A Dissertation submitted on

A COMPARATIVE STUDY OF DESFLURANE AND SEVOFLURANE IN SHORT SURGICAL PROCEDURES LIKE FIBROADENOMA EXCISION UNDER GENERAL ANAESTHESIA WITH SPONTANEOUS RESPIRATION

A Dissertation submitted to

THE TAMILNADU DR. M.G.R. MEDICAL UNIVERSITY

In partial fulfilment of the requirements

For the award of the degree

M.D. (BRANCH-X)

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GOVERNMENT STANLEY MEDICAL COLLEGE & HOSPITAL

THE TAMILNADU DR. M.G.R. MEDICAL UNIVERSITY

CHENNAI, TAMILNADU

MAY 2018

DECLARATION BY THE CANDIDATE

I, **Dr. R.PREMA** solemnly declare that the dissertation, titled "**A COMPARATIVE STUDY OF DESFLURANE AND SEVOFLURANE IN SHORT SURGICAL PROCEDURES LIKE FIBROADENOMA EXCISION UNDER GENERAL ANAESTHESIA WITH SPONTANEOUS RESPIRATION"**, is a bonafide work done by me during the period of **FEBRUARY 2017 to SEPTEMBER 2017** at Government Stanley Medical College and Hospital, Chennai under the expert supervision of **Dr.NALINI.M.D.,D.A.,** Professor, Department Of Anaesthesiology, Government Stanley medical college, Chennai.

This thesis is submitted to The Tamil Nadu Dr. M.G.R. Medical University in partial fulfilment of the rules and regulations for the M.D. degree examinations in Anaesthesiology to be held in May 2018.

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PLAGIARISM CERTIFICATE

This is to certify that this dissertation work titled “A COMPARATIVE STUDY OF DESFLURANE AND SEVOFLURANE IN SHORT SURGICAL PROCEDURES IN FIBROADENOMA UNDER SPONTANEOUS RESPIRATION” of the candidate Dr.R.PREMA with Registration Number 201520055 for the award of M.D ANAESTHESIOLOGY. I personally verified the urkund.com website for plagiarism check. I found that the uploaded file containing introduction to conclusion pages shows a result of 6% plagiarism in this dissertation.

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suman shekhar tiwari An observational study to compare recovery of elderly patients from general anesthesia with sevoflurane and desflurane.docx (D30543015)
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http://bookpromos.lww.com/wp-content/uploads/2014/10/Shafer-Ch4-Inhaled-Anesthetics.pdf

Instances where selected sources appear:

30

CONTENTS

TABLES

FIGURES

ABBREVIATION

ABBREVIATION	EXPANSION
ASA PS	AMERICAN SOCIETY OF ANAESTHESIOLOGIST PHYSICAL STATUS
BIS	BISPECTRAL INDEX
CNS	CENTRAL NERVOUS SYSTEM
CC	CLOSED CIRCUIT
EEG	ELECTROENCEPHALOGRAM
ECG	ELECTROCARDIOGRAPHY
$ETCO_2$	END TIDAL CARBONDIOXIDE
FRC	FUNCTIONAL RESIDUAL CAPACITY
HR	HEART RATE
IV	INTRAVENOUS
MAC	MINIMUM ALVEOLAR CONCENTRATION
MAP	MEAN ARTERIAL PRESSURE
NMDA	N-METHYL D-ASPARTATE
N2O	NITROUS OXIDE
NIBP	NON-INVASIVE BLOOD PRESSURE
P_A	ALVEOLAR PARTIAL PRESSURE OF GAS
P_a	ARTERIAL PRARTIAL PRESSURE OF GAS

PARS	**POST-ANAESTHESIA RECOVERY SCORE**
P_I	**PARTIAL PRESSURE OF INSPIRED GAS**
$PaCO_2$	**PARTIAL PRESSURE OF ARTERIAL CARBONDIOXIDE**
PONV	**POSTOPERATIVE NAUSEA AND VOMITING**
SCC	**SEMI-CLOSED CIRCUIT**
SPO2	**PULSE OXIMETER OXYGEN SATURATION**
LMA	**LARYNGEAL MASK AIRWAY**

INTRODUCTION

Short surgical procedures like Fibroadenoma excision are commonly performed as a daycare procedure which demands short, safe and effective balanced anaesthesia.

Volatile anesthetics are commonly used for the maintenance of anesthesia nowadays. Diethyl ether was the first agent used in the history of volatile anaesthesia followed by Nitrous oxide to the most modern volatile anaesthetics like Desflurane and Sevoflurane[1]. These modern volatile anaesthetics form an important tool in patients undergoing general anaesthesia by altering central nervous system functions. In 1950, all halogenated older anaesthetics were withdrawn due to their hepatotoxicity except Nitrous oxide. The newer inhaled anaesthetics that are available today are introduced by replacing fluoride to hydrogen atom.

Desflurane and Sevoflurane with low blood-gas partition co-efficients have facilitated rapid induction of anaesthesia, precise control of end-tidal concentration during maintenance of anaesthesia and rapid recovery and less airway adverse effects at the end of anaesthesia. The rapid induction, recovery and clinical acceptance of Desflurane and Sevoflurane led to their use in daycare surgery.

Economic [cost] factor is an important consideration in the practice of these newer anaesthetics which can be decreased by effective anaesthetic techniques like low flow anaesthesia..

So, in this study we decided to compare the recovery profile, emergence, airway adverse effects and haemodynamic parameters of Desflurane and sevoflurane using a balanced anaesthesia technique.

AIM OF THE STUDY

To compare the Emergence, Recovery, Airway adverse effects and Haemodynamic parameters (Heart rate and Mean arterial pressure) between Desflurane and Sevoflurane in Fibroadenoma excision under General Anaesthesia using Proseal LMA with spontaneous respiration.

PRIMARY OBJECTIVE:

Primary objective in the study was to compare the Emergence, Recovery characteristics and Airway adverse effects of Desflurane and Sevoflurane

SECONDARY OBJECTIVE:

The secondary objective was to assess the intraoperative variability of Heart rate and Mean Arterial Pressure of two groups anaesthetised with either Desflurane or Sevoflurane.

REVIEW OF LITERATURE

S.Gergin B.Cevik et al did a randomised comparative study to compare hemodynamic changes, emergence and recovery characteristics of Sevoflurane and Desflurane in Laparoscopic cholecystectomy cases. 40 patients were selected and randomized into two groups. After standardized induction sequence and intubation, patients were maintained under anaesthesia with either 1% Sevoflurane or 3% Desflurane. They concluded that Desflurane had faster recovery and emergence when compared to Sevoflurane. Haemodynamic changes were comparable between both the groups[2].

Klock PA, Czeslick EG did a randomized comparative study of 64 patients of ASA PS I and II, comparing Desflurane and Sevoflurane in range of 1 to 1.8 MAC in day care surgeries. They assessed upper airway reactivity and haemodynamic changes between Desflurane and sevoflurane. They concluded that at 1 MAC Desflurane had upper airway reactivity such as coughing and associated Heamodynamic changes (both at $p < 0.05$). At 1.8 MAC Desflurane and Sevoflurane both caused Heamodynamic changes(BP fall and bradycardia) but do not cause any upper airway reactivity[3].

White PF et al did a randomized control study to compare effects of Desflurane with Sevoflurane in maintenance of general anaesthesia in ambulatory surgery. They selected 130 patients undergoing superficial surgical

procedures requiring general anaesthesia and randomized them into two groups. The patients were induced with Propofol and a laryngeal mask airway was placed followed by maintenance with either Sevoflurane 1-3% or Desflurane 3-8% in air/ oxygen mixture. They assessed the Recovery time to eye opening, response to commands, orientation, fast-track score of 14, first oral intake, sitting, standing, ambulating unassisted, actual discharge and postoperative complications like cough. They concluded that Desflurane had faster recovery with high incidence of cough[4].

