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Comparative study of propofol and dexmedetomidine Infusion for hypotensive anesthesia in FESS surgeries: A randomized prospective double-blind controlled study

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ABSTRACT

Background: Intra operative bleeding is most common factor that diminishes visibility resulting in an increased incidence of complications in patients undergoing functional endoscopic sinus surgery (FESS). Methods to reduce intra-operative bleeding include Trendelenburg position, maintenance of normothermia, and controlled hypotension by various anesthetic techniques. Many studies have shown that propofol and dexmedetomidine infusion reduces the amount of bleeding in different surgeries. **Aims and Objectives:** The aim of the study was to compare the effects of dexmedetomidine and propofol infusion over hemodynamic, quantity of blood loss, and quality of surgical field in patients undergoing FESS and to compare the side effects of dexmedetomidine and propofol infusion in cases undergoing FESS. **Materials and Methods:** This was a comparative study conducted in the department of anesthesiology of a tertiary care medical college. The duration of study was 2 years. 60 patients of ASA Grades I and II with age between 20 and 60 years, including both males and females posted for FESS were included in this study on the basis of a predefined inclusion and exclusion criteria. Patients were divided into two groups (on the basis of whether they received propofol or dexmedetomidine infusion) of 30 patients each. Hemodynamic parameters (Heart rate and mean arterial pressure [MAP]) quantity of blood loss, quality of surgical field, and side effects were recorded and compared in both the groups. For statistical purposes, $P<0.05$ was taken as statistically significant. **Results:** Antrochoanal polyp and chronic sinusitis were the most common indication of FESS in studied cases. Intraoperatively, heart rate was lower in both the groups as compared to baseline. However, the heart rate was lower in the Group D at all times as compared to Group P and the difference was statistically significant from 20 min onward after induction. The mean arterial blood pressure in both the groups was comparable till up to 15 min post induction with no statistical difference. Thereafter, the mean arterial blood pressure was lower in Group D than in Group P throughout the procedure, the difference being statistically significant ($P<0.05$). The isoflurane requirement in Group D was significantly lower starting from 5 min of induction to throughout the procedure as compared to Group P ($P< 0.05$). Mean blood loss in Group D was 115.0 ± 16.78 ml and in Group P was 140.47 ± 29.42 ml, the difference in blood loss was statistically significant ($P<0.0001$). **Conclusion:** Dexmedetomidine is comparatively better than propofol in controlling heart rate and MAP, reducing the blood loss, and isoflurane requirement in patients undergoing FESS.

Key words: Dexmedetomidine; Propofol; Functional endoscopic sinus surgery; Hemodynamics

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INTRODUCTION

Functional endoscopic sinus surgery (FESS) is done through endoscope and the area is richly supplied by blood vessels. Hence, it is mandatory to minimize bleeding so as to provide clear endoscopic vision. Intraoperative bleeding is most common factor that diminishes visibility resulting in an increased incidence of complications.[1] Reduced visibility of the surgical field is related to an increased risk of dangerous vascular, nasal (synechiae and anosmia), orbital (optic nerve damage, nasolacrimal duct damage, and extraocular muscle damage), and intracranial complications (CSF leak causing meningitis), prolonged duration of intervention and reduced quality of intervention. Surgical bleeding during FESS is mainly local bleeding which is difficult to control due to anatomical and pathological characteristics.[2]

Methods to reduce intra-operative bleeding include Trendelenburg position, preoperative steroid administration, injected and topical local anesthetics and vasoconstrictors such as phenylephrine, maintenance of normothermia, and controlled hypotension by various anesthetic techniques. Thus, surgeons demand hypotensive anesthesia for FESS.[3] However, deliberate hypotension is not without potential complications, including delayed awakening, cerebral thrombosis, brain ischemia, and permanent cerebral damage and death.[4]

Ideally, hypotensive agents should be easy to administer, have rapid onset, have effects that disappear quickly when administration is discontinued and have predictable and dose dependent effects.[5] Volatile anesthetics, sympathetic antagonists, Beta adrenoreceptor antagonists, calcium channel blockers, opioids, and direct-acting vasodilators have been used to achieve controlled hypotension.[6] Some disadvantages have been reported of these techniques including delayed recovery from inhaled agents, resistance to vasodilators, tachyphylaxis, and cyanide toxicity with nitroprusside.[7]

