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The Comparison of the Hemodynamics and Recovery Characteristics of Desflurane versus Sevofluane in Adult Patients Undergoing Craniotomies

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Abstract

Introduction

General anaesthesia is a dynamic balance between the level of hypnosis, analgesia, and stimulation. The introduction of general anaesthetics into clinical practice over 150 years ago stands as one of the seminal innovations of medicine. This single discovery facilitated the development of modern surgery and spawned the specialty of anaesthesiology.[1]From the 'dark ages' where diethyl ether was first synthesized, to the modern operating room, inhalational anaesthetics have played a tremendous role . These compounds are the 'backbone' of modern anaesthetic practice.[2] Inhaled volatile anaesthetics remain the most widely used drugs for maintenance of general anesthesia because of their predictable intraoperative and recovery characteristics.3One of the major factors that determine speed of recovery from anaesthesia is the choice of anaesthetic technique. An ideal general anaesthetic, should provide smooth and rapid induction, optimal operating conditions, and rapid recovery with minimal side effects like nausea, vomiting.[2] Inhaled anaesthetics allow rapid emergence from anaesthesia because of easy titrability with inherent neuromuscular blocking effects that make them more suitable for ambulatory anaesthesia.[1] The availability of less soluble inhalation anaesthetics such as sevoflurane and desflurane made us rethink about the selection of volatile anaesthetics for patients

undergoing general anaesthesia.[3]Given the low blood: gas partition coefficient of sevoflurane [2] [0.63] and desflurane [0.42], faster emergence from anaesthesia is expected compared to traditional inhalation anaesthetics like halothane.[2] Favorable emergence and recovery profiles of these newer volatile anaesthetics have made their use increasingly common. Studies in healthy volunteers indicate that recovery from anaesthesia proceeds nearly twice as fast with desflurane as with sevoflurane. Differences in blood/gas and tissue/blood solubility coefficients of these drugs account for this observation.[2] Both Desflurane and Sevoflurane provide cardiovascular stability at one minimum alveolar concentration (1 MAC).2 Since, Desflurane has low blood: gas partition coefficient, it is required to know if the emergence is faster with Desflurane when compared to Sevoflurane.Anaesthesia for neurosurgical patients is a challenge. Continuous research in neuro anaesthesia over the last three decades has been dedicated towards understanding of anaesthetic agents, which have favourable cerebral physiology with minimal adverse effects.[4]The important goals of anaesthesia in neurosurgical patients are maintenance of haemodynamic stability, producing a slack brain and facilitating early emergence[5] .In this regard, nearly every anaesthetic agent has been used and the choice of anaesthetic agent, such as intravenous or volatile agent, has been considered an area of significant debate in neuroanaesthesia for last one and half decades at least.[4] The purpose of this prospective randomized study was to assess and compare the intraoperative haemodynamics, maintenance and recovery characteristics after anaesthesia with Desflurane and Sevoflurane in patients undergoing craniotomies . [3]

Aims and Objectives of the Study

Aim

To compare sevoflurane and desflurane in patients undergoing craniotomies under general anaesthesia with regard to: PRIMARY OBJECTIVE: 1. To assess perioperative haemodynamic stability. 2. To assess the recovery status. SECONDARY OBJECTIVE: 1. Observation for postoperative side effects like nausea, vomiting, drowsiness, patient neurological status

Materials and Methods

A randomized, prospective, clinical study of 100 adult patients belonging to both sexes undergoing elective craniotomies under general anaesthesia will be carried out at RangarayaMedical College Kakinada from November 2015- July 2017.The study was conducted aftertaking the approval of institutional ethical committee Written informed consent wastaken from the patients before including any patient in the Study. Inclusion criteria: Age Group – 18-60 years Either sex. ASA – I/III GCS 12-15 Exclusion criteria: Patients with severe cardiopulmonary disease Patients with severe hepatic or renal dysfunction Patients with endocrinal disturbances Patients with neurological or psychiatric disorders History of drug allergy or abuse Patients on CNS depressant drugs Pregnant or lactating women Patients with Body mass index (BMI) of >30 kg/m2. 44 PREANAESTHETIC EVALUATION & CONSENT: All the patients underwent a preanaesthetic evaluation which consisted of detailed history regarding present complaints, past medical history, history of previous surgeries or anaesthesia, physical examination and routine investigations including complete haemogram, urine examination, blood urea, serum creatinine, random blood sugar, X-ray chest PA view and

