How to Cite:
Thippeswamy, H. G., Upendra, U., & Padmanabha, S. (2022). A randomised prospective comparative study of hemodynamic variables using propofol versus sevoflurane for induction and maintanence of anaesthesia in adult nasal surgeries. *International Journal of Health Sciences*, *6*(S1), 4626–4644. https://doi.org/10.53730/ijhs.v6nS1.5881

A randomised prospective comparative study of hemodynamic variables using propofol versus sevoflurane for induction and maintanence of anaesthesia in adult nasal surgeries

Dr. Thippeswamy HG
Associate professor, Department of Anaesthesia, Yenepoya Medical College Hospital, Derlakatte, Mangalore

Dr. Upendra
Resident, Department of Anaesthesia, Yenepoya Medical College hospital, Derlakatte, Mangalore

S Padmanabha
Professor, Department of Anaesthesia, Yenepoya Medical College Hospital, Derlakatte, Mangalore

***Abstract*---**Introduction: Intravenous agents are commonly used for induction of anaesthesia in adults followed by inhalational agents for maintenance. A problem with this technique is transition phase from induction to maintenance. Rapid redistribution of Intravenous agent could lead to lightening of anaesthesia before adequate depth is attained with inhalational agent. As nasal surgeries like FESS requires a blood less field with minimal hemodynamic variability, present study is undertaken to compare hemodynamic variability and induction time using Propofol versus Sevoflurane for both induction and maintenance of anaesthesia in adult nasal surgeries. Materials and Methods: This Quasi Experimental study was conducted in Department of Anaesthesia, Yenepoya Medical College Hospital, Mangalore during the period between October 2015 and October 2017. 60 patients were randomly divided into one of the two groups by envelope method in which Group P patients (n = 30) was induced with Propofol 2 mg/kg and maintained with Propofol infusion at 100 mcg/kg/min and Group S patients (n = 30) was induced with Sevoflurane 8% and maintained with Sevoflurane 2%. Induction time was noted. HR, SBP, DBP, MAP readings were recorded Prior to premedication (Baseline), after induction, after intubation, 30 mins after induction, 60 mins after induction and after extubation. Results:

International Journal of Health Sciences ISSN 2550-6978 E-ISSN 2550-696X © 2022.
***Corresponding author**: Upendra; Email: thippeswamy.hg@gmail.com*
Manuscript submitted: 27 Feb 2022, Manuscript revised: 18 March 2022, Accepted for publication: 09 April 2022

It was observed that induction time was 79±10.7 seconds in Propofol group and 169±12 seconds in Sevoflurane group. HR is comparable in both the groups at Baseline, after Induction, after Intubation and statistically lower in group P compared to group S, 30 mins after induction, 60 mins after induction and after extubation but within normal limits.MAP, SBP, DBP are comparable in both the groups at Baseline, after Intubation, 30 mins after induction, 60 mins after induction and after extubation. After induction MAP, DBP are comparable in both the groups, but SBP is statistically lower in group P compared to group S (Pvalue<0.05). Conclusion: Sevoflurane inhalational induction is smooth and well tolerated like Propofol induction in adult patients and there were no complications at time of induction in either groups. Mean induction time was more in Sevoflurane group when compared with Propofol group. Hemodynamic variability in both groups were with minimal changes as we used single agent for both induction and maintenance and surgical field was satisfactory in both groups. There was no incidence of tachycardia or bradycardia and hypertension and hypotension in either group.

***Keywords*---**Single agent anaesthesia, TIVA, VIMA, FESS.

Introduction

Before the era of endoscopic sinus surgery, patients had significant morbidity from open approaches to the sinonasal cavity that were often fraught with failure. Rhinology and sinus surgery have undergone a tremendous expansion since then. With improvements in transnasal endoscopy, functional endoscopic sinus surgery subsequently emerged from the work of Messerklinger and other pioneers in the field.

The popularity of endoscopic sinus surgery quickly escalated and expanded to pathology other than inflammation.[1] Septoplasty (correction of a deviated septum) and surgery to remove nasal polyps are often performed to improve nasal Airflow and ventilation of the sinuses. Functional Endoscopic Sinus Surgery (FESS) is aimed to restore the drainage and aeration of the paranasal sinuses, while maintaining the natural mucociliary clearance mechanism and seeking to preserve the normal anatomic structures.[4] Endoscopic sinus surgery has become a common ENT procedure.[2] Indications are varied and include conditions such as nasal polyposis, recurrent or chronic sinusitis, epistaxis control, tumour excision, orbital decompression (e.g., for Graves ophthalmopathy), foreign body removal, treatment of sinus mucoceles, and more02. Given the close proximity of major blood vessels and nerves, the orbit, and the brain, complications are possible, especially when the surgical landmarks are obscured by blood. Some major complications include orbital hematoma formation, blindness from orbital trauma or damage to the optic nerve, formation of cerebrospinal fluid leak, carotid or ethmoid artery invasion, entry into the cranial cavity, severe haemorrhage and death.[2]

Sevoflurane does not alter hemodynamic variables during induction or maintenance of anaesthesia whereas Propofol is known to cause hypotension immediately after induction. Hence present study is undertaken to study hemodynamic variability both during induction and maintenance of anaesthesia. As endoscopic surgeries require bloodless field especially during procedures like functional endoscopic sinus surgery present study is undertaken in nasal surgeries in adults to study hemodynamic variability of Propofol versus Sevoflurane both during induction and maintenance of anaesthesia.