Nathanson MH et al did a randomized comparative study comparing the Recovery characteristics of Desflurane and Sevoflurane used for maintenance in 42 women undergoing Laparoscopic sterilization procedures. Based on adequate depth of anaesthesia and to maintain Mean arterial pressure (MAP) within 20% of the pre-induction baseline values, agents were titrated. Visual analogue scale (VAS) and the digit-symbol substitution test (DSST) were done preoperatively and at 30 minutes intervals during post-op recovery period. They concluded that Desflurane leads to a more rapid Emergence compared to that of Sevoflurane. However, Recovery time, postoperative VAS and DSST scores, and side effects were similar in the both groups[5].

Mckay RE, compared airway response during Desflurane and Sevoflurane administration using laryngeal mask airway in 110 patients who were smokers and divided into two groups of 55 each. They compared coughing, breath holding, laryngospasm and desaturation in both the groups. This study concluded that coughing, breath holding were more common during Emergence at lower anaesthetic concentration of Desflurane and Sevoflurane. Airway adverse effects were comparable in both groups and respiratory complications were more common with smokers[6].

HYUN _JOUNG NO did a retrospective cohort study of perioperative upper respiratory events in children undergoing general anaesthesia using Desflurane and Sevoflurane through supraglottic airway. This retrospective study

evaluated 3499 children of age 1 to 15 years .This study concluded that there was no significant difference in perioperative respiratory events between the two groups[7] .

A study conducted by **Dupont et al** compared Maintenance and Recovery profile after general anaesthesia with Sevoflurane, Desflurane and Isoflurane in 100 patients undergoing pulmonary surgery. This study showed that the three anaesthetics had comparable haemodynamic effects and arterial oxygenation during one-lung ventilation. Emergence was twice as fast with Desflurane as with Sevoflurane or Isoflurane. Aldrete score, cognitive and psychomotor functions were faster with Desflurane[8].

Isik Y et al did a randomized control study of low flow Desflurane and Sevoflurane anaesthesia in children. In this study they included 80 patients in the age group of 5-15 yr. Induction of anaesthesia was done with Propofol and Endotracheal intubation was facilitated with Atracurium. Desflurane group was maintained with Desflurane, oxygen and nitrous oxide and Sevoflurane group was maintained with Sevoflurane, oxygen and nitrous oxide. Intraoperative heart rate variability and Mean arterial pressure variability ,preoperative and postoperative hepatic and renal functions ,the total duration of anaesthesia and surgery ,early recovery parameters were recorded.The modified PARS score recorded at 10th and 30 th minutes postoperatively and postoperative nausea and vomiting were assessed.They concluded that low flow Desflurane and Sevoflurane anaesthesia

did not adversely affect the intraoperative haemodynamic values, LFT and RFT in children and preferred Desflurane as it has early recovery from anaesthesia[9].

McKay RE et al conducted a study on awareness and return of Airway reflexes after Desflurane anaesthesia and Sevoflurane anaesthesia. A total of 64 patients were randomized to receive Desflurane (n = 31) or Sevoflurane (n=33) via a laryngeal mask airway. The time from stopping inhalational anaesthetic to response to oral commands, ability to swallow 20 ml of water without coughing or drooling were observed in both the groups. They concluded that from the time of cutting inhalational anaesthetic to the first response to oral command was significantly longer with Sevoflurane. At 2 minutes after responding to oral commands, all patients in Desflurane group were able to swallow without drooling or coughing but 55% of patients with Sevoflurane drooled and coughed[10].

L. E. C. De Baerdemaeker et al conducted a study in 50 morbidly obese patients undergoing Laproscopic gastroplasty and compared the optimization of Desflurane administration with Sevoflurane using an 'inhalation bolus' technique. They assessed the depth of anaesthesia, haemodynamic stability, and Recovery time in both the groups using Bispectral index. They concluded that immediate recovery was significantly faster in the Desflurane group. Overall hypnotic controllability measured by BIS was less accurate with Desflurane. Overall haemodynamic controllability was better with Desflurane. The use of an inhalation

bolus was found to be appropriate in both the groups without causing severe heamodynamic side effects[11].

JY Park et al did a comparison of consumption and recovery Profiles according to anaesthetic circuit Mode using a New Multifunctional Closed-Circuit Anaesthesia System during Desflurane Anaesthesia. This clinical study was conducted in 60 female patients undergoing Gynaecological procedures and total induction time, anaesthetic dose consumed and haemodynamic and Recovery profiles were studied. Three groups were randomly assigned to receive Desflurane anaesthesia through closed circuit and semi-closed circuit at fresh gas flow rates of 4 l/min and 2 l/min . Inhalational anaesthetics were maintained at Minimum alveolar concentration $_{BAR..}$ The time required to reach MAC_{BAR} was significantly shorter and the dose of Desflurane required was significantly less in the CC group when compared with the other groups. There was no statistical difference in haemodynamic and recovery profiles between the two groups.They concluded that the CC mode allowed a faster and more reliable induction, lower anaesthetic consumption and stable haemodynamic and recovery profiles[12].

HISTORICAL REVIEW

HISTORY OF VOLATILE ANAESTHETICS

The history of volatile anaesthetics falls way back to 1772 when Joseph Priestely prepared Nitrous Oxide followed by **Humphry Davy,** who recognised Nitrous oxide's anaesthetic properties and used them in dental surgeries for pain relief. **JAMES YOUNG SIMPSON,** an obstetrician introduced chloroform in 1831 in obstetric practice[13].

In **1842, Diethyl ether** was first used as an anaesthetic by **WILLIAM CLARKE,** which was used previously for treating whooping cough and other respiratory ailments. On **October 16th 1846**, a dentist of Boston origin, **William T.G. Morton**, first did public demonstration of the ether anaesthesia on a patient and excised a tumour from his jaw. This day is celebrated as "**ETHER DAY**" or "**WORLD ANAESTHESIA DAY".**

In 1950, all halogenated older anaesthetics except Nitrous oxide were withdrawn due to their inflammability and potential hepatotoxicity.

This is followed by **Methoxyflurane** and **Enflurane** which were withdrawn from market due to organ toxicity**. Isoflurane**, chemically a halogenated methyl ethyl ether and in 1981 Enflurane isomer was introduced which has least arrythmogenic potential.

Desflurane, a fluorinated methyl ethyl ether was introduced in 1992 by Dr.Ross terell followed by the introduction of Sevoflurane in 1994, a fluorinated mehyl isopropyl ether[13].

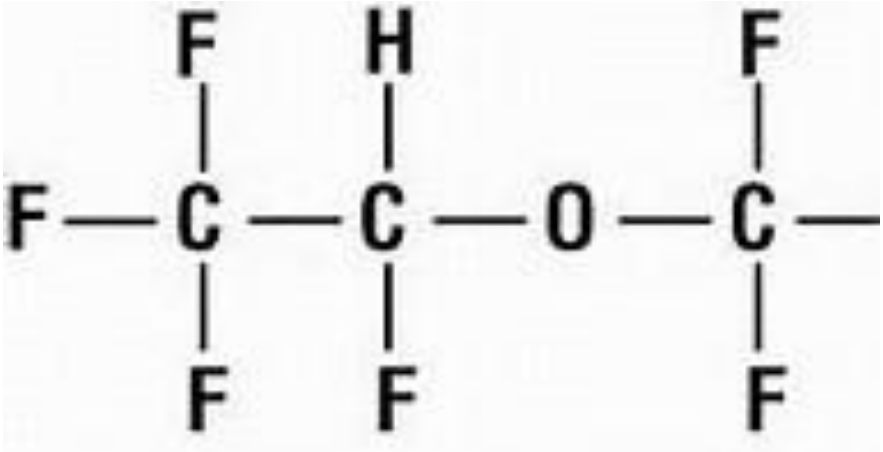
PHARMACOLOGY:

DESFLURANE:

Desflurane a fluorinated methyl ethyl ether.

CHEMICAL NAME: 1,2,2,2-tetrafluoroethyl difluoromethyl ether

Figure 1: DESFLURANE STRUCTURE



PHYSICAL AND CHEMICAL PROPERTIES

- The molecular weight of Desflurane is 168
- Density is 1.465g/cm^3 at 20ºC
- Boils at 22.8ºC.
- It has a high vapour pressure of 669 mm Hg at 20ºC.
- It is **pungent smelling**.
- Minimum alveolar concentration (MAC) of 6.6.
- Low blood-gas partition co-efficient of 0.42.
- Oil-gas partition coefficient of 19.