electrocardiogram. CT scan/MRI ,Other relevant investigations such as 2D echo were done if indicated in that particular case. Selected patients were explained about the study in their own language and a written informed consent was taken to participate in the study. Preparation of the patient: All patients were kept nil by mouth for a minimum of 6 hours for solids and 2 hours for clear liquids before taking them for surgery. They were premedicatedwithTab. Ranitidine 150mg and Tab .Alprazolam 0.5mg orally on the night before surgery. Anaesthesia technique: On the morning of the surgery, anaesthesia machine and monitors were checked. Emergency drugs tray was kept ready. After wheeling in the patient into the operation theatre, patients were monitored for baseline heart rate, systolic blood pressure, diastolic blood pressure, mean arterial pressure, ECG (lead II) and oxygen saturation using multiparameter monitor. An 18 G I.V. canula was secured and an infusion of dextrose normal saline was started at a rate of 10ml/kg body weight. 45 Premedication: Inj.Fentanyl 1mcg/kg IV, Inj. Ondansetron 0.1mg/kg IV, Inj.Midazolam 0.01mg/kg IV. Randomization: Patients were randomized using shuffled opaque sealed envelope technique into two groups of 50 each. Group S:Anaesthesia was induced with Inj.Propofol and maintained with 66% nitrous oxide (N2O) in 33% oxygen (O2) and Sevoflurane. Group D:Anaesthesia was induced with Inj .Propofol and maintained with 66% N2O in 33% O2and Desflurane. Induction: Preoxygenation was done with 100% O2 for 3 min using closed circuit.Patient was induced with Inj. Propofol 2 mg/kg IV till loss of eyelash reflex .After confirming adequate mask ventilation, Inj. Vecuronium bromide0.1 mg/kg IV was given and ventilated with 66 % N2 O and 33% O2 Laryngoscopy & Intubation was done with appropriate size, cuffed portex endotracheal tube. Closed circuit was connected to endotracheal tube and bilateral equal air entry was confirmed and endotracheal tube was secured. Maintenance: Anaesthesia was maintained with O2 : N2O (50:50) at 2 L/min + Sevoflurane 1-2% or Desflurane 6% as per the group the patient was assigned to using mind ray A6 machine compatible with Sevoflurane and Desfluranevapourizers. Dial concentration was adjusted to control mean arterial pressure (MAP) and heart rate (HR) within 20% range of the preoperative values. Ventilation was controlled using closed circle absorber system and end tidal carbon dioxide was maintained between 35-45 mm Hg using volume control mode of ventilation. Incremental doses of muscle 46 relaxant, Inj.Vecuronium Bromide were given in doses of - 0.025 mg/kg IV.Intraoperative fluids were given as per the need of the patient. Reversal: At the end of surgery, after the last skin suture was placed, N2O and volatile agent were discontinued, patient was ventilated with 100% oxygen with fresh gas flow of eight liters/min. till patient established spontaneous respiration. Reversal of residual neuromuscular block was done with Inj. Neostigmine 0.05mg/kg IV and Inj. Glycopyrrolate 0.01 mcg/kg IV.Patients were extubated once they fulfilled the extubation criteria and were hemodynamically stable. Early recovery characteristics assessed. Patients were then shifted to post-anaesthesia care unit (PACU). MONITORING: A. Heart rate, Systolic blood pressure, Diastolic blood pressure and SpO2 to be recorded before induction, after induction, every 5 min for initial 15 min and every 15 min till the end of surgery and then postoperatively every 5 min till the modified Aldrete