Materials and Methods

Study design: Quasi experimental study.
Source of the data/ Sampling method: Patients in Yenepoya Medical College Hospital, Mangalore who were admitted during the period from October 2015 to August 2017 underwent elective nasal surgeries. The patients were randomly allocated through closed envelope method, to one of two groups: Group P and Group S.
Sample size: 30 in each group

Inclusion Criteria

- ASA grade I or II
- Age group 18-50yrs.
- Both sexes were included
- Patients underwent elective nasal surgeries

Exclusion Criteria

- ASA grade III and above
- Patients with medical comorbities
- Bleeding disorders and Anticoagulation therapy
- Surgeries more than 2 hours
- Emergency surgeries

Materials and Methods: After ethical committee approval and informed consent, 60 patients belonging to “American society of Anesthesiology ” (ASA) physical status I and II of either sex, aged between 18-50 years, scheduled for elective nasal surgeries who required general anaesthesia are included in our study. Thorough pre- anaesthetic evaluation and routine investigation was done before taking up the patient for surgery. Patients were assigned randomly to one of two groups by sealed envelope method.
Group 1 (n=30): Inhalation Anaesthesia received Sevoflurane-Nitrous oxide-Oxygen for both induction and maintenance
Group 2 (n=30): Total intravenous anaesthesia (TIVA) received Propofol for induction followed by Propofol, Nitrous Oxygen for maintenance
Premedication: Patients were given,
Tab. Ranitidine 150 mg at night before surgery and at the morning of the surgery
Tab. Lorazepam 1 mg at night before surgery
Inj. Glycopyrrolate 0.2 mg I.M 1 hour before the surgery

On arrival to operation room, hemodynamic monitoring was performed using a Philips MP 20 Monitor and the following parameters were recorded,

- Noninvasive blood pressure
- Electrocardiogram
- Heart Rate
- Oxy-hemoglobin saturation
- End tidal co2

Intra venous line was secured for all the patients. All the patients received ringer lactate/ normal saline intravenous fluids at 4-6 ml/kg/hr
Patient was preoxygenated with 100% Oxygen for 3 minutes prior to induction. Patient was premedicated with Inj. Midazolam 0.02 mg/kg, Inj. Fentanyl 2 µg/ kg

Group P

Patient was induced With Inj. Propofol 2 mg /kg with given slow intravenously over 30 secs. Preservative free Lignocaine 0.3 mg/kg is added to avoid pain on injection. Additional doses if required were given slowly after that till end point is achieved. End point of intravenous induction was loss of verbal response and eyelash reflex tested at 15 second intervals. Any pain during injection was noted.
Then patient was given Inj.Vecuronium 0.1 mg /kg and was intubated under all aseptic conditions with endotracheal tube of appropriate size. After checking for adequate air entry in all lung fields on both sides and confirming with end tidal CO_2, cuff was inflated and tube was secured in place.
Time for induction (i.e. giving intravenous Propofol to loss of verbal response and loss of eye lash reflex) and induction intubation (time taken from the induction till intubation, inflation of the cuff and confirming the air entry) were noted. Oropharynx was packed with saline-soaked throat pack.
Patient was maintained with 67% Nitrous oxide in Oxygen and Propofol infusion at the rate of 100 mcg /kg/min and Propofol infusion rate was adjusted if hemodynamic variability is more than 25% baseline values.
For muscle relaxation Vecuronium 0.02 mg/kg was administered as required. The infusion of Propofol was stopped at end of the procedure 10 mins before anticipated awakening.

Group S

Patients were induced with tidal volume breath technique with Sevoflurane starting at 1% titrated after every 3 tidal volume breaths to maximum of 8% with a initial fresh gas flow of 6 Lit/min (67%Nitrous oxide in Oxygen) End point of inhalational induction was loss of response to verbal commands repeated at 10 sec intervals until the subjects failed to respond, loss of eyelash reflex, adequate jaw relaxation on jaw thrust, onset of normal tidal volume regular respiration, centralisation of eye balls tested at 15second intervals.

Induction time and the presence of excitatory phenomena were recorded by an independent observer. Any cough, hiccups, laryngospasm, apnoea, excitatory phenomenon during Sevoflurane induction were noted.
Then patient was given Inj. Vecuronium 0.1 mg /kg and was intubated under all aseptic conditions with endotracheal tube of appropriate size.
After checking for adequate air entry in all lung fields on both sides and confirming with end tidal CO_2, cuff was inflated and tube was secured in place.
Induction time i.e. the time between the end of inspiration of a first tidal breath after holding mask of Sevoflurane and appearance of signs of end point of inhalational induction and induction intubation time (i.e. time taken from the induction till intubation, inflation of the cuff and conforming the air entry) were noted. Oropharynx was packed with saline-soaked throat pack.
Patient was maintained with Oxygen, Nitrous oxide, Sevoflurane 2% and Sevoflurane was adjusted if hemodynamic variability is more than 25% baseline values.
For muscle relaxation Vecuronium0.02mg/kg was administered as required. Sevoflurane was stopped at completion of procedure.

Heart rate, Mean Arterial Pressure, Systolic Blood Pressure, Diastolic Blood Pressure were recorded at following intervals:
Prior to premedication (Baseline), after induction, after intubation, 30 mins after induction, 60 mins after induction and after extubation. Inj.Ondansetron 0.1 mg/kg was given to all patients before extubation. The throat pack was removed at the end of the procedure.
The residual neuromuscular blockade was reversed with 0.05 mg/kg of neostigmine along with 0.01 mg/kg Glycopyrrolate.
Patient was extubated after adequate recovery signs like spontaneous respiration, eye opening widely, protrusion of the tongue, sustained head lift for 5 sec, hand grip and ability to cough.
All the data was collected and analyzed by appropriate statistical methods and results were interpreted.
Statistical analysis: Descriptive statistics was reported as Mean±SD for continuous variables and frequency % for categorical variables. Repeated measures Annova / Friedmans Testwas used to compare the data over different time periods within the groups. Two sample independent 't'test were used to compare data between two groups. Results were considered statistically significant for p values <0.05. We have taken 30 patients in each group to obtain the power >80%.

