



Anesthesiology

“COMPARISON OF EFFECT OF SEVOFLURANE VERSUS DESFLURANE ADMINISTRATION VIA I-GEL FOR MAINTENANCE OF ANAESTHESIA ON AIR WAY RESPONSE AND RECOVERY”

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ABSTRACT With the advent of short duration surgical technique ambulatory surgeries are on the rise, as a result there is a need for the use of short- acting anaesthetic drugs for a better quality of recovery. Sevoflurane and Desflurane have been in use for ambulatory anaesthesia as they both have properties of an ideal agent. Desflurane has lower blood gas solubility than Sevoflurane resulting in rapid induction and emergence from anaesthesia. However, Desflurane is pungent and can be irritant to the airway leading to coughing, breath-holding, laryngospasm and copious secretions. This property may make Sevoflurane an agent of choice for cases on spontaneous respiration. There are limited studies on Desflurane with spontaneous breathing. We designed a prospective randomised observational study to compare the efficacy of Desflurane and Sevoflurane for maintenance and recovery of anaesthesia and to evaluate airway responses in spontaneously breathing patients using the I-gel during short duration surgeries.

KEYWORDS : Desflurane, Sevoflurane, Short duration Surgery.

AIMS OF STUDY

To Compare hemodynamic parameters.

To compare Aldrete score in 5min and 10min in Recovery of the patient.

Perioperative complications.

Intra-operative and post operative Airway response.

PHARMACOLOGY

	DESFLURANE	SEVOFLURANE
MAC	6.0	2.0
Blood Gas partition coefficient	0.42	0.67
Physicochemical	Clear liquid , strong odor	Clear liquid, nonpungent
CVS	Fall in SVR TACHYCARDIA due to baroreceptor activation	Fall in SVR No/minimal increase in HR Tachycardia only >1.5MAC
RS	Bronchodilation AIRWAY IRRITATION, salivation, coughing, laryngospasm, breath holding	Bronchodilation
CNS	Increase CBF ; Decrease CMR	

MATERIAL AND METHODS

Following the approval by hospital ethical committee, written, informed consent was obtained from patient's relatives. Sixty patients, Age >6yr, Gender: Both, ASA Grade I and II were randomly assigned into two groups, group D and group S.

Pre-operative assessment of the patient including history, general examination, systemic examination with all required investigations were done a day before operation.

Patient was advised NBM 6 hours.

Informed and written consent was taken.

Monitoring of ECG, NIBP, SpO₂. Base line hemodynamic parameters were recorded.

Pre-medicated with intravenous glycopyrrolate 0.004mg/kg, ondansetron 0.16mg/kg, fentanyl 2µg/kg.

Preoxygenated with 100% O₂ for 3mins.

Induction with inj. Propofol 2 mg/kg IV.

Air way secured with appropriate size of I-gel after giving inj. Succinylcholine 2mg/kg IV.

Patients were randomly divided to one of the following two groups as per study drug injected.

Group S: patients maintained on Sevoflurane (1-3%), 50% O₂ & 50% N₂O

Group D: patient maintained on Desflurane (2-6%)50% O₂ & 50%N₂O

The inspired concentration of the volatile anaesthetic were adjusted to maintain MAP within 20% of baseline values.

All the patients were ventilated by close circuit to maintain an EtCO₂ of 30-35 mmHg.

Rescue bolus dose of Fentanyl citrate 0.5mcg/kg was administered to control acute hemodynamic changes not controlled by a 50% increase in inspired concentration of inhalation agent.

Intra-Operative Observation: Coughing Breath-holding Laryngospasm
In all cases, Desflurane and Sevoflurane was discontinued when the last skin suture taken.

Spontaneous breathing, eye opening, and extubation time were measured from time of termination of anesthetic gas.

Perioperative hemodynamic parameters were recorded.

Postoperative recovery were assessed by the time from 1.response to painful stimuli 2.to eye opening 3.to verbal commands 4.stating name 5.stating the residential place 6.able to squeeze fingers 7.able to lift limb.

Modified ALDRETE Score will be recorded at the time of arrival, at 5 min and a 10 min of recovery post-operative care room. Time to achieve the aldrete score of 9 will also be recorded.

Patients will be observed for Nausea/vomiting, drowsiness, respiratory distress postoperatively.

Inj. Diclofenac Sodium was administered 1.5-2mg/kg Iv for postoperative pain relief.