Propofol is one of the most common drugs used in general anesthesia, which reduces systemic blood pressure by dilating blood vessels. In the maintenance of anesthesia, propofol infusion reduces pressure by 20–30%. Hypnotic action of propofol mediated by enhancing GABA induced chloride current by binding to GABA receptor Propofol, with slight influence on the myocardium, exerts similar effects to nitroglycerine dilating veins hence facilitating the outflow of blood from surgical fields.[8]

Dexmedetomidine is a potent, highly selective alpha-2 adrenoreceptor agonist with an alpha 2: alpha1 activity ratio of 1620:1. It has sympatholytic, anesthetic, sparing hemodynamic stabilizing properties without significant respiratory depression. Activation of central nervous system (CNS) postsynaptic alpha 2 receptors leads to inhibition of sympathetic activity, which decreases blood pressure and heart rate. Dexmedetomidine is rapidly distributed and is mainly hepatically metabolized into active metabolites by glucuronidation and hydroxylation. The elimination half-life of dexmedetomidine is 2 h and the redistribution half-life is 6 min and this short half-life makes it an ideal drug for intravenous titration. Dexmedetomidine has additional properties such as anxiolysis, conscious Sedation, hemodynamic stability, anti-shivering effects, and decreased nausea and vomiting. Moreover, Dexmedetomidine not only reduces anesthetic requirements, it also induces anesthesia by itself. It has also been documented to decrease post-operative nausea and vomiting. It has sympatholytic, anesthetic sparing and hemodynamic stabilizing properties without significant respiratory depression. Most common side effects of Dexmedetomidine are bradycardia and hypotension.[9]

We undertook this study to compare effects of propofol and dexmedetomidine Infusion for hypotensive anesthesia in FESS surgeries.

Aims and objectives

The objectives are as follows:

1. To primary aim of this study was to compare the effects of dexmedetomidine and propofol infusion over hemodynamic, quantity of blood loss, and quality of surgical field in patients undergoing FESS
2. To compare the side effects of dexmedetomidine and propofol infusion in cases undergoing FESS.

MATERIALS AND METHODS

This was a randomized, comparative study conducted in a tertiary care medical college after approval from e institutional Ethics Committee. 60 consecutive patients undergoing elective FESS surgery under general anesthesia were allocated randomly into two groups. Sample size calculation was done on the basis of pilot study on propofol and dexmedetomidine Infusion for FESS surgery. Keeping power (1-Beta error) at 80% and confidence level (1-alpha error) at 95%, the minimum sample size required in each group was 25 patients; therefore, we included 30 patients in each group. Patients were randomly allocated, using sealed envelope method, into two groups with 30 patients in each group. Group D received dexmedetomidine IV infusion at the rate of 0.5 mcg/kg/hr during surgery and Group P patients receiving Propofol iv infusion during surgery.

All patients were admitted prior to the day of surgery, and fasting of 8 h was ensured. On arrival to the operation theater, the baseline recording of vital parameters such as non-invasive systemic blood pressure, heart rate, peripheral oxygen saturation (SpO_2), and ECG was recorded. After establishing the intravenous line, Ringer lactate solution was started. All patients were pre medicated with intravenous 0.2 mg inj. Glycopyrrolate. Sedation was given with inj. Midazolam 0.03 mg/kg and inj. Fentanyl citrate 2 mcg/kg after pre oxygenation for 3 min, anesthesia was induced with inj. Propofol 2 mg/kg and maintained with 50% nitrous oxide in oxygen, inj. Vecuronium bromide 0.1 mg/kg and isoflurane. The agents used for induction and maintenance of anesthesia, perioperative and post-operative intravenous fluids and analgesics were kept same for all the patients. Inj dexmedetomidine infusion at the rate of 0.5 mcg/kg/h in Group D and inj. propofol infusion at the rate of 100 mcg/kg/min in Group P was started immediately after induction.