score was >9 B. Following emergence times were noted :i. Time taken for response to verbal command (time taken from discontinuation of the inhalational agent to the patient's response to verbal commands) ii. Time taken for spontaneous eye opening (time taken from discontinuation of the inhalational agent to spontaneous eye opening) 47 iii. Time taken to squeeze fingers and lift limb (time taken from discontinuation of the inhalational agent to squeeze fingers and lift limb) iv. Extubation time (from the time of administering reversal agent to removal of endotracheal tube) C. After extubation , orientation was assessed Time taken to state name, place of stay and date of birth (i.e, from thetime of extubation to the time patient states name, place of stay and date of birth) D. Duration of surgery (defined in this study as the time period from incision to the application of last skin suture) E. Duration of anaesthesia (from the time of induction to discontinuation of the inhalational agent) F. In the post - anaesthesia care unit (PACU)intermediate recovery was assessed by the modified Aldrete score every 5 min. till the score became greater than9 [time taken to achieve modified Aldrete score of >9 is defined in this study as the time when patient was shifted to PACU till he/she reaches modified Aldrete score of > 9] G. Patients were observed for adverse effects like nausea, vomiting, drowsiness, respiratory tract irritation in the form of cough and were treated accordingly depending on severity

Observation and Results

In this prospective, randomized study, 100 adult patients admitted to rangaraya medical college and government general hospital kakinada,undergoing elective craniotomies under general anaesthesia were randomly given Desflurane or Sevoflurane as maintenance agents .The effects of Desflurane and Sevoflurane on haemodynamics and recovery characteristics were observed. The minimum age of the patient in group DESFLURANE was 18 years and maximum age was 56 years. The minimum age of the patient in group SEVOFLURANE was 22 years and maximum age was 60 years. The difference in age groups between the two groups was statistically insignificant (p= 0.06) There were 40 males and 10 females in Group Desflurane and 44 males and 6 females in Group Sevoflurane. The differences in the gender distribution between the two groups were statistically insignificant (p=0.275). The mean weight of patients in Group DESFLURANE was 64.78 ± 5.821 kg and in Group SEVOFLURANE was65 ± 7.52 kg. The differences in mean weight between the two groups were statistically insignificant (p =0.87).

Hemodynamic Characteristics Changes In Intraoperative Mean Heart Rate (BPM)

TABLE - 1:

	Desflurane		Sevoflurane		
Heart rate	**Mean**	**SD**	**Mean**	**SD**	**P value**
baseline	88.32	5.48	89.58	6.40	0.29
5min	83.56	4.54	84.55	4.70	0.27
10min	84.25	4.56	85.45	3.89	0.15
15min	83.2	5.12	82.1	6.21	0.33
30min	82.6	4.4	83.3	4	0.17
60min	84.21	6.3	82.3	7.2	0.17
90min	78.2	5.34	76.34	6.2	0.10
120min	78.34	3.53	77.28	4.2	0.17
180min	78.2	4.4	79.28	6.4	0.372
240min	76.23	4.53	74.23	5.34	0.05
300min	76.18	4.5	75.13	5.2	0.76

The difference in the mean heart rate between the two groups in the intra1operative period (at induction, 5min, 10min, 15min, 30min, 45min, 60min,90 min,120mins,180mins,240mins,300mins) was statistically insignificant. The changes in the mean heart rate were within + 20% baseline values.The difference in the mean systolic blood pressure between the two groups in the intra-operative period (at induction, 5min, 10min, 15min, 30min, 45min, 60min, 90 min,120mins,180mins, 240mins,300mins) was statistically insignificant. The difference in the mean diastolic blood pressure between the two groups in the intra-operative period (at induction, 5min, 10min, 15min, 30min, 45min, 60min, 90min, 120mins, 180mins, 240mins,300mins) was statistically insignificant. The difference in the mean arterial pressure between the two groups in the intraoperativeperiod (at induction, 5min, 10min, 15min, 30min, 45min, 60min, 90min, 120mins,180mins, 240mins,300mins) was statistically insignificant.