PHARMACOKINETICS:

Desflurane has the lowest blood gas solubility of all volatile anaesthetic and thus results in faster induction and recovery.

The distribution of Desflurane follows a five compartment model which may be as follows_the lungs, the vessel rich organs, fat around the vessel rich organs and finally peripheral fat.

Desflurane undergoes minimal metabolism which is seen by increased serum and urinary trifluroacetate.

The elimination of Desflurane is faster and it is almost exclusively through the lungs, with metabolism by the liver estimated to be less than 0.02%.

PHARMACODYNAMICS:

CNS EFFECTS: Desflurane causes dose dependent cerebral vasodilation, thus increasing CBF, cerebral blood volume and intracranial pressure at normotension and normocapnia.

There is marked reduction in cerebral metabolic rate of O_2.

It produces a dose dependent burst suppression of the EEG at concentrations greater than 1.24 MAC and at a MAC of greater than 1.66 the EEG becomes isoelectric.

CVS EFFECTS: Desflurane causes a dose dependent tachychardia.

It causes myocardial depression and decrease in the SVR resulting from peripheral vasodilation. These changes occur at concentration ranging from 0.83 to 1.66 MAC. Desflurane is a also a direct coronary vasodilator and produces overall reduction in cardiac work.

RESPIRATORY EFFECTS: Desflurane is a potent respiratory depressant. Desflurane causes decrease in tidal volume and increase in respiratory rate with overall reduction in minute alveolar ventilation.

Desflurane is unsuitable for an inhalational induction because it is extremely irritating to the airway due to its pungent odour.

RENAL EFFECTS: Renal blood flow is reduced and thus Glomerular filtration rate and urine output are reduced.

HEPATIC EFFECTS: It causes decrease in hepatic blood flow and increase in portal vein blood flow.

NEUROMUSCULAR EFFECTS: It is associated with dose dependent decrease in response to train of four and tetanic peripheral nerve stimulation. It potentiates the action of non depolarizing muscle relaxants.

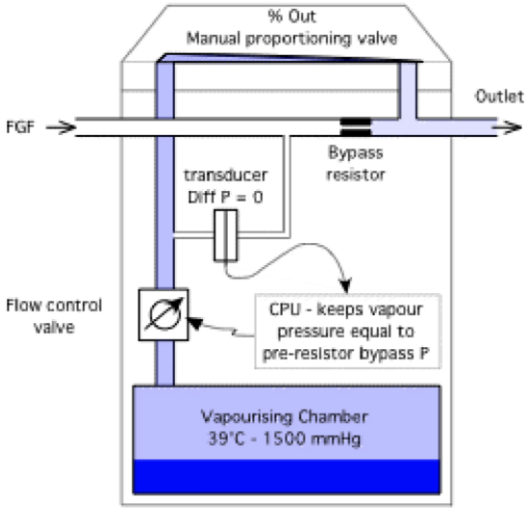
DESFLURANE VAPOURIZER:

Since Desflurane has a boiling point of 22^0c which is room temperature and the MAC is high, a special vaporizer is required for its delivery .

The vapouriser is electrically heated, dual circuit gas vapor blender which heats Desflurane to 39^oc increasing its SVP to 1300 mmHg.

Figure 2: DESFLURANE VAPORISER

Figure 3: MEASURED FLOW VAPORISER



Concerns of Desflurane:

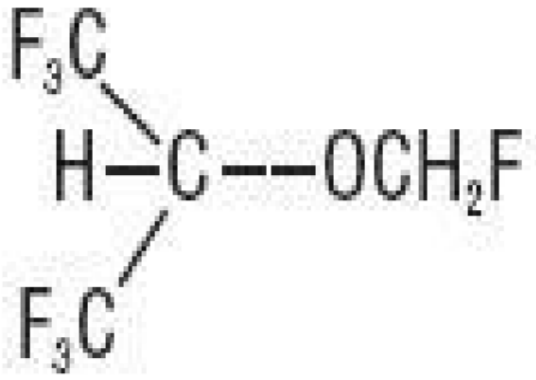
- High cost, low potency, pungency.
- Airway irritability is seen. So, it is unsuitable for inhalational induction.
- Desflurane reacts with the desiccant soda lime and produce carbon monoxide.
- It can cause tachycardia because of sympathetic stimulation[13,14,15].

SEVOFLURANE:

Sevoflurane is a fluorinated methyl isopropyl ether.

CHEMICAL NAME: 2,2,2-trifluoro-1-[trifluoromethyl]-ethyl-fluoromethyl-ether.

Figure4:SEVOFLURANESTRUCTURE



PHYSICAL AND CHEMICAL PROPERTIES:

- The molecular weight of Sevoflurane is 200
- Density is 1.517- 1.522g/cm^3 at 20ºC
- Boils at 58.5ºC.
- It has a vapour pressure of 170mm Hg at 20ºC.
- It is a sweet-smelling agent.
- Minimum alveolar concentration (MAC) of 1.8.
- Low blood-gas partition co-efficient of 0.69.

- Oil-gas partition coefficient of 55.

- It has a sweet smell which makes it the agent of choice for inhalational induction.

PHARMACOKINETICS:

Sevoflurane is a low soluble inhalational anaesthetic agent with Blood:gas partition coefficient of 0.69 and Brain blood partition coefficient of 1.7 causing rapid induction and recovery

Its distribution follows 5 compartmental model consists of lungs,vessel rich organs group (brain,liver) and muscle rich group (muscle and skin), fat group and vessel poor group(bone,cartilage)

Sevoflurane is eliminated 95% unchanged through lungs and 5% undergoes hepatic metabolism. Hepatic metabolism results in the formation of inorganic fluorides and is rapidly excreted by kidneys.

PHARMACODYNAMICS OF SEVOFLURANE:

CNS EFFECTS:

Sevoflurane is the least cerebral vasodilating agent and preserves autoregulation upto 2 MAC.

Cerebral blood flow(CBF) increases with sevoflurane to 11.5 ml/100 gms/dl which is less than other volatile anaesthetics except isoflurane.

$CMRO_2$ is reduced and causes slight increase in Intracranial tension.

CVS EFFECTS:

It causes dose dependent fall in systemic vascular resistance and it decreases myocardial contractility therefore fall in Blood pressure.

It has myocardial protectivity by causing coronary vasodilation.

RESPIRATORY EFFECTS:

It causes dose dependent decrease in tidal volume and causes rapid shallow breathing.

It can cause increase in $Paco_2$.

It has bronchodilator effects and it has sweet odour making it's a agent of choice for inhalational induction.

HEPATIC EFFECTS:

It has very little effect on hepatic blood flow.

RENAL EFFECTS:

It causes decrease in Renal blood flow,Glomerular filtration rate and urine output.

It reacts with sodalime and baralime and compound A is produced.

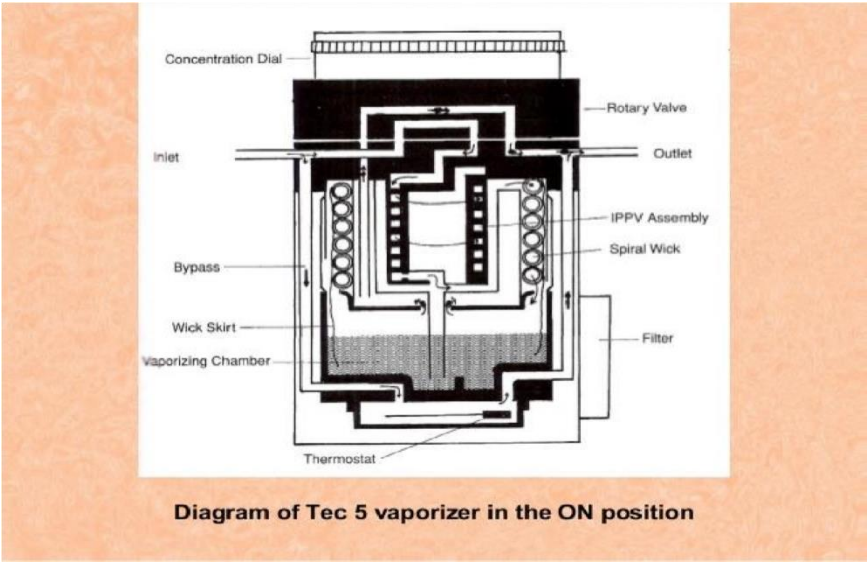
Compound A may be nephrotoxic particularly at low fresh gas flows however it is not proved in Humans.