Deliberate hypotension was maintained by titration of isoflurane 0.5–2% to maintain MAP up to target limit 60–65 mmHg. Concentration of isoflurane was recorded in volume % every 15 min during the surgery. Monitoring included SPO_2, HR, systolic blood pressure, diastolic blood pressure, mean arterial pressure (MAP), and ECG measurements was recorded preoperatively, post-induction of anesthesia, during hypotensive stage every 15 mins throughout the surgery. When MAP reaches the desired range of 60–65 mm of Hg, the surgeon estimated the quality of surgical field using a 6-point scale of Fromme et al., depending on bleeding occurring at operative site.[10] 5 min before the end of surgery, anesthesia, propofol, and dexmedetomidine infusion had been cut. After surgery the residual neuromuscular blockade was antagonized with neostigmine 0.05 mg/kg and glycopyrrolate 0.008 mg/kg. Patient was extubated after observing adequate motor recovery and spontaneous breathing effort.

Patients were transferred to post anesthesia care unit for observation of any respiratory depression, hemodynamic changes, nausea, vomiting, muscle stiffness, shivering, or any other drug induced side effects. Side effects such as nausea, vomiting, bradycardia (HR <45/min), and hypotension (MAP <60 mm of hg), hypertension was recorded bradycardia, were treated with inj. atropine 0.6 mg iv. Hypotension was treated with iv mephenteramine, hypertension was managed accordingly.

Quantitative date were represented as mean and standard deviation. Association between qualitative variables was assessed by Chi-square test and Fisher's exact test. Comparison of quantitative data between cases in two groups was done using "Unpaired t-test" or by "Mann Whitney test". SSPS 21.0 software was used for statistical analysis and P<0.05 was taken as statistically significant.

Inclusion criteria

The following criteria were included in the study:

1. Scheduled for elective FESS surgeries
2. Age between 20 and 60 years
3. Patients who gave informed written Consent
4. Patients Belonging to ASA Grade I and Grade II.

Exclusion criteria

The following criteria were excluded from the study:

1. Patients' refusal to give written consent
2. ASA Grades III and IV
3. Allergy to study drugs
4. Pregnant patients
5. Patients with uncontrolled systemic illnesses such as diabetes, hypertension, and chronic obstructive airway disease.

RESULTS

The demographic details such as age and gender distribution were found to be comparable in both the groups. Mean duration of surgery as well as ASA grades of patients in Group P and Group D was comparable with no statistically significant difference (P=0.107) (Table 1).

Most patients belonged to antrochoanal polyp (20% in Group P and 43.3% in Group D) and chronic sinusitis (53.3% in Group P and 36.7% in Group D). P value was statistically not significant. Ethmoidal polyp and fungal sinusitis were other causes for which FESS was done. Mucormycosis, dacryocystorhinostomy, and septoplasty were the indication of FESS in 1 patient each in Group P (Figure 1).

Intraoperatively, heart rate was lower in both the groups as compared to baseline. However, the heart rate was lower in the Group D at all times as compared to Group P and

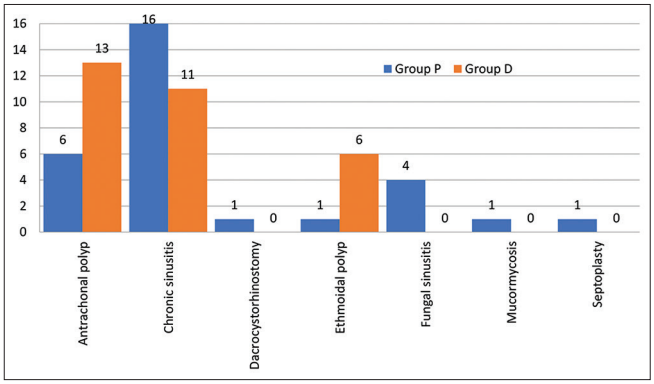

Figure 1: Indications for FESS in both the groups in studied cases

Table 1: Gender distribution, age group, and ASA grades of the studied cases

Demographics and duration of surgery in studied groups	Group P	Group D	P-value
Gender distribution			
Male	17	18	1 (Not significant) *Fisher test
Female	13	12	
Total	30	30	
Age distribution			
<20 years	3	1	0.221(Not significant) *Mann Whitney test
21–30 years	02	02	
31–40 years	16	10	
41–50 years	05	07	
>50 years	04	07	
Total	30	30	
Mean age	32.23±10.95	35.90±11.99	
ASA grades			
ASA I	04	08	0.107 (Not significant) *Fisher test
ASA II	26	22	
Total	30	30	
Mean duration of surgery (min)	106.66±13.98 min	112.33±16.22	0.1524 (Not significant) *Mann Whitney test

the difference was statistically significant from 20th min onward after induction. Post-operative mean heart rate was comparable in both Groups P and D and was found to be statistically insignificant (P>0.05) (Table 2).