Early Recovery Profiles (Min)

Table – 2:

	Desflurane		Sevoflurane		
	Mean	**SD**	**Mean**	**SD**	**P value**
Time taken for response to verbal commands	4.7	0.5	6.7	0.5	<0.0001
Time taken for spontaneous eye opening	5.0	0.6	7.7	0.5	<0.0001
Time taken to squeeze fingers and lift limb	5.6	0.6	8.9	0.6	<0.0001
Extubation time	7.1	0.8	10.4	0.5	<0.0001
Time taken to state place name	8	1	11	1	<0.0001

This table shows the early recovery profiles between two Groups. In Group Desflurane, the mean time taken for response to verbal commands was 4.7+0.5 min, spontaneous eye opening was 5+0.6 min, to squeeze fingers and lift limb was 5.6 +0.6 min. While the mean time taken for extubation was 7.1+0.8 min. and mean Time taken to state name, place of stay and date of birth was 8+1min. In Group S, the mean time taken for response to verbal commands was 6.7+0.5 min, spontaneous eye opening was 7.7+0.5 min, to squeeze fingers and lift limb was 8.9+ 0.6 min. While the mean time taken for extubation was 10.4+0.5 min. and mean time taken to state name , place of stay and date of birth was 11+1min. The early recovery profile as indicated by the above observed parameters 62 were significantly faster in Group D compared to Group S with p value being < 0.001 indicating a highly significant difference between the two groups

Adverse Effects

Table – 3:

Adverse Effects	Group Desflurane	Group Sevoflurane	P value
Nausea	5(10%)	3(6%)	>0.05
Vomiting	2(4%)	4(8%)	>0.05
Drowsiness	0	0	>0.05
Cough	4(8%)	3(6%)	>0.05

The incidence of adverse effects during postoperative period was comparable in both the groups with 5(10%) patients having nausea in Group D as compared to 3(6%) in Group S, 2 patients(4%) in Group D had vomiting as compared to 4(8%) in Group S, respiratory tract irritation in the form of cough was noted in 4(8%) in Group D as compared to 3(6%) in Group S with p value being > 0.05 indicating that there was no significant difference in the incidence of adverse effects between the groups in postoperative period

Discussion

The quest for an ideal anaesthetic agent, which subserves the neuroanaesthetic goals has now ushered us into an era whereby, sevoflurane and desflurane have gained popularity.Generalanaesthesia is popular among the surgeons, anaesthesiologists, and patients and still remains the mainstay of anaesthesia in many centres. With the introduction of less soluble volatile anaesthetics such as Desflurane and Sevoflurane, general anaesthesia is the favouredanaesthetic technique of choice for many patients as these inhalational anaesthetics provide amnesia, maintain haemodynamics and promote early and clear headed recovery from anaesthesia. The blood gas solubility co efficient of desflurane is 0.42 and sevoflurane is 0.63 and very close to each other,and many of the studies found that general anaesthesia with Desflurane is faster compared to general anaesthesia with Sevoflurane.2 Anaesthetic

agents in this study appear to subserve the objectives of maintaining haemodynamic stability, providing adequate brain conditions and facilitating early emergence Considering the observations of our preliminary study, it is reasonable to interpret that sevoflurane as well as desflurane appear acceptable for use in practice of neuroanaesthesia. Maintenance of stable haemodynamics is an important part of the neuroanaesthesia practice. Unacceptable hypotension can jeopardise the cerebral perfusion pressure. Similarly,perioperative hypertension is associated with intracranial hypertension,whichmayresult in intracranial haemorrhage and aggravation of brain oedema.[6]We observed similar, intraoperative haemodynamics conditions and recovery profile between sevoflurane and desflurane in patients undergoing craniotomies.One study has found out that sevoflurane has early recovery status compared to desflurane and another study has found not much of difference between recovery status of desflurane and sevoflurane. [7] Hence it was decided to know the effect of these volatile agents on the haemodynamics and compare their early and intermediate recovery characteristics. Heavneret al. observed a significantly faster time to extubation, eye opening and orientation with desflurane than sevoflurane after various surgeries. Nathanson et al. [2] reported the mean emergence time andextubationtimeto be significantly less with desflurane as compared to sevoflurane in outpatient surgeries but the recovery of cognitive function and discharge times from the hospital were similar between the two. Dupont et al. reported a faster emergence time and extubation time with desflurane than sevoflurane in patients undergoing pulmonary surgery.The return of cognitive function at 5 min was earlier with desflurane but there was no significant difference after 15 min of tracheal extubation on neurosurgical patients, Magniet al. reported similar emergence time. but longer tracheal extubation time and recovery time in the sevoflurane compared to the desfluranegroup.Hence, this study was taken up to compare the haemodynamics and recovery status between the patients on Desflurane and Sevoflurane for maintenance. In our study, which is a prospective randomised one, we have compared the haemodynamic characteristics and early and intermediate recovery profiles of Desflurane (Group D) and Sevoflurane (Group S) in 100 ASA class I and II,III adult patients undergoing craniotomies. Hypothesis for the study: Hypothesis formed before the study was alternate hypothesis i.e, recovery status with patients maintained on Desflurane will be faster than patients maintained with Sevoflurane. Demographic data: In both groups S and D in our study, there was no statistical difference with respect to age, gender, weight, ASA physical status, duration of surgery and duration of anaesthesia. Per-operative haemodynamics: Regarding the haemodynamic parameters, changes in HR, SBP, DBP and MAP, when compared to the baseline values, there was no statistically significant difference between the two groups at various intervals during maintenance of general anaesthesia till the patients were extubated. The changes in the mean heart rate, systolic blood pressure and diastolic pressure were within ±20% of the baseline values in both the groups.Similar findings were observed in the studies conducted by Ravi Jindal et al in 2011,Amandeep Kaur et al in 2013and Michael H. Nathanson et al. In a study conducted by and Weiskopf RB et al [8], there was an increase in heart rate when desflurane concentration was increased rapidly to 1.66 MAC and in a study