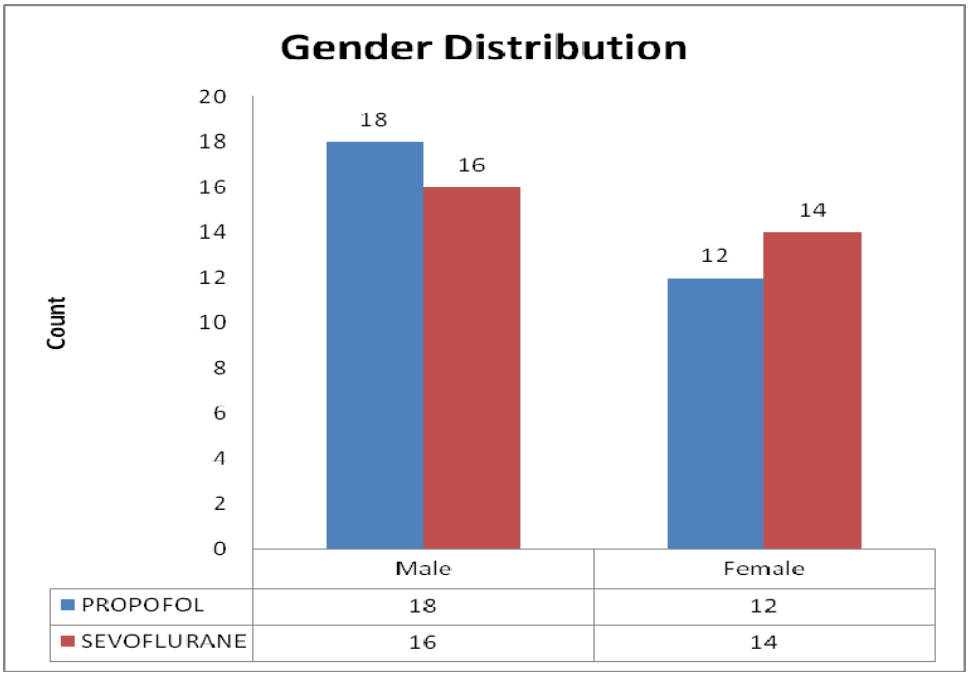
Results

This Quasi Experimental study was conducted in Department of Anaesthesia, Yenepoya Medical College Hospital, Mangalore during the period between October 2015 and August 2017. 60 patients were randomly divided into one of the two groups by envelope method in which Group P patients (n = 30) was induced with Propofol 2mg/kg and maintained with Propofol infusion at 100 mcg/kg/min and Group S patients (n = 30) was induced with Sevoflurane 8% and maintained with Sevoflurane 2%. The types of surgeries and duration of surgery were similar in both groups and included Functional endoscopic sinus surgery, Septoplasty.

Table 1
Gender distribution of patients studied

			GROUP		Total
			P	S	
GENDER	F	Count	12	14	26
		% within GROUP	40.0%	46.7%	43.3%
	M	Count	18	16	34
		% within GROUP	60.0%	53.3%	56.7%
Total		Count	30	30	60
		% within GROUP	100.0%	100.0 %	100.0%

Total 60 patients included in the study out of which 26(43.3%) patients are females and 34 (56.7%) patients are males. Both groups are comparable in gender distribution (P value > 0.05)

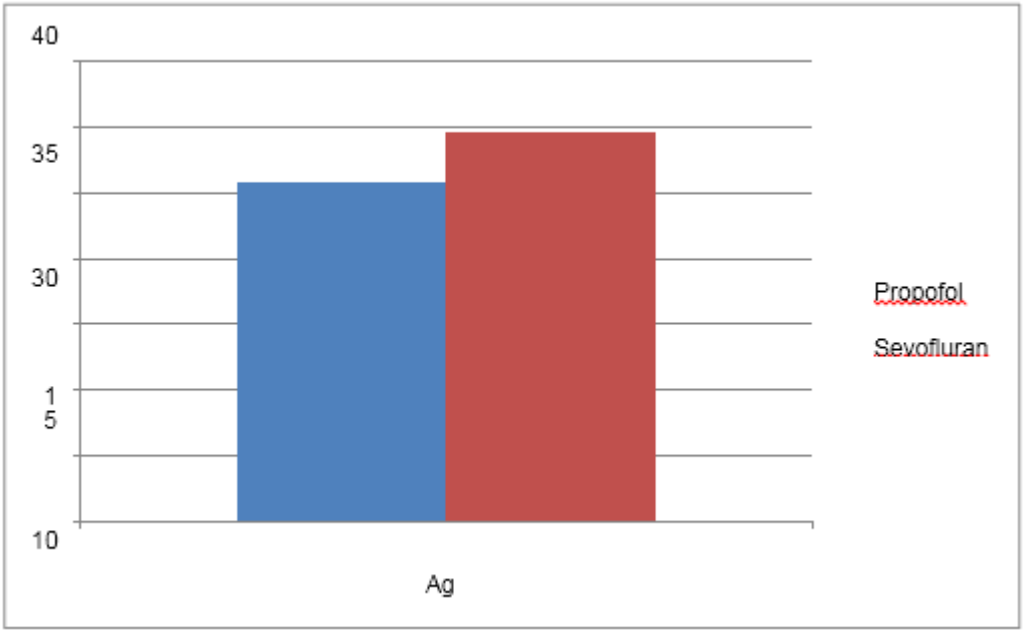


Graph 1. Gender Distribution

Table 2
Age distribution of the patients studied

	GROUP	N	MEAN	SD	T	Df	P value
AGE (yrs)	P	30	30.83	10.73	-1.389	58	0.170
	S	30	34.67	10.64			

Mean age of group P was 30.83 yrs and group S was 34.67 yrs. Both groups are comparable in Age distribution (P value > 0.05)

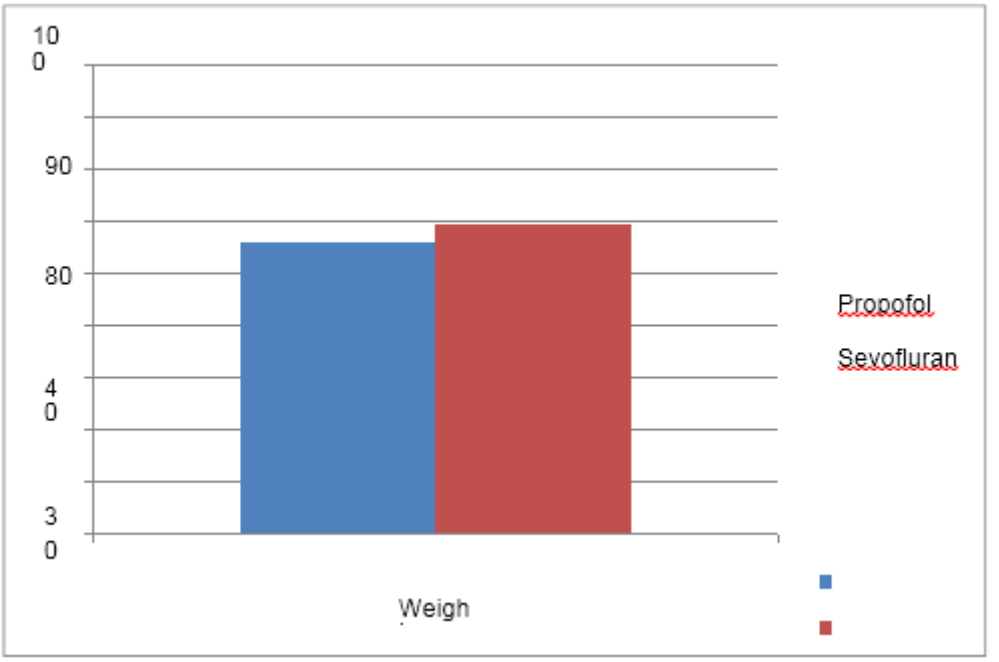


Graph 2 -Age distribution of the patients studied

Table 3
Weight distribution of the patients studied

	GROUP	N	MEAN	SD	T	Df	P value
Weight (Kgs)	P	30	65.73	7.71	-1.930	58	0.06
	S	30	69.40	6.98			