The mean arterial blood pressure in both the groups was comparable till up to 15 min post induction with no statistical difference. Thereafter, the mean arterial blood pressure was lower in Group D than in Group P throughout the procedure, the difference being statistically significant (P<0.05). No patient developed hypotension in either group. The post-operative mean MAP was comparable in both Groups P and D with P>0.05 which was statistically insignificant (Table 3).

The isoflurane requirement in Group D was significantly lower starting from 5 min of induction to throughout the procedure as compared to Group P (P<0.05) (Table 4).

Mean blood loss in Group D was 115.0±16.78 ml and in Group P was 140.47±29.42 ml, the difference in blood loss was statistically significant (P<0.0001). Operative field visibility was better in Group D as compared to Group P and the difference was statistically significant with a P<0.05. On the basis of grade of bleeding, all patients were in Grade 2 or Grade 3. On the basis of grade of bleeding, all patients were in Grade 2 or Grade 3. Mean surgical grading for Group P was 2.27±0.45 while in Group D it was 2.07±0.25. P=0.019 which was statistically significant (Table 5).

Table 2: Intraoperative and post-operative mean heart rates in studied groups

Mean heart rate	Group P	Group D	t-value	P-value
Intraoperative				
Base line	78.60±9.96	77.00±9.98	1.04	0.204
Induction	74.32±9.32	76.43±6.98	1.34	0.109
0 min	70.23±10.33	75.30±11.95	1.59	0.089
5 min	69.60±9.42	71.03±10.15	0.573	0.579
10 min	67.02±9.25	70.42±7.38	1.27	0.231
15 min	67.30±9.98	69.23±9.77	0.975	0.342
20 min	68.72±9.09	65.37±9.94	1.853	0.043
25 min	69.23±9.41	64.27±9.34	2.97	0.02
30 min	68.27±8.50	64.22±8.12	2.21	0.024
40 min	67.50±7.95	63.93±8.54	3.204	0.001
50 min	69.90±8.23	65.17±9.09	2.46	0.003
60 min	68.87±9.92	64.27±8.47	2.13	0.023
70 min	68.03±9.11	63.50±8.91	3.92	0.0001
80 min	69.63±9.67	63.39±9.11	2.89	0.003
90 min	68.39±7.73	64.37±8.40	2.36	0.011
100 min	69.46±8.17	63.37±8.08	3.56	0.001
110 min	68.55±7.52	63.00±6.96	3.429	0.001
120 min	68.08±4.44	63.39±4.08	2.953	0.002
130 min	69.33±6.78	63.68±5.23	3.491	0.001
140 min	69.95±6.77	63.11±4.87	5.01	<0.0001
150 min	68.32±4.17	63.30±4.18	3.56	0.002
160 min	69.11±3.07	63.56±5.09	5.73	<0.0001
170 min	68.43±4.76	63.11±4.23	4.23	<0.0001
180 min	68.13±4.33	63.30±3.12	4.29	<0.0001
Post-operative				
0 min	101.12±12.1	103.03±9.98	0.887	0.379
5 min	96.43±12.12	97.29±11.03	0.393	0.696
10 min	91.17±11.75	94.33±13.17	0.996	0.323
15 min	90.60±11.26	91.57±12.14	0.320	0.750
20 min	91.02±11.1	90.03±10.18	0.660	0.512
25 min	90.99±10.22	91.11±10.04	0.620	0.538
30 min	89.10±11.03	91.00±11.34	1.10	0.114
1 h	87.63±9.67	89.56±12.11	0.727	0.310
2 h	88.10±9.23	88.93±7.90	0.872	0.431
3 h	88.90±8.34	91.40±9.23	1.67	0.101
4 h	90.32±7.90	92.29±7.12	1.14	0.240
5 h	88.89±8.10	91.40±10.12	0.984	0.202
6 h	90.68±7.92	91.45±7.42	1.12	0.110
8 h	88.98±8.02	90.89±10.12	0.921	0.213
10 h	90.32±7.89	92.44±7.56	0.622	0.423
12 h	89.87±6.23	92.41±6.22	0.910	0.210
16 h	90.68±5.92	92.04±3.42	0.890	0.308
20 h	90.23±2.89	92.66±4.09	1.067	0.201
24 h	91.98±3.13	93.23±4.42	0.935	0.230

