and found that dexmedetomidine resulted in lower MAP and HR compared to propofol, despite achieving the target MAP [26]. Rahman NI et al., conducted a study with three groups, with one group receiving saline infusion and the other two receiving different infusion rates of dexmedetomidine. The group receiving the higher infusion rate (0.8 mcg/kg/hr) had a lower bleeding score [27]. Fromme GA et al., reported that a 0.4 mcg/kg/hr infusion rate of dexmedetomidine was insufficient to lower MAP to the target level [15]. However, the otolaryngologists' grading of surgical field visibility was better in the group receiving dexmedetomidine. Shams T et al., found comparable average category scale scores for the quality of the surgical field in patients receiving esmolol or dexmedetomidine [6]. Only 4% of patients in the dexmedetomidine group required additional agents (esmolol and nitroglycerine) to maintain the required MAP and clear operative field, compared to 70% in the control group. Studies comparing plasma cortisol levels during the intra and postoperative periods in patients receiving dexmedetomidine or esmolol did not find a significant difference between the two groups. This lack of difference was attributed to the sympathoadrenal blocking action of both drugs, which inhibits the release of catecholamine and other stress hormones [16,28,29].

Studies involving intraoperative use of dexmedetomidine infusion have reported significantly reduced perioperative analgesic requirements, a lower incidence of postoperative shivering, and higher postoperative sedation scores [24,30,31]. However, postoperative sedation can sometimes prolong the emergence time [32]. Chhabra A et al., were able to achieve a target MAP of 60-70 mmHg with a dexmedetomidine infusion rate of 0.2-0.4 mcg/kg/hr [33]. The present study results were compared to other studies in [Table/Fig-9] [2,3,6,8,25,33].

Author's name and year of the study	Place of study	Sample size	Name of study drugs compared	Parameters assessed	Conclusion
Shams T et al., [6] 2013	Egypt	40	Dexmeditomidine 1 mcg/kg over 10 minutes followed by 0.4-0.8 mcg/kg/hour vs Esmolol 1 mg/kg over 1 minute followed by 0.4-0.8 mg/kg/hour	a) Quality of surgical field b) Average blood loss c) Heart Rate (HR) d) Mean Arterial Pressure (MAP) e) Intraoperative fentanyl consumption	No significant difference in Frommes score grading of surgical field MAP could be achieved in all three groups Mean total fentanyl consumption and mean HR significantly lower in dexmedetomidine group at all times of measurement.
Bajwa SJ et al., [2] 2016	Punjab, India	150	Dexmeditomidine 1 mcg/kg over 10 minutes followed by 0.5-1 mcg/kg/hour vs esmolol 1 mg/kg loading dose over 1 minute followed by 0.5-1 mg/kg/hour vs NTG 0.5-2 mcg/kg/minute	a) Visibility of surgical field b) Haemodynamic variables c) Total fentanyl consumption	No significant difference in Frommes score grading of surgical field MAP could be achieved in all three groups Mean total fentanyl consumption and mean HR significantly lower in dexmedetomidine group at all times of measurement. Emergence times and Ramsey sedation score higher in dexmedetomidine group.

Chhabra A et al., [33] 2020	Rajasthan, India	68	Dexmeditomidine 1 mcg/kg over 10 minutes followed by 0.2-0.7 mcg/kg/hour Vs $MgSO_4$ 40 mg/kg over 10 minutes followed 10-15 mg/kg/hour	a) Time to reach target MAP of 60-70 mmHg b) Number of patients requiring maximum and minimum infusion doses c) Bleeding score d) Surgeon satisfaction score	Target MAP was achieved between 5 minutes and 15 minutes in 73.52% with 0.2-0.4 mcg/kg/hour with dexmeditomidine without use of sevoflurane, while 82.35% required 4% sevoflurane with >12-15 mg/kg/hour $MgSO_4$ to achieve target MAP in 10-20 minutes. Bleeding score of 2 or less was found in 26 patients of the dexmeditomidine group versus only 2 in the $MgSO_4$ group. Bleeding score of >2 was found in eight patients in dexmeditomidine versus 32 patients in $MgSO_4$ group. Significantly higher satisfaction scores were observed in the dexmeditomidine group.
Fazel MR et al., [8] 2020	Iran	90	Three groups: Dexmeditomodine 0.2 mcg/kg/hour Dexmeditomidine 0.5 mcg/kg/hour and saline infusion	a) Blood loss b) Duration of surgery c) Analgesic consumption	Lowest bleeding with 0.5 mcg/kg/hour. Lowest duration of surgery with 0.2 mcg/kg/hour. Lowest consumption of morphine and pethidine with 0.5 mcg/kg/hour.
Mahendran K and Priya R [25] 2021	Tamil Nadu, India	50	Dexmeditomidine bolus 1 mcg/kg over 10 minutes followed by infusion 0.3-0.6 mcg/kg/hour	a) Quality of the surgical field b) Awakening times c) Requirement of isoflurane d) Duration of surgery	Patients who received dexmedetomidine showed faster awakening times, lower requirement of isoflurane and lesser duration of surgery. No significant difference in quality of the surgical field Scores were comparable from 15 to 60 minutes postoperatively with most patients having Ramsey sedation score of 2 or 3.
Bafna U et al., [3] 2021	Jaipur, India	70	Dexmeditomidine 1 mcg/kg loading followed by 1 mcg/kg/hour vs clonidine 2 mcg/kg loading followed by 1 mcg/kg/hour	a) Haemodynamic parameters b) Quality of surgical field d) Time to first rescue analgesia	In both the groups, target MAP of 65-70 mmHg and improved surgical field was achieved. HR and MAP were significantly lower in the dexmeditomidine group with a longer duration of postoperative analgesia. Mean VAS scores were significantly lower dexmeditomidine.Time to first rescue analgesia was 110.43±12.27 minutes in the dexmeditomidine versus 84.29±10.08 minutes in the clonidine group. Significant difference was seen in the emergence time with 7.36±0.6 minutes in dexmeditomidine and 6.42±0.74 minutes in the clonidine group. Significantly higher sedation scores were found with dexmeditomidine, however patients were readily arousable.
Present study	Mumbai, India	100	Dexmeditomidine infusion 0.5 mcg/kg/hour vs saline 0.5	a) Surgeons grading of the operative field b) Mean MAC value of sevoflurane c) MAP, HR d) Need for additional drugs e.g., NTG and esmolol	Significantly better grading of the surgical field with lower MAP and HR. The mean MAC of sevoflurane was 1.9675 ±0.438 in the control group and 1.135±0.664635 in the dexmedetomidine group. Significantly more number of patients requiring NTG in the control group.

[Table/Fig-9]: Comparison of the various parameters of the current study with the previous studies [2,3,6,8,25,33].

Limitation(s)

The MAC of sevoflurane was not titrated using entropy/ BIS to maintain the depth of anaesthesia. Instead of a fixed dose infusion of dexmedetomidine, it may be preferable to use a range for the infusion. Additionally, postoperative analgesic requirements and sedation scores were not evaluated in the present study.

CONCLUSION(S)

Dexmedetomidine is freely available, and unlike opioids, there are no stringent storage regulations for it. Due to its favourable properties and safety profile, it can be effectively used in various surgeries where undesired haemodynamic fluctuations and oozing in the surgical field occur. The present study found that dexmedetomidine provides a good surgical field and haemodynamic stability while reducing the requirement of sevoflurane. An infusion of dexmedetomidine at a rate of 0.5 mcg/kg/hour during FESS improves the visibility of the operative field and decreases the requirement of sevoflurane.

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