Mean weight of group P was 65.73 kgs and group S was 69.40 kgs. Both groups are comparable in weight distribution (P value > 0.05)

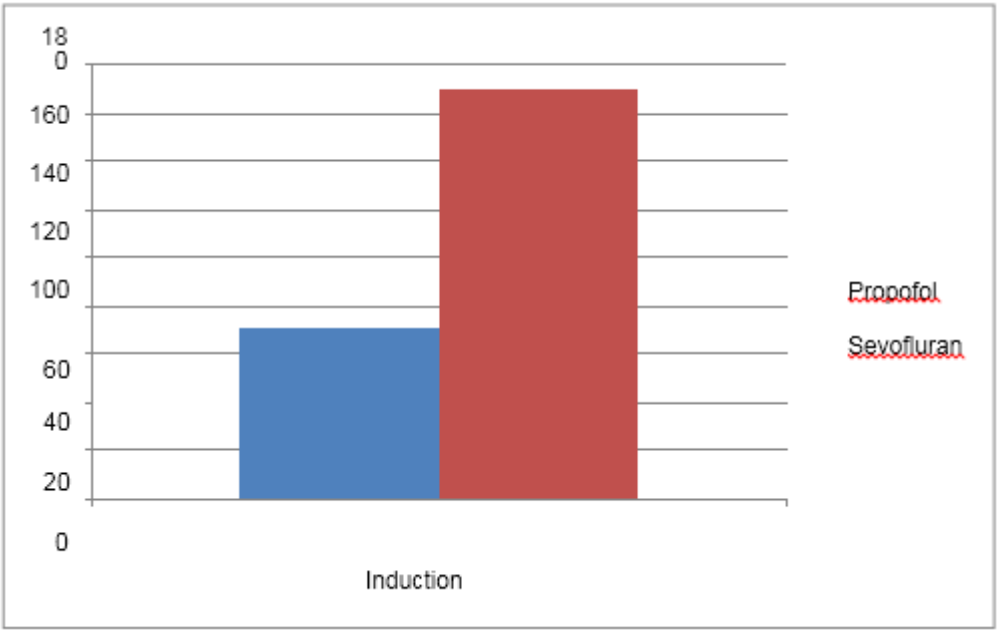


Graph 3. Weight distribution of the patients studied

Table 4
Comparison of induction time in two groups of patients studied

	GROUP	N	Mean	SD	T	Df	P value
Induction Time	P	30	70.90	10.723			
	S	30	169.57	12.091	-33.44	58	<0.001

Mean induction time in group P was 70.9 secs with standard deviation of 10.7 secs and group S was 169.57 secs with standard deviation of 12 secs. There is statistically significant difference in Mean induction time in both groups (p value < 0.001).

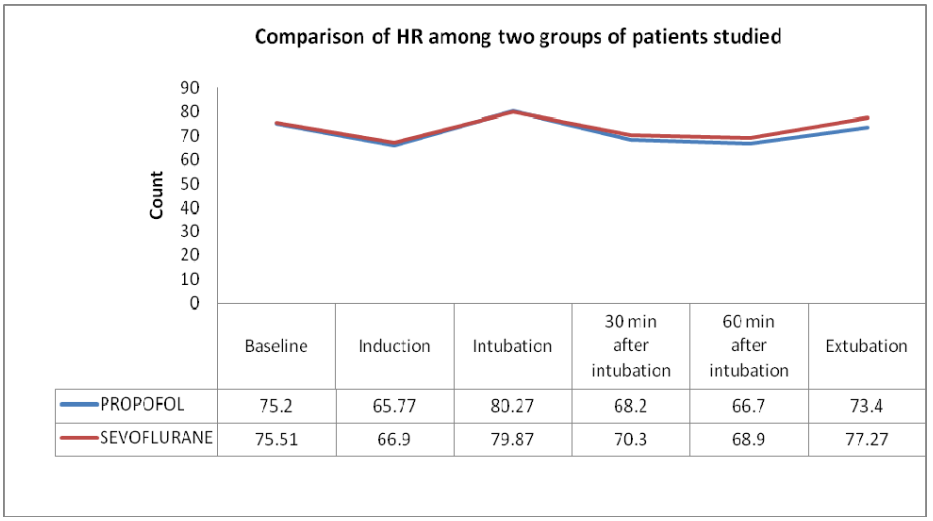


Graph 4. Comparison of induction time in two groups of patients studied

Table 5
Comparison of HR (bpm) in two groups of patients studied

HR	Group	N	Mean	SD	t	Df	P value
Baseline	P	30	75.2	4.83	-0.298	58	0.767
	S	30	75.51	4.69			
After Induction	P	30	65.77	3.12	-1.635	58	0.107
	S	30	66.9	2.15			
After Intubation	P	30	80.27	6.96	0.250	58	0.803
	S	30	79.87	5.31			
30 mins after intubation	P	30	68.2	2.84	-3.404	49.36	0.001
	S	30	70.3	1.82			
60 mins after intubation	P	30	66.7	2.83	-3.514	51.26	0.001
	S	30	68.9	1.93			
After Extubation	P	30	73.4	2.45	-6.927	58	0.001
	S	30	77.27	1.81			

HR is comparable in both the groups at baseline, after induction, after intubation. HR is statistically and clinically lower in group P, 30 mins after induction, 60 mins after induction and after extubation.