DISCUSSION

During FESS it is mandatory to minimize bleeding so as to provide clear endoscopic vision. Intra op bleeding is most common factor that diminishes visibility resulting

Table 3: Intraoperative and post-operative mean arterial pressures in studied groups

Intraoperative and postoperative mean arterial pressure		Group P	Group D	t-value	P-value
Intraoperative mean arterial pressure	Base line	78.60±9.96	77.00±9.98	1.04	
	Induction	74.32±9.32	76.43±6.98	1.34	
	0 min	101.12±12.1	103.03±9.98	0.887	
	5 min	96.43±12.12	97.29±11.03	0.393	
	10 min	91.17±11.75	94.33±13.17	0.996	
	15 min	90.60±11.26	91.57±12.14	0.320	
	20 min	91.02±11.1	90.03±10.18	0.660	
	25 min	90.99±10.22	91.11±10.04	0.620	
	30 min	89.10±11.03	91.00±11.34	1.10	
	1 h	87.63±9.67	89.56±12.11	0.727	
	2 h	88.10±9.23	88.93±7.90	0.872	
	3 h	88.90±8.34	91.40±9.23	1.67	
	4 h	90.32±7.90	92.29±7.12	1.14	
	5 h	88.89±8.10	91.40±10.12	0.984	
	6 h	90.68±7.92	91.45±7.42	1.12	
	8 h	88.98±8.02	90.89±10.12	0.921	
	10 h	90.32±7.89	92.44±7.56	0.622	
	12 h	89.87±6.23	92.41±6.22	0.910	
	16 h	90.68±5.92	92.04±3.42	0.890	
	20 h	90.23±2.89	92.66±4.09	1.067	
	24 h	91.98±3.13	93.23±4.42	0.935	
Post-operative mean arterial pressure	0 min	99.17±11.32	99.45±9.12	0.025	
	5 min	92.77±10.12	92.89±8.23	0.143	
	10 min	91.34±11.21	87.13±7.34	1.12	
	15 min	89.20±7.43	85.45±6.45	1.42	
	20 min	88.27±8.74	84.46±7.08	1.32	
	25 min	88.60±8.51	84.63±8.13	1.36	
	30 min	86.27±8.74	84.00±7.09	1.323	
	1 h	88.17±8.83	84.87±714.	1.65	
	2 h	88.27±8.74	84.47±7.08	1.19	
	3 h	88.10±6.76	86.57±7.34	0.967	
	4 h	89.07±6.74	86.47±6.19	1.545	
	5 h	88.53±6.79	88.83±7.05	0.117	
	6 h	87.77±5.19	88.63±6.57	0.667	
	8 h	87.89±5.14	88.90±6.08	0.437	
	10 h	88.90±6.47	89.50±6.79	0.350	
	16 h	88.50±5.74	90.47±6.04	1.292	
	20 h	87.87±5.80	91.37±5.92	1.652	
	24 h	90.03±6.65	92.07±5.66	1.274	

in an increased incidence of complications. Controlled (deliberate and induced) hypotension during general anesthesia is a technique used to limit intraoperative blood loss to provide the best possible field for surgery in FESS. Propofol is one of the most common drugs used in general anesthesia, which reduces systemic blood pressure by dilating blood vessels. By stimulating the pre synaptic alpha 2-adrenoceptors dexmedetomidine decreases the nor epinephrine release and causes fall in blood pressure and heart rate. Because of this property dexmedetomidine is nowadays used as hypotensive agent in endoscopic surgeries. It also has an added advantage of analgesic property thus reducing perioperative analgesic requirement.[11]