MODIFIED ALDRETE SCORE+

SCORE	ACTIVITY	RESPIRATION	CIRCULATION	COUNSCIOUSNESS	SpO ₂
2	Moves all 4 limbs on command	Breaths deeply & coughs freely	BP >20 mmHg of preanesthetic level	Fully awake	>92% on air
1	Moves 2 limbs	Dyspnea, shallow breathing	BP >20-50 mmHg of preanesthetic level	Arousable on calling	>90% with o ₂
0	Unable to move limbs	Apnea	BP >50 mmHg of preanesthetic level	Not responding	<90% with o ₂

STATISTICAL ANALYSIS

All observation were recorded and results were analyzed statistically. Comparison of parameters between two groups patients were carried out by applying unpaired t-test and their correlation were studied by applying Pearson Correlation test. Interpretation was done according to p-value. $p < 0.05$ was interpreted clinically significant.

INTRA-OPERATIVE MONITORING: COUGHING BREATH HOLDING LARYNGOSPASM

Coughing Score	No. of Patients		Breath Holding	No. of Patients		Laryngospasm	No. of Patients	
	DESFLURANE (n=30)	SEVOFLURANE (n=30)		DESFLURANE (n=30)	SEVOFLURANE (n=30)		DESFLURANE (n=30)	SEVOFLURANE (n=30)
0	14	11	0	18	7	0	16	12
1	15	18	1	12	9	1	14	13
2	1	1	2	0	0	2	0	0
3	0	0	3	0	0	3	0	0

COUGHING (MIN)	DESFLURANE (n=30)	SEVOFLURANE (n=30)
	Mean	1.06
Standard Deviation	0.63	0.62
Standard error	0.12	0.11
Mean+/-SD	1.06+/-0.69	0.76+/-0.62

P<0.0001 SO NO SIGNIFICANT AIRWAY RESPONSE LIKE COUGHING

BREATH-HOLDING (MIN)	DESFLURANE (n=30)	SEVOFLURANE (n=30)
	Mean	0.73
Standard Deviation	0.58	0.5
Standard error	0.1	0.09
Mean+/-SD	0.73+/-0.58	0.53+/-0.62

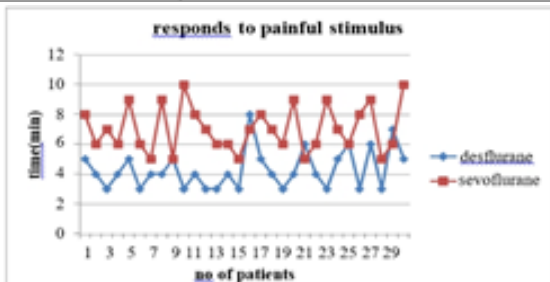
P<0.0001 SO NO SIGNIFICANT AIRWAY RESPONSE LIKE BREATH-HOLDING

LARYNGO SPASM (MIN)	DESFLURANE (n=30)	SEVOFLURANE (n=30)
	Mean	1.3
Standard Deviation	0.46	0.43
Standard error	0.08	0.07
Mean+/-SD	1.3+/-0.46	1.23+/-0.43

PARAMETERS ASSESSED AFTER STOPPING DESFLURANE OR SEVOFLURANE

1. response To Painful Stimulus

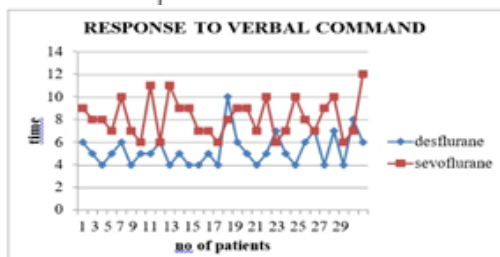
Responds to painful stimulus	Desflurane(mins)	Sevoflurane(mins)
Mean	4.300	7.033
Standard deviation	1.317	1.564
Standard error	0.2404	0.2856
Mean+/-SD	4.300+/-1.317	7.033+/-1.564
P value	<0.0001	



Time to response to painful stimuli was faster in pt receiving Desflurane than Sevoflurane. Mean for time to response to painful stimuli in Desflurane receiving patient was 4.300mins and Sevoflurane was 7.033mins. P value was also <0.05 in both groups.