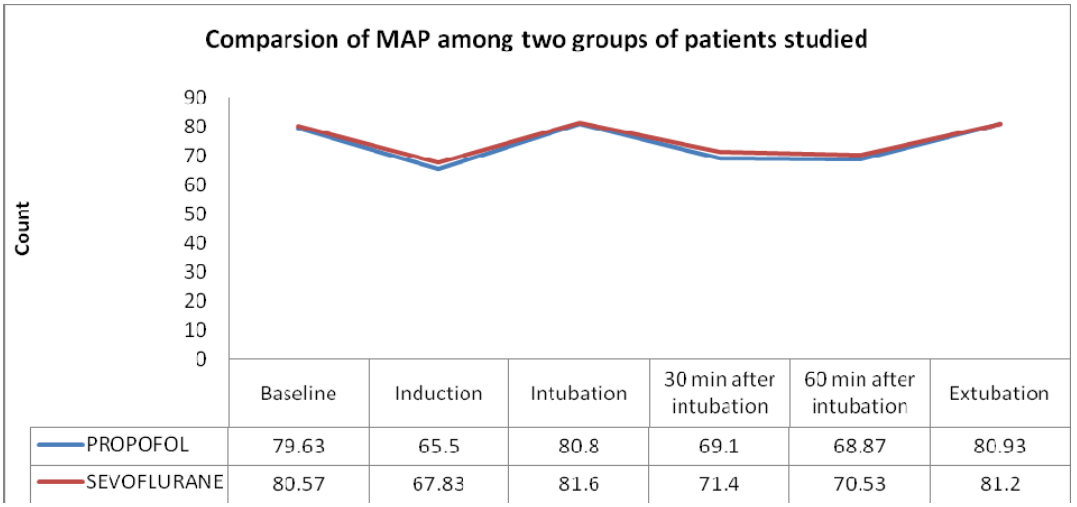


Graph 5. Comparison of HR (bpm) in two groups of patients studied

Table 6
Comparison of MAP (mm Hg) in two groups of patients studied

MAP	Group	N	Mean	SD	t	Df	P value
Baseline	P	30	79.63	5.518	-0.667	58	0.508
	S	30	80.57	5.32			
After Induction	P	30	65.50	5.07	-1.866	58	0.067
	S	30	67.83	4.60			
After Intubation	P	30	80.8	4.88	-0.642	58	0.523
	S	30	81.60	4.76			
30 mins after intubation	P	30	69.10	4.81	-1.913	58	0.061
	S	30	71.4	4.49			
60 mins after intubation	P	30	68.87	4.59	-1.44	58	0.154
	S	30	70.53	4.32			
After Extubation	P	30	80.93	4.94	-0.216	58	0.830
	S	30	81.20	4.59			

MAP is comparable in both the groups at baseline, after induction, after intubation, 30 mins after induction, 60 mins after induction and after extubation.

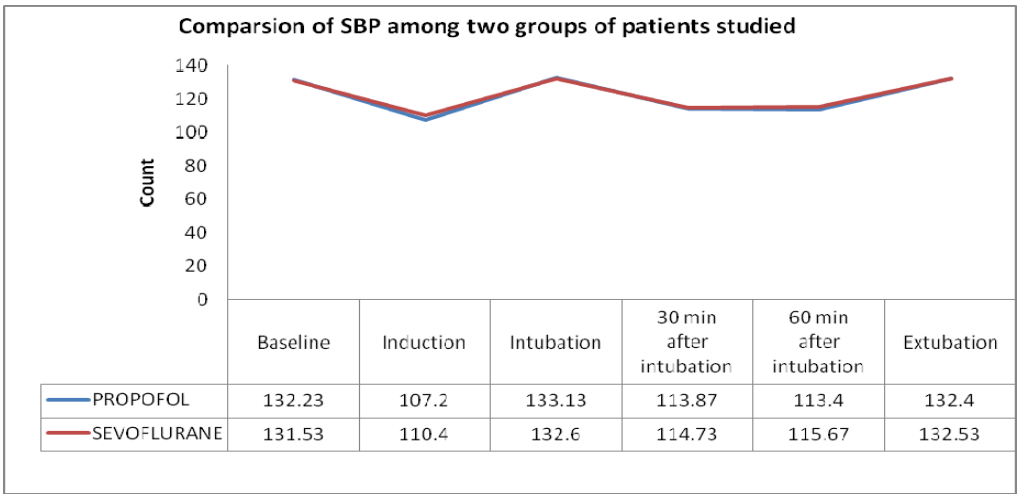


Graph 6. Comparison of MAP (mm Hg) in two groups of patients studied

Table 7
Comparison of SBP (mm Hg) in two groups of patients studied

SBP	Group	N	Mean	SD	T	df	P value
Baseline	P	30	132.23	8.81	0.366	49.33	0.716
	S	30	131.53	5.64			
After Induction	P	30	107.20	6.63	-2.150	58	0.036
	S	30	110.4	4.73			
After Intubation	P	30	133.13	7.36	0.321	52.85	0.749
	S	30	132.60	5.33			
30 min after intubation	P	30	113.87	6.16	-0.606	58	0.547
	S	30	114.73	4.82			
60 min after intubation	P	30	113.4	5.92	-1.658	58	0.103
	S	30	115.67	4.58			
After Extubation	P	30	132.4	7.015	-0.082	58	0.935
	S	30	132.53	5.457			

SBP is comparable in both the groups at baseline, after intubation, 30 mins after induction, 60 mins after induction and after extubation.SBP is statistically and clinically lower in group P, after Induction.