Figure 5: SEVOFLURANE VAPOURISER

Sevoflurane vaporiser is a variable bypass vaporisers.

It works by controlling rate of vaporisation of agents from liquid and then accurately controlling the amount of vapour to be added to the fresh gas flow.

Figure 6: VARIABLE BYPASS VAPORISER



LIMITATIONS

- Sevoflurane after prolonged exposure especially in low fresh gas flows reacts with soda lime components and produces Compound A and fluoride by-products which are potentially toxic.
- Accumulation of Compound A and fluoride causes nephrotoxicity in rats but, this is not proven to be toxic in humans.
- >800ppm is clinically significant amount to cause nephrotoxicity.
- Minimum fresh gas flow of 2l/min is required[13,14].

NITROUS OXIDE:

- CHEMICAL NAME: Dinitrogen monoxide
- The molecular weight of Nitrous oxide is 44g.

PHYSICAL AND CHEMICAL PROPERTIES:

- Density is 1.517- 1.522g/cm3 at 20ºC
- Boiling Point: -88°C
- Critical temperature is 36.5ºC.
- Minimum alveolar concentration (MAC) of 105.
- Low blood-gas partition co-efficient of 0.47.
- Oil-gas partition coefficient of 1.4.
- Liquefying Pressure (36.5°C): 74 bar / 72 bar
- Vapour Pressure (20°C): 52 bar 39,000 mmHg
- Normal Cylinder Pressure: 52 bar

GENERAL CHARACTERISTICS:

- N_2O is a colourless gas, without odour or taste
- Steel cylinders are used for their storage, they are present in the liquid state.
- The normal filling ratio = 0.65

- The gas is neither inflammable, nor explosive
- Rapidly and predominantly eliminated unchanged through the lungs

- PHARMACOKINETICS:

  It is least potent of all anaesthetic agents with Blood:Gas partition coefficient of 0.46 and Blood:brain partition coefficient of 1.3

  Brain concentration occurs by displacement of N_2 by N_2O usually in 3 to 5 minutes

  Tissue with greater blood flow receive greater amounts of N_2O and poor blood supply absorb small amounts

  Absorption slows down once primary saturation is achieved

  It has no biotransformation in the body and majority leaves unchanged in 3 to 5 minutes

  1% eliminated via skin and lungs

  PHARMACODYNAMICS OF NITROUS OXIDE:

  CENTRAL NERVOUS SYSTEM:

  Mild depression of cerebral cortex in conjunction with physiological levels of o_2

  Sensations such as sight, hearing, touch are depressed

CARDIOVASCULAR EFFECTS:

No changes in heart rate or cardiac output

Blood pressure remains stable

RESPIRATORY SYSTEM:

N_2O is non irritating to pulmonary epithelium

Change in rate and depth of respiration are more likely due to anxiolytic effects

HEPATIC SYSTEM:

No significant effects

HEMATOPOIETIC SYSTEM:

Long term exposure can produce transient bone marrow depression

Peripheral neuropathy can be produced due to its ability to inactivate vitamin B 12[13,14].

ADVANTAGES

- It has a very rapid onset because of low blood gas solubility.
- It is a non-inflammable, non-explosive

- Potent analgesic

DISADVANTAGES

- It is a weak anaesthetic agent with muscle relaxation effect
- It leads to Diffusion hypoxia.
- It causes expansion of air containing cavities
- Megaloblastic marrow changes.
- Demyelination of the cord leading to peripheral neuropathy.

MECHANISM OF ACTION OF VOLATILE ANAESTHETICS

Though inhalational (volatile) anaesthetics has been used extensively,its mechanism of action is still not fully known. The inhalational anaesthetic agents mainly produce its effects (analgesia, amnesia, immobility) by their action on membrane proteins of neuronal membrane[14].

Various theories have been postulated:

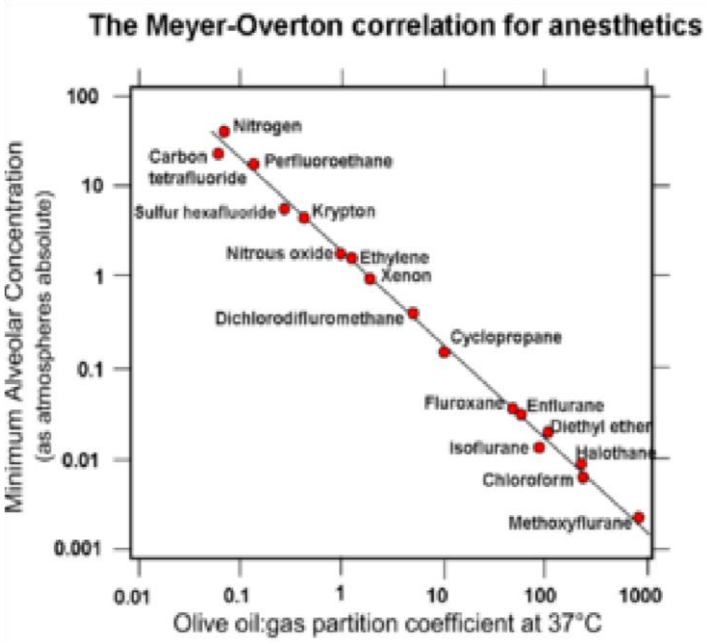
1. Meyer overton correlation:Lipid solubility_Anaesthetic potency
2. Critical Volume Hypothesis
3. Modern lipid hypothesis
4. Membrane protein hypothesis
5. Various other mediators of Anaesthetic action

1. **MEYER OVERTON CORRELATION: LIPID SOLUBILITY - ANAESTHETIC POTENCY:**

This theory suggested that potency of volatile anaesthetics depends on solubility in olive oil and states that lipids are the prime targets of their anaesthetic action.

The potency of the drug is directly proportional to their lipid solubility.

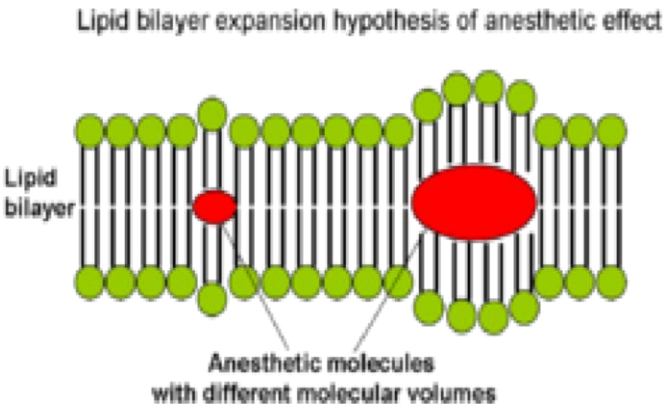
Figure 7: MEYER-OVERTON CORRELATION



2.CRITICAL VOLUME HYPOTHESIS:

In 1973, Miller and Smith proposed a Lipid bilayer expansion. They postulated that inhalational anaesthetic molecules can accumulate inside neuronal lipid bilayer membrane causing distortion and expansion . These agents reversibly alters the function of ion channels in membrane. The anaesthetic effect is directly proportional to more space within the membrane.

Figure 8: CRICTICAL VOLUME HYPOTHESIS

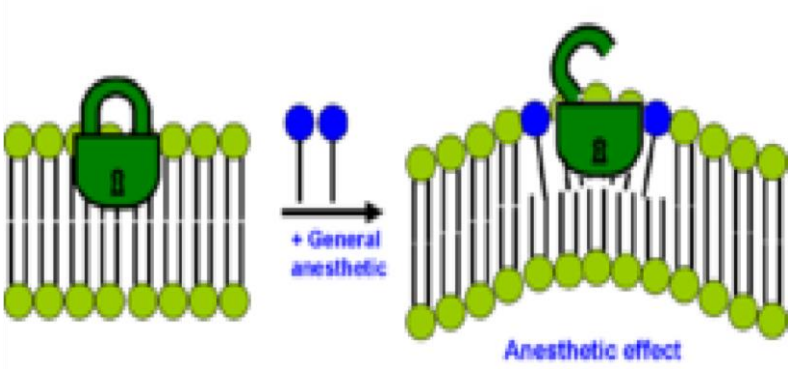


3.MODERN LIPID HYPOTHESIS:

Anaesthetic action is caused by solubilization of inhalational anaesthetic in lipid bilayer and lateral pressures redistribution.