2. Response To Verbal Command

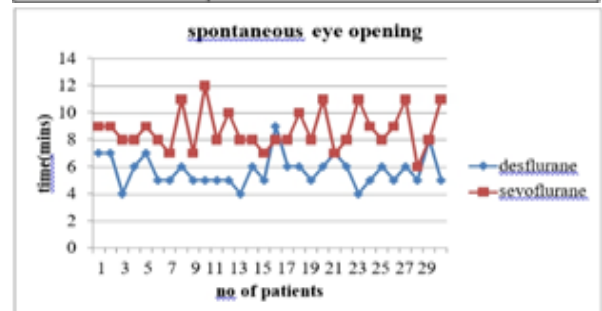
Responds to painful stimulus	Desflurane(mins)	Sevoflurane(mins)
Mean	5.333	8.200
Standard deviation	1.422	1.690
Standard error	0.2596	0.3.86
Mean+/-SD	5.333+/-1.422	8.200+/-1.690
P value	<0.0001	



Time to response to verbal command was faster in pt receiving Desflurane than Sevoflurane. Mean for time to follow verbal command in Desflurane receiving patient was 5.333 mins and Sevoflurane was 8.200mins. P value was also <0.05 in both groups.

3. Response To Spontaneous Eye Opening

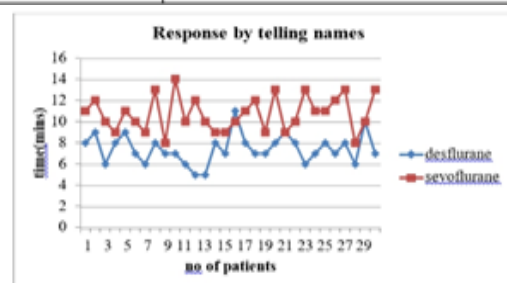
Spontaneous eye opening	Desflurane(mins)	Sevoflurane(mins)
Mean	5.700	8.733
Standard deviation	1.149	1.507
Standard error	0.2098	0.2752
Mean+/-SD	5.700+/-1.149	8.733+/-1.507
P value	<0.0001	



Time to spontaneous eye opening was faster in pt receiving Desflurane than Sevoflurane. Mean for time to spontaneous eye opening in Desflurane receiving patient was 5.700mins and Sevoflurane was 8.733mins. P value was also <0.05 in both groups.

4. Response By Telling Name

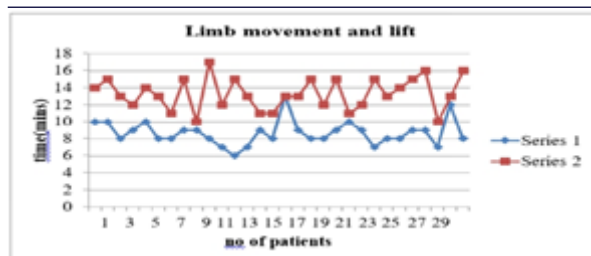
Telling name	Desflurane(mins)	Sevoflurane(mins)
Mean	7.433	10.733
Standard deviation	1.357	1.660
Standard error	0.2478	0.3031
Mean+/-SD	7.433+/-1.357	10.733+/-1.660
P value	<0.0001	



Time to response by telling name was faster in pt receiving Desflurane than Sevoflurane. Mean for time to telling names in Desflurane receiving patient was 7.433mins and Sevoflurane was 10.733mins. P value was also <0.05 in both groups.

5. Limb Movement And Lift

Telling name	Desflurane(mins)	Sevoflurane(mins)
Mean	8.667	13.300
Standard deviation	1.446	1.860
Standard error	0.2640	0.3396
Mean+/-SD	8.667+/-1.446	13.300+/-1.860
P value	<0.0001	



Time to Limb movement and lift was faster in pt receiving Desflurane than Sevoflurane. Mean for time to limb lift in Desflurane receiving patient was 8.667mins and Sevoflurane was 13.300mins. P value was also <0.05 in both groups.