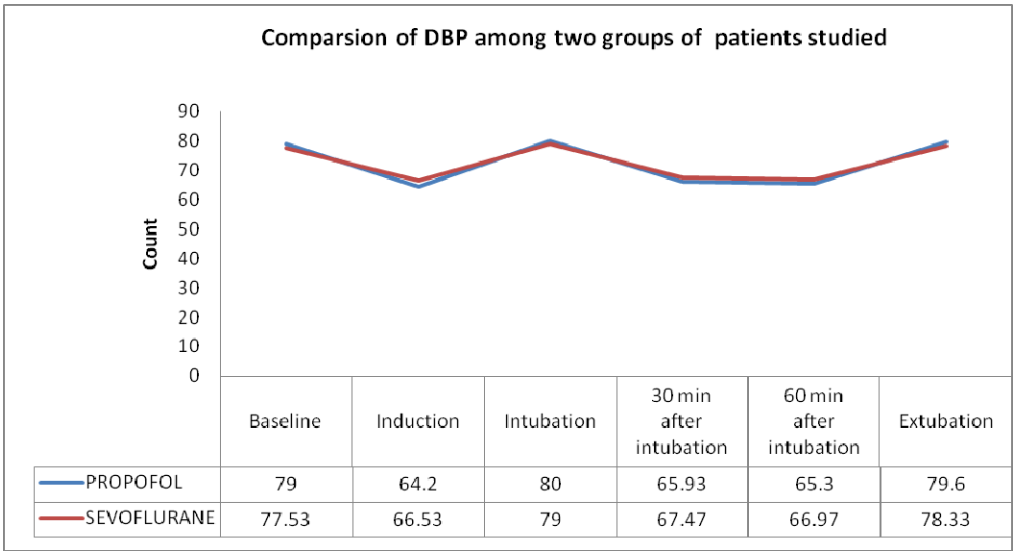


Graph 7. Comparison of SBP (mm Hg) in two groups of patients studied

Table 8
Comparison of DBP (mm Hg) in two groups of patients studied

DBP	Group	N	Mean	SD	T	df	P value
Baseline	P	30	79	7.62	0.941	42.87	0.352
	S	30	77.53	3.84			
After Induction	P	30	64.2	5.75	- 1.943	45.2	0.058
	S	30	66.53	3.18			
After Intubation	P	30	80.00	7.83	0.655	45.02	0.516
	S	30	79	4.02			
30 min after intubation	P	30	65.93	5.83	-1.251	45.98	0.217
	S	30	67.47	3.31			
60 min after intubation	P	30	65.30	5.60	-1.43	44.56	0.159
	S	30	66.97	3.02			
After Extubation	P	30	79.60	7.26	0.870	40.36	0.389
	S	30	78.33	3.38			

DBP is comparable in both the groups at baseline, after induction, after intubation, 30 mins after induction, 60 mins after induction and after extubation.



	Baseline	Induction	Intubation	30 min after intubation	60 min after intubation	Extubation
PROPOFOL	79	64.2	80	65.93	65.3	79.6
SEVOFLURANE	77.53	66.53	79	67.47	66.97	78.33

Graph 8: Comparison of DBP (mm Hg) in two groups of patients studied

Discussion

This Quasi experimental study was carried out at Yenepoya Medical college Hospital, Mangalore. A total of 60 ASA physical status 1, 2 patients aged between 18 to 50 years of age, of either sex scheduled to undergo elective nasal procedures under general anaesthesia were included in the study. Patients were randomly divided into two groups of 30 each by closed envelope method (Group P and group S).Group P was induced with Propofol 2mg/kg and maintained with Propofol infusion at 100 mcg/kg/min where as Group S was induced with Sevoflurane 8% and maintained with Sevoflurane 2%. This study was designed to compare the use of single agent anaesthesia using Propofol or Sevoflurane in patients undergoing nasal surgeries by comparing the hemodynamic changes during induction and maintenance of anaesthesia and induction time in both the groups Induction time was noted. HR, SBP, DBP, MAP readings were recorded prior to premedication (baseline), after induction, after intubation, 30 mins after induction, 60 mins after induction and after extubation.

Demographic Data

Demographic profile of our patients was comparable with respect to mean age, sex and weight, Height, BMI, ASA physical status and there was no statistically significant difference among both the groups. ($p > 0.05$). The types of surgeries and duration of surgery were similar in both groups and included Functional endoscopic sinus surgery, Septoplasty.

Induction Time

Watson et al [06] compared induction times using Propofol and Sevoflurane (8% with 67% Nitrous oxide in Oxygen). They reported that time to loss of

consciousness after induction with Propofol (66.7 s) was significantly shorter than Sevoflurane (96.9s) (*P*=0.004) and there was no marked difference in intubation times.
Similarly Thwaites. A *et al* [11] compared induction times using Propofol and Sevoflurane (8% with 67% Nitrous oxide in Oxygen). They reported that Induction of anaesthesia with Propfol (57 secs) was more rapid compared with 8% Sevoflurane (84 secs).
Similarly Bharti *et al* [05] compared induction times using Propofol and Sevoflurane (5% with Oxygen) by vital capacity breath induction technique using for induction.They reported that time taken for initiation of induction is less than one minute (Group P -38±9 s) (Group S - 46±11 s) for both the groups.

Hemodynamic Parameters Heart Rate

Mean value of HR in both groups at all time periods perioperatively was within range of 65.7 bpm to 77.27 bpm and was within clinically acceptable limits. Mean baseline HR in Group P was 75.2 bpm and Group S was 75.5 bpm and was comparable (P value > 0.05) between the groups.

Mean HR after induction in Group P was 65.77 bpm and Group S was 66.9 bpm and was comparable (P value > 0.05) between the groups. In both groups, the mean HR decreased significantly ($p<0.05$) from the baseline after induction. Decrease in mean HR from baseline was 12.7 % in group P and 11.3% in group S.

Mean HR after intubation in Group P was 80.27 bpm and Group S was 79.87 bpm and was comparable (P value > 0.05) between the groups. In both groups, the mean HR increased significantly ($p<0.05$) from the baseline after intubation. Increase in mean HR from baseline was 6.6 % in Group P and 5.6 % in Group S. This increase in heart rate may be due to larygoscopy and intubation response. Mean HR 30 mins after induction in Group P was 68.2 bpm and Group S was 70.3 bpm and there was statistically significant difference (P value < 0.05) in HR between the two groups. In both groups, the mean HR decreased significantly ($p<0.05$) from the baseline 30 mins after induction. Decrease in mean HR from baseline was 9.3% in group P and 6.8% in group S.

Mean Arterial Pressure

Mean value of MAP in both groups at all time periods perioperatively was within range of 65.5 mm of Hg to 81.6 mm of Hg and was within clinically acceptable limits.