In this study, we tried to provide controlled hypotensive anesthesia by lowering Mean BP by using Dexmedetomidine infusion and Propofol infusion as maintenance agents, and compare the hemodynamic parameters, blood loss, and operative field visibility. In our study, we chose a target MAP of 60–65 mmHg to provide the best quality of surgical field without any adverse effects. In Group D, we were able to achieve target MAP within 20 min post-induction and were able to it throughout the surgery by titrating isoflurane concentration. In Group P, we were able to achieve the desired MAP within 20 min post-induction and this was maintained throughout the procedure by titrating isoflurane percentage. It was found that MAP was lower in dexmedetomidine group than propofol group; this could be due to combined effect of the decreased central sympathetic outflow and also decrease in the plasma norepinephrine levels after Dexmedetomidine infusion.[12]

In our study, Group P needed more isoflurane than Group D and difference was statistically significant (P<0.001). Similar

results were obtained by Shah and Kulkarni in their prospective randomized controlled study on 60 patients undergoing FESS under general anesthesia with statistically significant reduction in MAP in dexmedetomidine group as compared to propofol group.[13] Similarly, Bharathwaj and Kamath in their randomized prospective and single blinded study of patients undergoing FESS found that MAP was significantly lower in dexmedetomidine infusion group when compared with propofol infusion group.[14]

In our study, we observed that intraoperatively both dexmedetomidine and propofol were able to reduce heart rate significantly from baseline with heart rate being lower in Group D (63.93±3.362) when compared with Group P (70.52±2.589) and the difference was statistically significant (P<0.05). However, in our study no episodes of bradycardia were observed. This is consistent with the study conducted by Shams et al., who in their comparative study of dexmedetomidine versus esmolol for induced hypotension in FESS found that heart rate was lower after dexmedetomidine infusion which was statistically significant.[15] Furthermore, Shah and Kulkarni who in their prospective randomized controlled study of patients undergoing FESS under general anesthesia found that there was statistically significant reduction in heart rate in dexmedetomidine group as compared to propofol group.[13] This difference in the heart rate could be attributed to the fact that Dexmedetomidine causes postsynaptic activation of α2-adrenoceptors in the CNS inhibits sympathetic activity. On the other hand, propofol has no effect on heart rate, it resets or inhibits the baroreceptor reflex mechanism reducing tachycardia response to hypotension.

Table 4: Comparison of isoflurane requirement in studied groups

Isoflurane concentration %	Group P	Group D	t-value	P-value
5 min	1.22±0.18	0.98±0.056	1.97	0.021
10 min	1.20±0.25	0.98±0.057	1.87	0.031
15 min	1.09±0.072	0.90±0.067	1.96	0.034
20 min	0.96±0.078	0.92±0.073	1.53	0.083
25 min	1.20±0.12	0.94±0.063	2.17	0.002
30 min	1.09±0.078	0.97±0.067	1.21	0.214
40 min	0.96±0.56	0.93±0.068	1.24	0.127
50 min	0.96±0.54	0.90±0.053	1.98	0.034
60 min	0.94±0.56	0.84±0.038	3.13	0.003
70 min	0.93±0.52	0.84±0.043	3.92	0.0001
80 min	0.93±0.51	0.80±0.054	6.93	<0.0001
90 min	0.92±0.089	0.80±0.050	5.78	<0.0001
100 min	0.90±0.084	0.78±0.062	7.56	<0.0001
110 min	0.90±0.092	0.77±0.046	3.67	<0.0001
120 min	0.89±0.056	0.75±0.043	5.92	<0.0001
130 min	0.85±0.054	0.74±0.062	3.32	0.001
140 min	0.85±0.034	0.66±0.045	7.01	<0.0001
150 min	0.84±0.039	0.64±0.056	9.56	<0.0001
160 min	0.83±0.064	0.63±0.044	5.73	<0.0001
170 min	0.80±0.036	0.60±0.045	5.78	<0.0001
180 min	0.79±0.064	0.60±0.053	5.29	<0.0001

In our study, the requirement of isoflurane concentration was significantly lower in dexmedetomidine group than propofol group. This is similar to study conducted by Gupta et al., who found that during middle ear surgeries under general anesthesia dexmedetomidine infusion of 0.5 mcg/kg/hr reduced the requirement of isoflurane concentration to maintain the mean arterial pressure 30% below baseline.[16] Furthermore, these findings were similar to the findings of study conducted by Khan et al., who found that use of dexmedetomidine decreases the requirement of isoflurane.[17]