Any change in the lateral pressure shifts the conformational equilibrium of membrane proteins called ligand-gated ion channels. It causes the positional and orientational distribution of its segments and bonds within the bilayer.

Figure 9: MODERN LIPID HYPOTHESIS

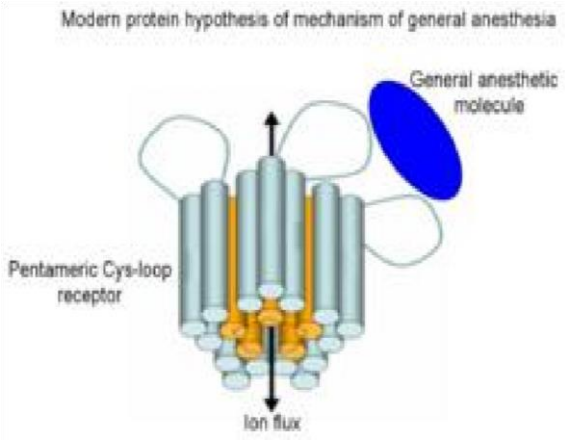


4.MEMBRANE PROTEIN HYPOTHESIS:

They found **Luciferases and the other one cytochrome P450** that are two protein groups in cell membrane which are inactivated by inhalational anaesthetic. They alter functions of signalling cytoplasmic proteins that are like protein kinase C.

They bind directly only to small number of targets in CNS mostly ligand (neurotransmitter) - gated ion channels - Cys-loop receptors. They are the possible targets of general anaesthetics that bind at the interface between the subunits.

Figure 10: MEMEBRANE PROTEIN HYPOTHESIS



5 .POTENTIAL MEDIATORS OF ANAESTHETIC ACTION:

It acts via Ionotropic(ligand gated) and Metabotropic (G protein)receptors. Binding of neurotransmitter(Acetylcholine) to metabotropic receptor causes activation of Guanosine triphosphate binding proteins (G proteins)* associated with these receptors and therefore G proteins acts as secondary messenger to activate other signaling molecules such as protein kinases ,potassium or calcium.

Glycine, a major inhibitory neurotransmitter found in the spinal cord is the major mediator and is found responsible for immobility caused by inhalational anaesthetics.

- NMDA blockade causes decrease in Glutamate in brain.
- TREK and TASK-3 are two pore potassium receptors that maintains the resting membrane potential of cell. The actions are mediated in these two receptors and action mediation is agent specific. TASK-3 plays a major role in maintaining the EEG oscillations under general anaesthesia.
- Voltage gated sodium channels are actually modulated rather than being blocked, to inhibit Glutamate release.
- Hyperpolarisation- Activated cyclic nucleotide (HCN) gated channels in motor neurons are affected to produce anaesthetic immobility[15].

PHARMACOKINETICS OF INHALED ANAESTHETICS

The pharmacokinetics is the

- Absorption or uptake of volatile from alveoli into pulmonary capillaries
- Distribution within the blood
- Metabolism in liver, kidney and lungs
- Elimination from lungs
- The pharmacokinetics of inhalational anaesthetics differs in Geriatric population due to decreased lean body mass, impaired alveolar exchange and apparent volume of distribution being in higher range.

- CNS, the target site of action of inhalational anaesthetics depends on partial pressure gradient at various levels whose main aim is to achieve adequate and constant partial pressure in brain.

- The alveolar partial pressure depends on arterial partial pressure which in turn equilibrates with partial pressure of brain.

    - P_A (Alveolar concentration) and in Brain P_{BRAIN} is important to maintain the optimal and constant depth of anaesthesia that further depends on factors influencing delivered anaesthetic concentration.

DETERMINANTS OF ALVEOLAR PARTIAL PRESSURE

1. TRANSFER FROM ANAESTHETIC MACHINE TO LUNG ALVEOLI:

Inspired partial pressure

The greater the initial inspired pressure the greater is the inhalational induction . After equilibration however the uptake decreases, then $P_{i\{inspired\ pressure\}}$ has to be adjusted according to decreased uptake.

- **Concentration effect:** It states that "inspired partial pressure influences the alveolar partial pressure of a volatile anaesthetic ".

- **Second gas effect:** This effect reflects the ability of high volume uptake of one gas (first gas) to accelerate the rate of increase of the P_A of a concurrently administered companion gas(second gas). This principle is seen in Nitrous oxide. Nitrous oxide auguments the uptake of volatile anaesthetics and oxygen.

Alveolar Ventilation:

Increased alveolar ventilation promotes the input of inhalational anaesthetics to offset uptake which results in rapid increase in $P_{A\ (alvbeolar)}$ toward the $P_{i(inspired)}$ and thus fast induction of anaesthetics.

a) The larger the alveolar minute ventilation is achieved, the more rapid the rise in alveolar concentration (FA).

b) Hyperventilation decreases the $PaCO_2$ which in turn will decrease Cerebral blood flow

c) Greater the alveolar ventilation equalizes to FRC ratio, more rapid is the rate of increase of $P_{A.}$

- **Spontaneous and mechanical ventilation:** When a high Pi is administered**,** Inhalational anaesthetics influence their own uptake by dose-dependent effects on alveolar ventilation and it acts as protective negative feedback mechanism. This phenomenon seen with patient on spontaneous breathing.

- **Impact of solubility:** Changes in the alveolar ventilation influence the rate of increase of P_A of soluble anaesthetics (halothane, isoflurane) more than a poorly soluble anaesthetics (nitrous oxide, desflurane ,sevoflurane).

Anaesthetic Circuit:

three important determinants,

a) Gas inflow from the anaesthetic machine

b) Volume of the breathing circuit.

Volume of the circuits slows the attainment of P_A. This can be eliminated by using higher flow rates.

c) Solubility of the agent: Solubility of the agent slows the rate at which P_A increases, and also the rate at which the P_A decreases

2. <u>SOLUBILITY:</u>

Partition coefficients reflects the capacity of each phase to accept the anaesthetic agent.

- **Blood:Gas partition coefficients:**
  - The solubility is inversely related to the rate of rise of P_A.
  - Higher the blood: gas partition coefficient, larger the amount of anaesthetic must be dissolved in the blood before equilibration.
  - Increasing the P_i above the required can increase the rate of induction. This is called overpressure.
  - The rapid increase of P_A associated with Nitrous oxide also causes absorption of several litres of nitrous oxide leads to expansion of air-containing spaces

Blood: gas partition coefficients is altered by variations in water,lipid and protein content and hematocrit of whole blood. The solubility of volatile anaesthetics varies with extremes of age[14,16,17].

Table 1: BLOOD: GAS PARTITION COEFFICIENT

Anaesthetic agent	**Blood: gas coefficient at 37 degree C**
Desflurane	**0.42**
Sevoflurane	**0.69**
Nitrous oxide	**0.46**

- **Tissue: Blood partition coefficient:**
  - This determines the uptake of anaesthetic into the tissues.
  - For equilibration between blood and the brain it take three time constant for 95% of change to occur[14,16,17].

Table 2: BRAIN: BLOOD PARTITION COEFFICIENT

Anaesthetic agent	**Brain :blood**	**Time constant**	**Equilibrium**
Desflurane	1.3	3.1	9.3
Sevoflurane	1.7	2.4	7.1
Nitrous oxide	1.1	2	6

Oil: Gas partition coefficient:

- This parallels the anaesthetic requirement and determines the potency of the drug.

MAC can be calculated as 150 divided by the oil: gas coefficient.

3. **Cardiac Output CO:**

- Cardiac output influences uptake by carrying away either more or less anaesthetic.

- Increased cardiac output results in rapid uptake, so rate of increase in P_A is slowed and thus slower induction.