We observed that the Mean baseline MAP in Group P was 79.63 mm of Hg and Group S was 80.57 mm of Hg and was comparable (P value > 0.05) between the groups. Mean MAP after induction in Group P was 65.5 mm of Hg and Group S was 67.83 mm of Hg and was comparable (P value > 0.05) between the groups. In both groups, the MAP decreased significantly ($p<0.05$) from the baseline after induction. Decrease in mean MAP from baseline was

17.7 % in Group P and 15.8 % in Group S. Mean MAP after intubation in Group P was 80.8 mm of Hg and Group S was 81.6 mm of Hg and was comparable (P value > 0.05) between the groups. In both groups, the mean MAP increased significantly ($p<0.05$) from the baseline after intubation. Increase in mean MAP from baseline was 1 % in group P and 1.2 % in group S.

Mean MAP 30 mins after induction in Group P was 69.1 mm of Hg and Group S was 71.4 mm of Hg and was comparable (P value > 0.05) between the groups. In both groups, the MAP decreased significantly ($p<0.05$) from the baseline 30 mins after induction. Decrease in mean MAP from baseline was 13.2 % in group P and 11.3 % in group S.

Mean MAP 60 mins after induction in Group P was 68.7 mm of Hg and Group S was 70.53 mm of Hg and was comparable (P value > 0.05) between the groups. In both groups, the MAP decreased significantly ($p<0.05$) from the baseline 60 mins after induction. Decrease in MAP from baseline was 13.5 % in group P and 12.4 % in group S.

Mean MAP after extubation in Group P was 80.93 mm of Hg and Group S was 81.2 mm of Hg and was comparable (P value > 0.05) between the groups. Increase in mean MAP from the baseline after extubation in group P was 1.6 % which is statistically significant (P value < 0.05) and in Group S was 0.7 % which is not statistically significant.

Systolic Blood Pressure

Mean value of SBP in both groups at all time periods perioperatively was within range of 107.2 mm of Hg to 132.6 mm of Hg and was within clinically acceptable limits. We observed that the mean baseline SBP in Group P was 132.3 mm of Hg and Group S was 131.53 mm of Hg and was comparable (P value > 0.05) between the groups. Mean SBP after induction in Group P was 107.2 mm of Hg and Group S was 110.4 mm of Hg and there was statistically significant difference (P value < 0.05) in SBP between the two groups. In both groups, the SBP decreased significantly ($p<0.05$) from the baseline after induction. Decrease in mean SBP from baseline was 18.9 % in group P and 16.06 % in group S.

Mean SBP after intubation in Group P was 133.13mm of Hg and Group S was 132.6 mm of Hg and was comparable between the groups. Increase in SBP from baseline in Group P was 0.6% which is not statistically significant and in group S was 0.08% which is statistically significant.

Mean SBP 30 mins after induction in Group P was 113.87 mm of Hg and Group S was 114.73 mm of Hg and was comparable (P value > 0.5) between the groups. In both groups, the mean SBP decreased significantly ($p<0.05$) from the baseline 30 mins after induction. Decrease in mean SBP from baseline was 13.8 % in Group P and 12.7 % in Group S.

Mean SBP 60 mins after induction in Group P was 113.4 mm of Hg and Group S was 115.67 mm of Hg and was comparable (P value > 0.05) between the groups. In both groups, the mean SBP decreased significantly ($p<0.05$) from the baseline 60 mins after induction. Decrease in mean SBP from baseline was 14.2% in Group P and 12.05 % in group S. Mean SBP after extubation in group P was 132.4 mm of Hg and Group S was

132.53 mm of Hg and was comparable (P value > 0.05) between the groups. SBP after extubation in both groups was comparable to baseline values. Increase in SBP from the baseline after extubation in group P is 0.001 % which is not statistically significant and in Group S is 0.007 % which is not statistically significant

Diastolic Blood Pressure

Mean value of DBP in both groups at all time periods perioperatively was within range of 64.2 mm of Hg to 80 mm of Hg and was within clinically acceptable limits. We observed that the Mean baseline DBP in Group P was 79 mm of Hg and Group S was 77.53 mm of Hg and was comparable (P value > 0.05) between the groups. Mean DBP after induction in Group P was 64.2 mm of Hg and Group S was 66.53 mm of Hg and was comparable (P value > 0.05) between the groups. In both groups, DBP decreased significantly ($p<0.05$) from the baseline after induction. Decrease in mean DBP from baseline was 18.7 % in Group P and 14.1 % in Group S.

Mean DBP after intubation in Group P was 80 mm of Hg and Group S was 79 mm of Hg and was comparable (P value > 0.05) between the groups. In both groups, the mean DBP increased significantly ($p<0.05$) from the baseline after intubation. Increase in mean DBP from baseline was 1.2 % in Group P and 0.01 % in Group S.

Mean DBP 30 mins after induction in Group P was 66.93 mm of Hg and Group S was 67.47 mm of Hg and was comparable (P value > 0.05) between the groups. In both groups, the mean DBP decreased significantly ($p<0.05$) from the baseline 30 mins after induction. Decrease in mean DBP from baseline was 16.54 % in group P and 12.9 % in Group S.

Mean DBP 60 mins after induction in Group P was 65.3mm of Hg and Group S was 66.97 mm of Hg and was comparable (P value > 0.05) between the groups. In both groups, the mean DBP decreased significantly ($p < 0.05$) from the baseline 60 mins after induction. Decrease in mean DBP from baseline was 17.3 % in Group P and 13.6 % in Group S. Mean DBP after extubation in Group P was 79.6 mm of Hg and Group S was

78.33 mm of Hg and was comparable (P value > 0.05) between the groups. Increase in MAP from the baseline after extubation in group P is 0.007 % which is statistically significant (P value < 0.05) and in Group S, is 0.01 % which is not statistically significant.

Similarly Wang et al [25] compared the hemodynamic effects of Sevoflurane-remifentanil (Group SR) with Fentanyl-etomidate (Group FE) for induction of anaesthesia in patients with ischemic heart disease. They have reported higher incidence of bradycardia with Sevoflurane induction in cardiac patients, which may be related to the high preoperative doses of beta-blockers and combined use of Remifentanil in this study.

Hemodynamic variability in both groups was comparable with minimal changes and was well maintained within clinically acceptable limits. Mean value of HR, MAP, SBP, DBP in both groups at all time periods perioperatively was within clinically acceptable limits and are comparable in both groups. The observed incidents of hypotension were transient, less than 20% from baseline and were easily managed with adjustments of anaesthetic agents and intravenous fluids if required. None of the patients in either groups required vasopressor administration.