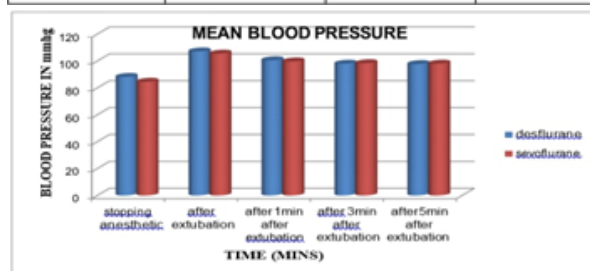
6. HEART RATE

Heart rate	Desflurane (mean+SD)	Sevoflurane (mean+SD)	P value
After stopping maintainance anaesthetic agent	88.167+/-7.144	84.5+/-7.793	0.0624
After extubation	111.2+/-8.497	103.8+/-9.636	0.0025
1min after extubation	101.333+/-9.760	95.167+/-7.996	0.0097
3min after extubation	96.1+/-7.622	90.0+/-6.571	0.0016
5min after extubation	92.7+/-6.758	87.33+/-8.083	0.0071

Haemodynamic parameter like Heart rate measurement didn't vary significantly different between patients receiving Desflurane and Sevoflurane anaesthesia. Postoperative Heart rate were comparable in both study groups. P value was not statistically significant.

7. MEAN BLOOD PRESSURE

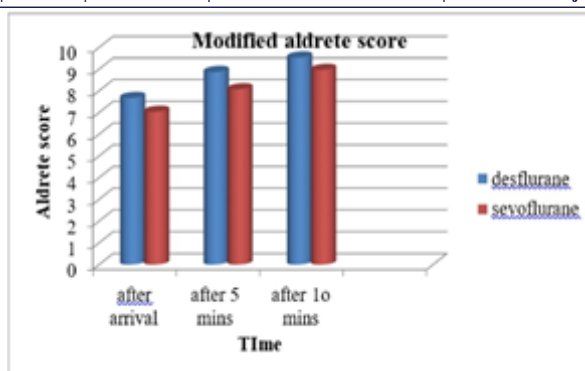
Mean blood pressure	Desflurane (mean+/-SD)	Sevoflurane (mean+/-SD)	P value
After stopping maintainance anaesthetic agent	88.1+/-7.783	89.2 +/- 9.102	0.616
After extubation	107.067+/-6.746	105.4+/-9.137	0.42
1min after extubation	100.533+/-6.377	99.6+/-7.356	0.602
3min after extubation	97.933+/-5.459	98.3+/-6.320	0.81
5min after extubation	97.667+/-5.320	97.967+/-6.620	0.85



Haemodynamic parameter like mean blood pressure measurement didn't vary significantly different between patients receiving Desflurane and Sevoflurane anaesthesia. Postoperative Mean blood pressure were comparable in both study groups. P value was not statistically significant.

MODIFIEDALDRETE SCORE

Modified aldrete score	Desflurane(Mean+/_SD)	Sevoflurane(Mean+/_SD)	P value
After arrival	7.667+/-0.71	7.033+/-0.66	0.0007
After 5 mins	8.866+/-0.73	8.066+/-0.639	<0.0001
After 10 mins	9.533+/-0.50	8.966+/-0.615	<0.0001



Mean modified aldrete score 7.667,8.866 and 9.533 was achieved after arrival , after 5 mins and after 10mins in patients receiving Desfluane anaesthesia. Mean modified aldrete score 7.033,8.066 and 8.966 was achieved after arrival , after 5 mins and after 10mins in patients receiving Sevofluane anaesthesia. So ,it was concluded that achievement of higher aldrete score in comparable time was faster in patients receiving Desflurane than Sevoflurane. P value was statistically significant in both groups.

POST OPERATIVE COMPLICATIONS

Postoperative complications	Desflurane	Sevoflurane
Nausea and vomiting	3	2
Bradycardia	-	-
Respiratory depression	-	-
Convulsion	-	-
Dizziness	-	-

Nausea and vomiting in 3 patients following Desflurane and in 2 patients following Sevoflurane anaesthetic agent . Postoperative respiratory and haemodynamic complications did not occur in both groups.

SUMMARY AND CONCLUSION

In comparative study of recovery characteristics following Desflurane versus Sevoflurane anaesthesia for short duration surgery there was no significant airway response like coughing, breath-holding and laryngospasm.(p<0.0001).

Recovery in group D patients was significantly earlier then group S patients.(p<0.0001)Time to response to painful stimuli ,response to verbal command, spontaneous eye opening ,response by telling name, limb movement and lift was earlier in group D patients than group S patients.

Haemodynamic parameters heart rate and mean blood pressure changes was not significantly different between both groups.

Postoperative complications nausea and vomiting was observed in 3 patients of group D and 2 patients of group S. Other complications like bradycardia, convulsion, dizziness and respiratory depression was not observed in both groups.

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