- Conversely, rate of rise of poorly soluble drugs like Nitrous oxide is rapid regardless of the physiological variations in cardiac output.

- Volatile anaesthetics that depress cardiac output exerts a positive feedback.

- **Shunt:**
  - It is valid to assume that arterial and alveolar partial pressure to be identical in the absence of an intracardiac shunt.

  - In the presence of the shunt, the diluting effect of the shunted blood will delay the induction process.

  - Impact of the right to left shunts on the rate of increase in the arterial blood depends on the solubility of the anaesthetic.

- Right to left shunt decreases the rate of rise of P_a of poorly soluble anaesthetic.

- Left to right shunts results in delivery of blood with high partial pressures to the lungs. The effect of left to right shunt offsets the dilutional effects of right to left shunts.

- **Alveoli to Venous Pressure Difference**

- This represents tissue uptake of the inhaled agent.
- The same factors which influence the uptake by the blood from the lungs also influences the uptake by the tissues from the blood.

- There is initially a rapid uptake of agents in the vessel-rich group, however after three time constants, there is a significant decrease in the tissue uptake reflecting the narrow inspired to alveolar partial pressure difference.

- vessel rich group **VRG** - brain, heart, kidney & liver
- the muscle group **MG** - muscle & skin
- the fat group **FG** - large capacity/minimal flow
- vessel poor group **VPG** - bone, cartilage & CT

4. <u>METABOLISM</u>:

Inhaled anaesthetics leave the body unchanged through the lungs.

Recovery from an inhalational anesthetic

It is the reverse process of the anaesthetic induction:

a) The rate of fall in brain concentration should be rapid for a agents that are not highly soluble in brain[44] P_{BRAIN} .

b) Return of consciousness occurs when the P_{BRAIN} drops below MAC-Awake

c) Even after prolonged anaesthetic, skeletal muscles probably and fat almost certainly will not have equilibrated with the P_A of the anaesthetic.

d) Recovery is prolonged in proportion to the duration of surgery for soluble anaesthetics.

e) Anaesthetic absorbed into the components of the breathing system will retard the rate of decrease in the P_A of the anaesthetics[17,18].

MINIMAL ALVEOLAR CONCENTRATION(MAC):

MAC of inhalational anaesthetics is defined as concentration at 1 atmosphere that prevents skeletal muscle movements in response to supramaximal painful stimulus(surgical skin incision) in 50% of patients[10].

MAC is an anaesthetics 50% Effective dose(ED 50%)

MAC $_{awake}$:

It is the concentration of anaesthetics that prevents consciousness in 50% of patients, is reliably about half of MAC.

MAC $_{memory}$:

It is the concentration of anaesthetics that is associated with amnesia in 50% of patients and it is significantly less than MAC awake.

MAC $_{bar}$:

It is the concentration of anaesthesia that blocks autonomic response to surgical incision in 50% of patients.

MAC $_{intubation:}$ MAC that would inhibit movement and coughing during endotracheal intubation[18,19].

FACTORS AFFECTING MAC:

Increase in MAC:

- Hyperthermia
- Hypernatremia
- Drugs increasing catecholamine secretion
- Cyclosporine

Decrease in MAC:

- Hypothermia
- Increasing age
- Drugs decreasing catecholamines secretion.
- Acute alcohol ingestion
- Alpha 2 agonist
- Neuraxial opioids
- Hyponatremia

No change in MAC:

- Chronic alcohol abuse
- Gender
- Duration of anaesthesia
- Thyroid gland dysfunction
- Hyperkalemia or Hypokalemia[18,19]

LARYNGEAL MASK AIRWAY

DR.ARCHIE BRAIN discovered LMA in 1983 And in clinical use since 1988 and its playing its important role since then.

Miller classification of LMA :

CUFFED PERILARYNGEAL SEALERS:

Nondirectional sealers:LMA,ILMA,Soft seal ..etc

Directional sealers:PLMA

CUFFED PHARYNGEAL SEALERS:

Without oesophageal sealing:COPA, PAX

With oesophageal sealing:Combitube, LT, LTS,Proseal LMA.

CUFFLESS preshaped sealers:

SLIPA, I_gel, Baska mask.

Proseal LMA types according to weight of the patients.

TABLE 3:PROSEAL LMA SIZE ACCORDING TO WEIGHT

PROSEAL LMA SIZE	**WEIGHT OF THE PATIENT**	**MAXIMUM CUFF INFLATION (in ml)**
2 ½	20 to 30	14
3	30 to 50	20
4	50 to 70	30

Advantages of LMA:

- Less Sympathetic stimulation thereby decreasing stress response associated with ET tube.
- LMA is well tolerated at lighter plane of anaesthesia and do not require any muscle relaxation.
- Incidence of sore throat and other complications associated with intubation are lesser with LMA.
- It is a rescue device in "can't intubate can't ventilate situation ."
- It is used to maintain airway during short elective surgical procedures

Disadvantages:

- It is not a definitive Airway.
- It is not recommended in full stomach patients and patients with reflux disease as it increases the chance of aspiration .However this problem is less common with second generation SAD as it has a separate gastric port for gastric contents[20].

MATERIALS AND METHODS

SOURCE AND SIZE OF SAMPLE:

This study was done on 60 patients undergoing Fibroadenoma excision in The Department of General surgery, Stanley Medical College, Chennai. Based on pilot study sample size was calculated.

INPUT:

Tail(s)	=	2
Effect size d	=	0.74
Alpha error prob	=	0.05
Power (1-beta error prob)	=	0.80
Allocation ratio N2/N1	=	1
Noncentrality parameter delta	=	2.8660077
Critical t	=	2.0017175
Df	=	58
Sample size Group 1	=	30

Sample size Group 2	=	30
Total sample size	=	60
Actual power	=	0.8046348

STUDY DESIGN:

Approval of the Institutional ethical committee was obtained. Randomisation was done by computerized method . It was a prospective comparative single blinded study.

The study was conducted on 60 patients over a period of eight months. Patients were explained about the procedure in detail and informed written consent was obtained.

Inclusion criteria:

- Age 18-50 years
- ASA PS I and II
- Fibroadenoma excision
- Surgery lasting less than one hour
- Under general anaesthesia

Exclusion criteria: Patients with

Age <18 or >50 years

- Obese patients [BMI]
- Uncontrolled diabetes or hypertension.
- MPC 3 and 4

MATERIALS:

The following equipments, drugs and monitors were kept ready for the conduct of anaesthesia.

EQUIPMENTS:

- Anaesthesia work station with ventilator
- Laryngeal mask airway Proseal of size 3,4,5.
- Laryngoscope with all sizes of blades.
- Endotracheal Tubes - 6 mm ID to 7.5 mm ID.
- Oropharyngeal airways
- Oxygen source
- Suction Apparatus
- Desflurane vaporiser
- Sevoflurane vaporiser
- End-tidal carbon dioxide analyser

- Anaesthesia agent gas monitor
- Oxygen analyser
- Bain”s circuit
- Ambu bag

DRUGS:

- Inj. Glycopyrrolate
- Inj. Fentanyl
- Inj. Propofol
- Inj. Ondansetron
- Desflurane
- Sevoflurane

Emergency drugs:

- Inj. Atropine
- Inj. Ephedrine
- Inj. Adrenaline
- Inj. Frusemide
- Inj. Hydrocortisone

- Inj. Nitroglycerine
- Inj. Dopamine
- Inj. Dexamethasone

MONITORS:

- ECG
- Pulse oximeter
- Non-invasive blood pressure
- End -tidal carbon dioxide
- Oxygen analyser
- Anaesthesia gas monitors for Nitrous oxide, Desflurane and Sevoflurane

METHODOLOGY

Pre-anaesthetic assessment was performed and detailed history has been recorded and complete physical assessment was done. Complete blood count, renal function test, blood grouping/typing, random blood sugar, electrocardiograph and chest x-ray were done. Patients not fulfilling the inclusion criteria were excluded from the study.

60 patients in the age group of 18-50 years, ASA PS I-II were randomised by using computerized randomization into 2 groups of 30 each.