In our study, mean total blood loss in Group D was around 115.0±16.78 ml and in Propofol Group P was around 140.47±29.42 ml. Thus, Dexmedetomidine lowers mean blood loss as compared to propofol and the difference was statistically significant (P<0.05). In a similar study conducted by Indira Kumari et al., it was found that dexmedetomidine reduced bleeding during endoscopic nasal surgery and had improved mean bleeding score and also showed significantly lower requirement of isoflurane concentration; however, the comparison was with normal saline instead of propofol.[18] Similar findings were reported by Zand et al., in their study which showed that intravenous use of dexmedetomidine significantly reduced the amount of bleeding during FESS.[19]

All the patients were either in Grade 2 (80%) or Grade 3 (20%); however, better operative field visibility was achieved with dexmedetomidine infusion group than propofol infusion group and there was significant difference between the two groups (P<0.05). Similar results were concluded by Moshiri et al.[20] Better operative visibility was attributed to reduced blood loss due to dexmedetomidine during controlled hypotension as compared to propofol. The surgeon's satisfaction score was better achieved with

Table 5: Blood loss, surgical field grading, and surgeon satisfaction score in both groups

Blood loss, surgical field grading and surgeon satisfaction score	Group P	Group D	t-value	P-value
Intraoperative blood loss	140.47±29.42	115.0±16.78	4.12	P<0.0001 significant
Surgical field grading	2.27±0.45	2.07±0.25	2.12	P=0.019 n significant
Surgeon satisfaction score	6.40±0.66	6.98±0.56	1.97	P=0.022 significant

dexmedetomidine as compared to propofol. Regarding the hemodynamic stability after extubation both groups returned to their baseline values. In our study, however, none of the patients in both the groups had nausea and vomiting in the post-operative period. This could be due to prophylactic administration of inj. Ondansetron. There was no significant difference in the post-operative sedation score in both the groups.

Limitations of the study

We only studied cases undergoing FESS and belonging to ASA Grades I and II. Inclusion of ASA Grade III would certainly help in determining outcome in patients who have significant hemodynamic instability.

CONCLUSION

Both Dexmedetomidine and Propofol are safe and efficacious to provide oligemic surgical field with better visualization in FESS surgeries keeping the hemodynamic variation within physiological range. They also reduce the requirement of isoflurane concentration. However, dexmedetomidine is found to be comparatively better than propofol in controlling heart rate and mean arterial pressure, reducing the blood loss, and isoflurane requirement, thus providing a better quality of surgical field throughout the procedure.