conducted by Ebert TJ et al increase in heart rate occurred only at desflurane concentration of 1.5 MAC. Since we titrated the desflurane concentration based on the blood pressure and heart rate changes and desflurane concentration was kept less than 3% throughout, we did not find any increase in the heart rate and blood pressure in our study. The cardiovascular stability during the maintenance period and the lack of any difference between the two groups in our study was predictable, since the study was designed to maintain mean arterial pressure (MAP) within 70 20% of the baseline values by varying the inspired concentration of the volatile anaesthetic agents. Cerebral vasodilatation and raised ICP are concerns with the use of all inhalational anesthetics in patients with intracranial pathologies and desflurane is considered to have more cerebral vasodilation and ICP raising potential when compared to isoflurane and sevoflurane. However, these concerns with the use of desflurane have been found to have little clinical significance. Talkeet al. studied the effect of sevoflurane on the cerebrospinal fluidpressure (CSFP) in normocapnic patients scheduled for transsphenoidal pituitary surgery. They found that the CSFP increased by 2 ± 2 mmHg with 1 MAC ofsevoflurane and concluded that the change produced by 1 MAC sevoflurane was not different from that producedin their earlier study. Kaye et al. compared the effect of 1.2 MAC of desflurane and isoflurane (in oxygen and air mixture) on CSFP in normocapnic patients undergoing craniotomy for removal of supratentorialtumors. They too observed that neither isoflurane nor desflurane caused significant increase in CSFP from the baseline values by 1 MAC desflurane or isoflurane which was observed. Fragaet al. compared the MAP, ICP, and cerebral perfusion pressure (CPP) using 1 MAC of either isoflurane or desflurane (with 60% N2O) in normocapneicpatientsundergoing craniotomy for supratentorial brain tumors. The ICP measurements throughout the study did not change within each group compared with baseline values and they did not find any significant difference of MAP, ICP, and CPP between the two groups. We measured the ICP intraoperatively and compared the hemodynamic parameters during the perioperative period between the two groups. Our study results have shown that the ICP and hemodynamic parameters in both the groups were comparable.Ornstein and associates studied the cerebral blood flow and CO2 reactivity in hypocapneic patients undergoing craniotomy using desflurane and isoflurane at 1 and1.5 MAC. The degree of cerebral vasodilatation was comparable at different MAC of both the agents. Recovery profiles: We studied different criteria for early and intermediate recovery profiles:- a) Time taken for response to verbal command (time taken from discontinuation of the inhalational agent to the patient's response to verbal commands) b) Time taken for spontaneous eye opening (time taken from discontinuation of the inhalational agent to spontaneous eye opening) c) Time taken to squeeze fingers and lift limb (time taken from discontinuation of the inhalational agent to squeeze fingers and lift limb) d) Extubation time (from the time of administering reversal agent to the removal of endotracheal tube) 72 e) Time taken to state name, place of stay and date of birth (i.e, from the time of extubation to the time patient states name, place of stay and date of birth) f) In the post - anaesthesia care unit (PACU), intermediate recovery was assessed by the modified Aldrete score (time taken to achieve