WATSON KR *et al* [06] in a study comprising 40 patients had compared Sevoflurane and Propofol for induction and maintenance of anaesthesia in patients undergoing spine surgery and concluded that hemodynamic variability was comparable in both the groups which is in accordance with our study.

In contrast to our study, Bharti et al [05] in a study comprising 30 patients had compared haemodynamic effects of sevoflurane induction & maintenance of anaesthesia (VIMA) with a standard total intravenous technique using Propofol(TIVA) during coronary artery bypass graft (CABG) surgery and concluded that Sevoflurane provided better perioperative hemodynamic control and cardiovascular profile than propofol during elective CABG surgery.

We observed no incidence of hypertension or tachycardia perioperatively in either group in our study. Hemodynamic variability in both groups was comparable with minimal changes and was well maintained within clinically acceptable limits. We also observed in our study that intraoperative bleeding was less, endoscopic visualization of the surgical field and surgeon satisfaction were good and comparable in both the groups. One possible reason might be maintenance of adequate depth of anaesthesia throughout perioperative period with use of single agent anaesthesia technique i.e. same agent either Propofol or Sevoflurane for both induction and maintenance of anaesthesia rather than conventional balanced anaesthetic technique i.e. Propofol for induction of anaesthesia followed by maintenance with Sevoflurane which could lead to lightening of anaesthesia during transition phase from induction to maintenance which may cause tachycardia, hypertension, increased intraoperative bleeding and poor endoscopic visualization of the surgical field due to rapid redistribution of Propofol before adequate depth is attained with Sevoflurane.

Tandon et al[17] in a study comprising of 44 patients compared TIVA with Propofol / Fentanyl to balanced general anesthesia with Isoflurane / Fentanil and conclude that the use of Propofol based TIVA as an anaesthetic agent offers a significantly better visual field as compared to balanced general

anaesthesia with Isoflurane in patients undergoing functional endoscopic sinus surgery. This is in agreement with our results. The reported that difference in the surgical fields diminishes as the duration of the surgery extends beyond 30 minutes which may be due to thrombocyte impairment by Propofol may become clinically relevant during extended operations[47]

Conclusion

We conclucled that Sevoflurane inhalational induction is smooth and well tolerated like Propofol induction in adult patients and there were no complications at time of induction in either groups. Mean induction time was more in Sevoflurane group when compared with Propofol group. Hemodynamic variability in both groups were comparable with minimal changes as we used single agent for both induction and maintenance and surgical field was satisfactory in both groups. There was no incidence of tachycardia or bradycardia and hypertension or hypotension in either groups.

References

1. Bobby A. Tajudeen, David W. Kennedy. Thirty years of endoscopic sinus surgery: What have we learned?. World Journal of Otorhinolaryngology-Head and Neck Surgery 2017 (3), 115-121.
2. Sivaci R, Yilmaz MD, Balci C, Erincler T, Unlu H.Comparison of Propofol and Sevoflurane anaesthesia by means of blood loss during endoscopic sinus surgery. Saudi Med J. 2004 Dec; 25(12):1995-8.
3. Sarika S Naik, Sudhir M Naik. Advantages of Propofol, Anaesthesia in Endonasal Endoscopic Surgeries. RGUHS Journal of Medical Sciences, October 2012 ,2 (4) 207-211.
4. Bharti Neerja, Chari Pramila, Thingnam Shyam K S, Arora Suman, Comparison of Hemodynamic and Cardiovascular Effects of VIMA with Sevoflurane Versus TIVA with Propofol in Patients Undergoing Coronary Artery Bypass Surgery , Indian journal of anaesthesia 2008, 52(6): 805-80.
5. K.R Watson, M.V. Shah, Clinical comparison of 'single agent' anaesthesia with Sevoflurane versus target controlled infusion of Propofol , British Journal of Anaesthesia2000, 85, 4, 541-546.
6. Ahn HJ, Chung SK, Dhong HJ, Kim HY, Ahn JH, Lee SM, Hahm TS, Kim JK. Comparison of surgical conditions during Propofol or Sevoflurane anaesthesia for endoscopic sinus surgery, Br J Anaesth. 2008 Jan;100(1):50-4.
7. Saravanan P Ankichetty, Manickam Ponniah, VT Cherian, Sarah Thomas, Kamal Kumar, L Jeslin, K Jeyasheela, Naveen Malhotra. Comparison of total intravenous anaesthesia using Propofol and inhalational anaesthesia using Isoflurane for controlled hypotension in functional endoscopic sinus surgery , Journal of Anaesthesiology Clinical Pharmacology, 2011, 27(3), 328-332.
8. Thrivikrama Padur Tantry, BG Muralishankar, Karunakara Kenjar Adappa, Sudarshan Bhandary, Pramal Shetty, Sunil P Shenoy. Target-controlled infusion (Propofol) versus inhaled anaesthetic (Sevoflurane) in

patients undergoing shoulder arthroscopic surgery, Indian Journal of Anaesthesiology 2013 ,57 (1)35-40.
9. Selen Osmanagaoglu, Hulya Ulusoy, Mehmet Salih Colak, Nesrin Erciyes. Comparison of the Effects of Sevoflurane, Desflurane and Totally Intravenous Anaesthesia with Propofol on Hemodynamic Variables Using Transesophageal Doppler, 2008 ,52(5) 527.
10. A. Thwaites, S. Edmends, I. Smith. Inhalation induction with Sevoflurane: a double-blind comparison with Propofol, British Journal of Anaesthesia ,1997; 78: 356–361.
11. Thompson S, Drummond GB. Loss of volition and pain response during induction of anaesthesia with Propofol or Sevoflurane, British Journal of Anaesthesia. 2001 August ;87(2):283-6.
12. Muzi M, Robinson BJ, Ebert TJ, O'Brien TJ. Induction of anaesthesia and tracheal intubation with Sevoflurane in adults. Anesthesiology 1996; 85: 536-543.
13. O'Brien K, Kumar R, Morton NS. Sevoflurane compared with halothane for tracheal intubation in children. Br J Anaesth 1998; 80: 452-455.
14. Sayyid SMS, Aouad MT, Taha SK, Daaboul DG, Deeb PG, Massouh FM, Muallem MRA, Baraka AS. A comparison of Sevoflurane-Propofol versus Sevoflurane or Propofol for laryngeal mask Airway insertion in adults. Anesth Analg 2005; 100: 1204-1209.