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REFERENCES

1. Sieśkiewicz A, Reszeć J, Piszczatowski B, Olszewska E, Klimiuk PA, Chyczewski L, et al. Intraoperative bleeding during endoscopic sinus surgery and microvascular density of the nasal mucosa. Adv Med Sci. 2014;59(1):132-135.
   https://doi.org/10.1016/j.advms.2013.10.001
2. Al-Mujaini A, Wali U and Alkhabori M. Functional endoscopic sinus surgery: Indications and complications in the ophthalmic field. Oman Med J. 2009;24(2):70-80.
   https://doi.org/10.5001/omj.2009.18
3. Cardesín A, Pontes C, Rosell R, Escamilla Y, Marco J, Escobar MJ, et al. Hypotensive anaesthesia and bleeding during endoscopic sinus surgery: An observational study. Eur Arch Otorhinolaryngol. 2014;271(6):1505-1511.
   https://doi.org/10.1007/s00405-013-2700-0
4. Barak M, Yoav L and el-Naaj IA. Hypotensive anesthesia versus normotensive anesthesia during major maxillofacial surgery: A review of the literature. ScientificWorldJournal. 2015;2015:480728.
   https://doi.org/10.1155/2015/480728
5. Degoute CS. Controlled hypotension: A guide to drug choice. Drugs. 2007;67(7):1053-1076.
   https://doi.org/10.2165/00003495-200767070-00007
6. Das A, Chhaule S, Bhattacharya S, Basunia SR, Mitra T, Halder PS, et al. Controlled hypotension in day care functional endoscopic sinus surgery: A comparison between esmolol and dexmedetomidine: A prospective, double-blind, and randomized study. Saudi J Anaesth. 2016;10(3):276-282.
   https://doi.org/10.4103/1658-354X.174919
7. Croft K and Probst S. Deliberate hypotensive anesthesia with the rapidly acting, vascular-selective, L-type calcium channel antagonist-clevidipine: A case report. Anesth Prog. 2014;61(1):18-20.
   https://doi.org/10.2344/0003-3006-61.1.18
8. Bajwa SJ, Kaur J, Kulshrestha A, Haldar R, Sethi R and Singh A. Nitroglycerine, esmolol and dexmedetomidine for induced hypotension during functional endoscopic sinus surgery: A comparative evaluation. J Anaesthesiol Clin Pharmacol. 2016;32(2):192-197.
   https://doi.org/10.4103/0970-9185.173325
9. Gertler R, Brown HC, Mitchell DH and Silvius EN. Dexmedetomidine: A novel sedative-analgesic agent. Proc (Bayl Univ Med Cent). 2001;14(1):13-21.
   https://doi.org/10.1080/08998280.2001.11927725
10. Fromme GA, MacKenzie RA, Gould AB Jr., Lund BA and Offord KP. Controlled hypotension for orthognathic surgery. Anesth Analg. 1986;65(6):683-686.
11. Kaur M and Singh PM. Current role of dexmedetomidine in clinical anesthesia and intensive care. Anesth Essays Res. 2011;5(2):128-133.
    https://doi.org/10.4103/0259-1162.94750
12. Kaye AD, Chernobylsky DJ, Thakur P, Siddaiah H, Kaye RJ, Eng LK, et al. Dexmedetomidine in enhanced recovery after surgery (ERAS) protocols for postoperative pain. Curr Pain Headache Rep. 2020;24(5):21.
    https://doi.org/10.1007/s11916-020-00853-z
13. Shah H and Kulkarni A. A comparative study between dexmedetomidine infusion and propofol infusion for maintenance in patients undergoing functional endoscopic sinus surgery under general anaesthesia. IOSR J Dental Med Sci. 2016;15:82-86.
14. Bharathwaj DK, Kamath SS. Comparison of dexmedetomidine versus propofol-based anaesthesia for controlled hypotension in functional endoscopic sinus surgery. South Afr J Anaesth Analg. 2019;25:37–40.
    https://doi.org/10.1080/22201181.2018.1517484
15. Shams T, El Bahnasawe NS, Abu-Samra M and El-Masry R. Induced hypotension for functional endoscopic sinus surgery: A comparative study of dexmedetomidine versus esmolol. Saudi J Anaesth. 2013;7(2):175-180.
    https://doi.org/10.4103/1658-354X.114073
16. Gupta K, Bansal M, Gupta PK, Pandey M and Agarwal S. Dexmedetomidine infusion during middle ear surgery under general anaesthesia to provide oligaemic surgical field: A prospective study. Indian J Anaesth. 2015;59(1):26-30.
    https://doi.org/10.4103/0019-5049.149445
17. Khan ZP, Munday IT, Jones RM, Thornton C, Mant TG and Amin D. Effects of dexmedetomidine on isoflurane requirements in healthy volunteers. 1: Pharmacodynamic and pharmacokinetic interactions. Br J Anaesth. 1999;83(3):372-380.
    https://doi.org/10.1093/bja/83.3.372

18. Kumari I, Sharma S, Surendran K, Naithani U, Saxena SS and Yadav R. Effect of dexmedetomidine on bleeding during endoscopic nasal surgery: A double blind, randomized, clinical study. Eur J Pharm Med Res. 2016;3(3):290-294.
19. Zand F, Hadavi SM, Chohedri A and Sabetian P. Survey on the adequacy of depth of anaesthesia with bispectral index and isolated forearm technique in elective Caesarean section under general anaesthesia with sevoflurane. Br J Anaesth. 2014;112(5):871-878.
https://doi.org/1093/bja/aet483
20. Moshiri E, Modir H, Yazdi B, Susanabadi A and Salehjafari N. Comparison of the effects of propofol and dexmedetomidine on controlled hypotension and bleeding during endoscopic sinus surgery. Ann Trop Med Public Health. 2017;10:721-725.
https://doi.org/10.4103/atmph.atmph_264_17

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