GROUP D [Desflurane](n=30)

GROUP S [Sevoflurane] (n=30)

In both the groups patients were asked to fast for 8 hours and nil per oral status was confirmed on the morning of surgery. 18G peripheral venous cannula was inserted and intravenous fluids were administered. All monitors were attached.

Premedication: Inj.glycopyrrolate 0.2mg iv, Inj.fentanyl 1.5mcg/kg iv ,Inj.ondansetron 0.1mg/kg iv given.

Preoxygenation: done with 100% O2 for 3 mins with 6 litres per min.

Induction: Inj. propofol 2.5mg/kg iv and loss of motor response to Jaw thrust was noted and taken as end point for LMA insertion and airway was secured using Proseal LMA ,size chosen according to weight of patient and connected to close

circuit and maintained on Spontaneous ventilation throughout the procedure[22,23].

- GROUP D: Patients assigned to Desflurane groups received Desflurane with nitrous oxide and oxygen mixture in the ratio of 66:33%. Initially flow rates of Nitrous oxide and oxygen were kept at 4:2 litres and dial concentration of Desflurane at 6%. When endtidal concentration of 4% of Desflurane was achieved, flow rate of nitrous oxide:oxygen was reduced to 2:1 litres and dial concentration titrated between 3.5% to 4.5% so that end tidal concentration of Desflurane was maintained at 4%[19].

- GROUP S: Patients assigned to Sevoflurane groups received Sevoflurane with nitrous oxide and oxygen in ratio of 66:33%. Initially flow rate of Nitrous oxide:oxygen was kept at 4:2 litres and dial concentration of Sevoflurane at 2.5%.

When end tidal concentration of sevoflurane of 1.2% was achieved, flow rates of Nitrous oxide:oxygen was reduced to 2:1 litres and dial concentration titrated between 0.8% and 1.4% so that end tidal was maintained at 1.2%[19] .

Following parameters were monitored and documented throughout the procedure:

- The Heart rate ,rhythm and Mean arterial pressure and SPO_2 was continuously monitored at pre induction, post induction, after LMA insertion and at skin incision and at 2 minutes ,5 minutes after that and every 5 minutes till the end of surgery and at 15^{th} minute postoperatively.
- Patients depth and adequacy of spontaneous respiration was monitored by $EtCO_2$, which was maintained between 25 to 35. Once the exhaled volatile anaesthetic concentration was equal to the inhaled concentration and when no further changes were seen, the fresh gas flows were reduced to Nitrous oxide: Oxygen in the ratio of 2:1 l/min[21,23].
- Volatile anaesthetic concentration were adjusted to maintain a exhaled concentration of 4% in Desflurane group and 1.2% in Sevoflurane group. Any decrease in blood pressure with a MAP <60 mmHg was managed with 100ml bolus fluid administration and Ephedrine 6mg i.v bolus[2].
- Primary inhaled anaesthetic agent was maintained at the desired concentration throughout the procedure and was discontinued at the end of last skin suture which was taken as TIME 0.
- From time 0(zero), Time taken for all other parameters were noted.
- Nitrous oxide was discontinued after thorough oral suctioning.
- Time taken to achieve response to Painful stimulus (Response to pressing of knuckles over sternal notch),Verbal commands

(Eye opening response to call of their names) and Spontaneous eye opening were noted as emergence parameters[2,5].

- LMA removed after spontaneous eye opening and after observing gag reflex[22,23].
- Patient were observed for time taken to recall of name and time taken to achieve Post Anaesthesia Recovery Score OF Aldrete and Kroulik >10 (PARS >10), and time taken for LMA removal since time 0. These parameters were noted as recovery parameters.
- Airway adverse effects such as cough, breath holding (apnoeic spells), laryngospasm, desaturation , post operative nausea and vomiting were noted[2,5].
- Patients were observed for immediate post op complications (<30minutes) like nausea, vomiting, pain.

POST ANAESTHESIA RECOVERY SCORE OF ALDRETE AND KROULIK (PARS)[13]

1.Consciousness	Score
Easily arousable, alert	3
Arousable, oriented, not alert	2
Arousable, not oriented	1
Not responding	0
2. Ventilation	
Normal	2
Not perfect but requires no support	1
Airway requires support	0
3.Circulation:Difference in mean Arterial pressure from baseline	
<10%	2
10-20%	1
>20%	0
4.Respiratory stability	
Able to breathe deeply	2
Tachypnoea with good cough	1
Dyspnoeic with weak cough	0
5.Count down test(backward from 10 to 0)	
Succeed right away	2
Succeed in 30 secs	1
Fail in 30 secs	0

AIRWAY ADVERSE EFFECTS SCORE [Veg N,Wall described scale][24]

1. COUGH:

No cough	0
1 or 2 cough with SPO2 >95%	1
3 multiple cough with SPO2 <95%	2
4 multiple cough with SPO2 <95% with IV medication required	3

2.BREATH HOLDING:(APNOEIC SPELLS)

No breath holding	0
No breath holding occurred for 10-20 seconds	1
No breath holding occurred for 20-30 seconds	2
Breath holding occurred exceeding 30 seconds	3

3.LARYNGOSPASM:

No evidence of stridor or phonation	0
If evidence of stridor or phonation occurs <15 seconds or no therapy other than ppv	1
If evidence of stridor or phonation occurs >15 seconds	2
If evidence of stridor or phonation occurs >15 seconds requiring IV medication	3

OBSERVATION AND RESULTS

The collected data were analysed with IBM.SPSS statistics software 23.0 Version to describe about the data descriptive statistics frequency analysis, percentage analysis were used for categorical variables and the mean & S.D were used for continuous variables. To find the significant difference between the bivariate samples in Independent groups the Unpaired sample t-test was used. To find the significance in categorical data Chi-Square test was used. In both the above statistical tools the probability value 0.05 is considered as significant level.

P - Value ** Highly Significant at P ≤ .01

P - Value * Significant at 0.01 < P ≤ .05

P -Value # No Significant at P >.05

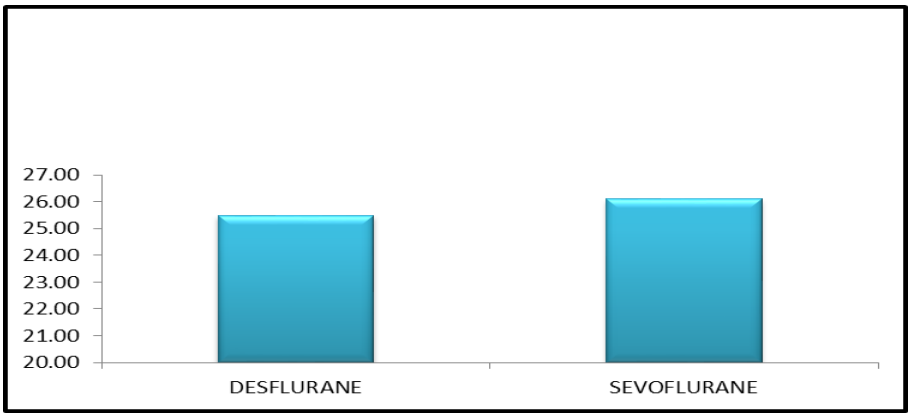
AGE DISTRIBUTION:

Table 4: AGE DISTRIBUTION

GROUP	**MEAN** (Years)	**STD. DEVIATION**	**STD. ERROR MEAN**	**p VALUE**
Desflurane	25.50	5.661	1.034	0.438 **(NIL SIGNIFICANCE)**
Sevoflurane	26.10	5.548	1.013	

The mean age of patients was 25.50 years in Desflurane group and 26.10 years in Sevoflurane group. The p-value was 0.438 which was not significant. The two groups were standardized with respect to age of patients.