modified Aldrete score of >9 is defined in this study as the time when patient was shifted to PACU till he/she reaches modified Aldrete score of > 9) .We found in our study that there was a statistically highly significant difference between Desflurane and Sevoflurane groups regarding all the parameters in therecovery profile with patients in group D having shorter recovery time compared to patients in group S. Extubation time: In our study, we switched off the volatile agent at the application of last skin suture.Our data analysis revealed that the time to extubation (from the time of administering reversal agent to the removal of endotracheal tube) was consistently less in the Desflurane group as compared to the Sevoflurane group] which was statistically highly significant. Desflurane gives the fastest recovery from anaesthesiaand would become the automatic choice for neurosurgery; This has prompted several researchers to study the effects of desflurane on the brain to ascertain whether this concern is theoretical or does it affect the operating conditions. All studies were done onpatients who did not have a significantly raised ICP preoperatively In a metaanalysis done by Dexter F etal, [9] they found that Desflurane reduced theaverageextubation time and the variability of extubation time by 20%-25% relative to Sevoflurane which compares with our study. Other early recovery profiles : In our study, we observed that the patients in Group D, consistently opened their eyes to verbal command faster than the patients in Group S . Also, as compared to the patients in Group S, the patients in Group D were able to verbalise faster In a study conducted by La Colla et al, who reported early recovery times in theDesflurane group compared with those of Sevoflurane group including the time from discontinuation of the anaesthetic drug to eye opening after verbal command, squeezing the observer's hand,extubation, and ability to state their name and give their correct date of birth. This study was conducted in morbidly obese patients leading to slightly longer time to recovery when compared to our study probably due to delay in wash out of the inhalational agents in morbidly obese patients (patients with morbid obesity were excluded from our study). Similar to the observations in our study, Jindal R et al commented that the time to eye opening to verbal commands and spontaneous eye opening were significantly shorter in patients who were administered Desflurane than in patients who were given Sevoflurane when maintenance and recovery characteristics were studied. The recovery timings were shorter when compared to the observations in our study as the definition of the timing was taken from time of administration of reversal agent. Kaur A et al were able to corroborate the same findings in a study conducted in morbidly obese patients undergoing bariatric surgery where the time to respond to painful stimuli , obey verbal commands and spontaneous eye opening was shorter in the Desflurane group. Though patients in this study were morbidly obese, recovery was earlier when compared to our study as they used bispectral index (BIS) as an indicator of adequate anaesthesia and the dial concentrations of the volatile agents was adjusted using BIS during maintenance.Hence the difference. Modified Aldrete score: In our study, the patients who received Desflurane had significantly higher mean modified Aldrete score at 5min.and 10min. After extubation, the patients were monitored and observed until they achieved a modified Aldrete score of ≥ 9. Analysis of the recovery profiles revealed that the patients who were enrolled in the group that received

Desflurane achieved a modified Aldrete score of ≥ 9 faster when compared to the patients in the Sevoflurane group . While contrasting between anaesthesia with Desflurane and Sevoflurane for video arthroscopy of the knee, Naidu K etal concluded that the early and intermediate [psychomotor] recovery is significantly faster in the Desflurane compared to the Sevoflurane group. Eshima RW et al also found that on comparing patients in whom DesfluraneandSevoflurane was administered via a Laryngeal Mask Airway, patients anaesthetized with Desflurane recovered sooner with respect to their Aldretescores . Adverse effects: Very few patients in our study had complications associated with the inhalational agents during the recovery [8 out of 100 patients had nausea; 6 patients had vomiting and 7 out of 100 patients had cough] in our study. It was seen that more patients in theDesflurane group had complications as compared to those in the Sevoflurane group. However, this number was not statistically significant

Summary

We conducted a study on "The comparison of the haemodynamics and recovery characteristics of Desflurane versus Sevoflurane in patients undergoing craniotomies under general anaesthesia–A prospective randomized study".In this all patients satisfying the inclusion criteria and giving informed consent to be a part of the study were included. Patients were randomized into the group receiving Desflurane and that receiving Sevoflurane. All patients were monitored using standard monitors. They all received general anaesthesia with Fentanyl, Propofol, Vecuronium and Desflurane or Sevoflurane depending on the group they were randomized to. At skin closure, the agent was turned off. After reversal and adequate evidence of return of tone and spontaneous respiration, patient was extubated and was observed in the immediate postoperative period till a modified Aldrete score of ≥ 9 was achieved. The time required for eye opening, verbal response and complications if any were also noted. Throughout this time frame, parameters namely heart rate, blood pressure, and modified Aldrete score were noted. We observed that age, ASA physical status and weight in both group D and S were not significantly different Intraoperative haemodynamic parameters in both groups were comparable throughout the surgical period. The time required for the patients to be extubated after the agent was switchedoff was significantly shorter in Group D as compared to Group S [mean in Group D-7.1 min. as compared to Group S-10.4 min., P < 0.0001].Verbal Response also occurred significantly faster in Group D with mean duration 4.7+ 0.5min.as compared to a mean of 6.7 + 0.5 min. [P 0.05] like nausea, vomiting and cough.

CONCLUSION From our study entitled "The comparison of the haemodynamics and recovery characteristics of Desflurane versus Sevoflurane in adult patients undergoing craniotomies - A prospective randomized study" we conclude that: Desflurane as the inhalational agent ensures faster recovery in the early postoperative period as evident from significant decrease in the time required for extubation and the time required to achieve a modified Aldrete score of ≥ 9 when compared to patients receiving Sevoflurane. The patients receiving Desflurane opened their eyes and verbalised sooner. It was also not associated with any significant adverse effects Desflurane or Sevoflurane administration has no negative effects on the intraoperative as well as the early postoperative haemodynamic parameters and

provide cardiovascular stability when titrated to maintain within 20% of the baseline values.

References

1. Eriksson L. The effects of residual neuromuscular blockade and volatile anesthetics on the control of ventilation. Anesthesia& Analgesia. 1999; 89(1):243-251.
2. Nathanson M, Fredman B, Smith I, White P. Sevoflurane versus Desfluranefor outpatient anesthesia. Anesthesia& Analgesia. 1995;81(6):1186-1190.
3. Jacob AK, Kopp SL, Bacon DR, Smith MH. The History of Anesthesia. In:Barash PG, Cullen BF, Stoelting RK, Cahalan MK, Stock MC. Clinical Anesthesia, 7th Edition. Philadelphia: Lippincott Williams &Wilkins ;2009 ,4- 27
4. Engelhard K, Werner C. Inhalational or intravenous anestheticsfor craniotomies? Pro inhalational. CurrOpin Anaesthesio l2006;19:504-8.
5. Magni G, Baisiet al. No difference in emergence time andearly cognitive function betweensevoflurane-fentanyl and propofol-remifentanil in patients undergoing craniotomy for supratentorial intracranial surgery. J Neurosurg Anesthesiol2005;17:134-8
6. Basali A, Mascha EJ, Kalfas I, Schubert A. Relation betweenperioperative hypertension and intracranial hemorrhage aftercraniotomy. Anesthesiology 2000;93:48-54.
7. Tarazi E Philip B. A comparison of recovery after sevoflurane or desflurane in ambulatory anesthesia. Journal of Clinical Anesthesia. 1998;10(4):272-277.
8. Vallejo M, Sah N, Phelps A, O'Donnell J, Romeo R. Desfluraneversussevoflurane for laparoscopic gastroplasty in morbidly obese patients. Journal of Clinical Anesthesia. 2007;19(1):3-8.
9. Dexter F, Bayman E, Epstein R. Statistical modeling of average andvariabilityof time to extubation for meta-analysis comparing 87 Desflurane to Sevoflurane.Anesthesia& Analgesia. 2010; 110 (2):570-580.