FIGURE:11 AGE DISTRIBUTION



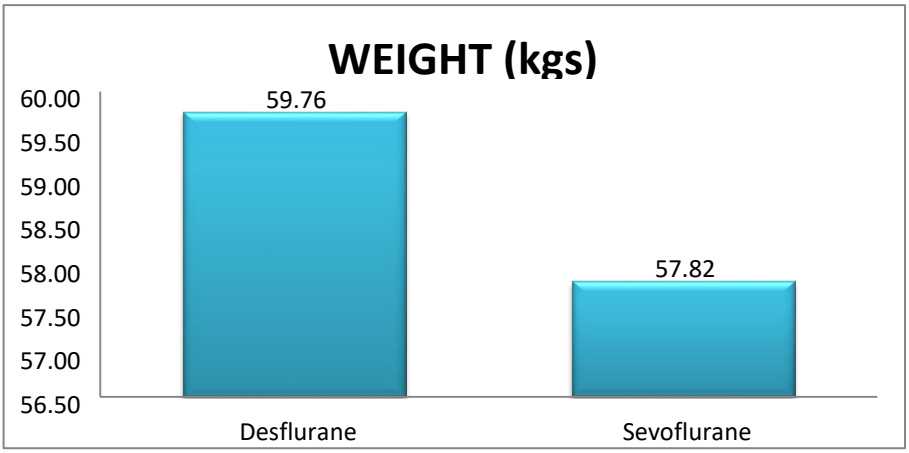
WEIGHT DISTRIBUTION:

Table 5: WEIGHT DISTRIBUTION

GROUP	MEAN(kg)	STD. DEVIATION	STD ERROR	P VALUE
Desflurane	59.76	6.702	0.948	0.130 **(NIL SIGNIFICANCE)**
Sevoflurane	57.82	5.985	0.846	

The mean weight of patients in Desflurane group was 59.76 kg and in Sevoflurane group it was 57.82 kg. The two groups were standardized with respect to weight .

Figure12:WEIGHT DISTRIBUTION



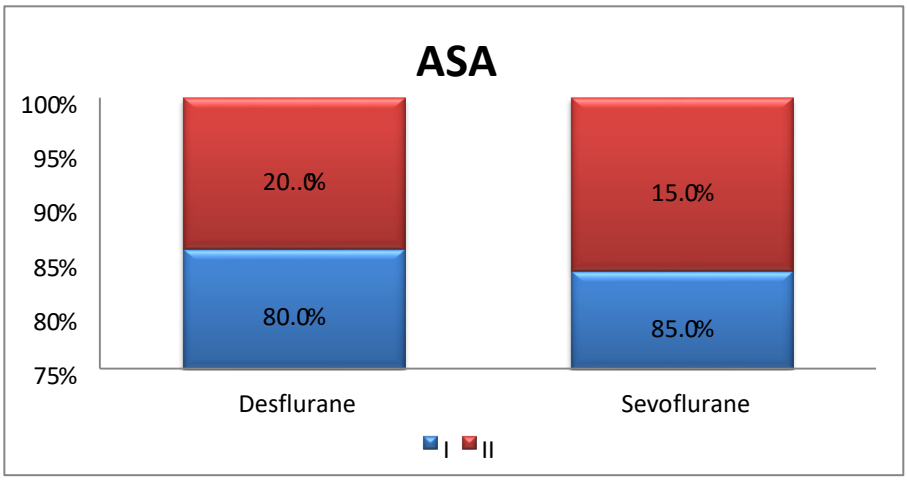
ASA PS DISTRIBUTION

24 patients in Desflurane group and 27 patients in Sevoflurane group belonged to ASA PSI status and 6 patients in Desflurane group and 3 patients in Sevoflurane group belonged to ASA PS II status. ASA PS status was standardized between two groups as p value was 0.779 which was not significant.

Table 6: ASA PS DISTRIBUTION

American society of anaesthesiologist :Physical status		**GROUP**		**TOTAL**
		Desflurane	**Sevoflurane**	
	I	24	27	51
	%within group	80.0%	90.0%	85.0%
	II	6	3	9
	% within group	20.0%	10.0%	15.0%
Total		30	30	60
	% within group	100.0%	100.0%	100.0%(**NIL SIGNIFICANCE)**

Figure13:ASA PS DISTRIBUTION



TIME TAKEN TO ACHIEVE DESIRED END TIDAL CONCENTRATION.

TABLE 7: TIME TAKEN TO ACHIEVE DESIRED END TIDAL CONCENTRATION.

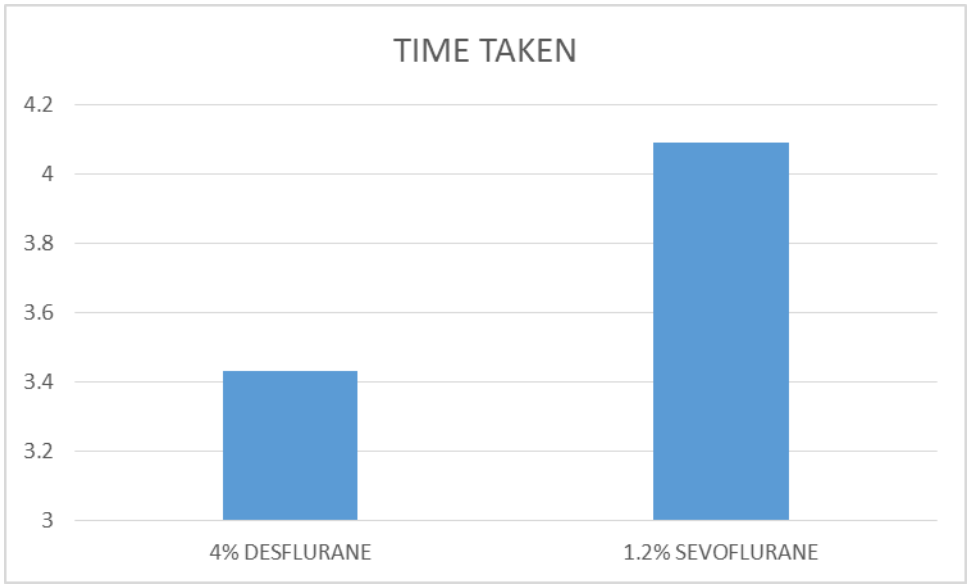
DESIRED END TIDAL CONCENTRATION	MEAN TIME TAKEN (MINUTES)	P VALUE
4% DESFLURANE	3.431	0.156 (NOT SIGNIFICANT)
1.2% SEVOFLURANE	4.09	

In group D the mean time taken to achieve 4% Desflurane end tidal concentration was 3.431minutes.

In group S the mean time taken to achieve 1.2% sevoflurane end tidal concentration was 4.09 minutes.

On statistical analysis, p value was 0.156 which is not significant. Hence the two groups were comparable.

FIGURE 14: TIME TAKEN TO ACHIEVE DESIRED END TIDAL CONCENTRATION.



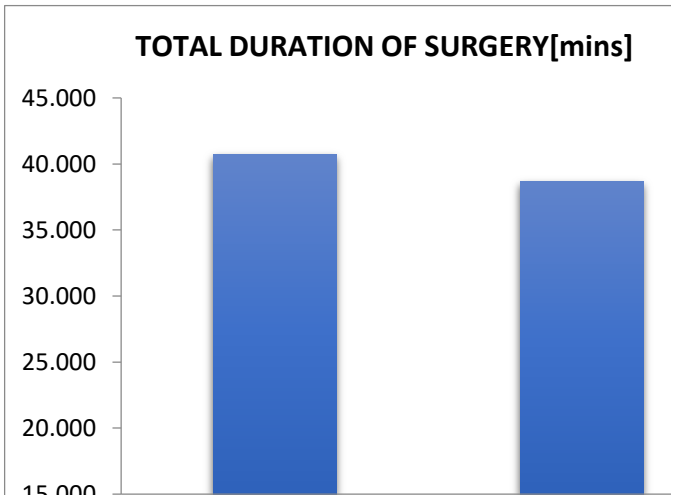
TOTAL DURATION OF SURGERY (minutes)

Table 8: TOTAL DURATION OF SURGERY (minutes)

GROUP	MEAN (minutes)	STD DEVIATION	STD ERROR	P VALUE	
Desflurane	40.70	5.5965	1.0218	0.207 (NIL SIGNIFICANCE)	
Sevoflurane	38.77	6.5028	1.1872		

The mean total duration of surgery in Desflurane group was 40.70 minutes and in the Sevoflurane group it was 38.70 minutes. On analysing this, the p value was 0.207 which was not significant. Hence the two groups were comparable with respect to duration of surgery .

FIGURE 15: TOTAL DURATION OF SURGERY



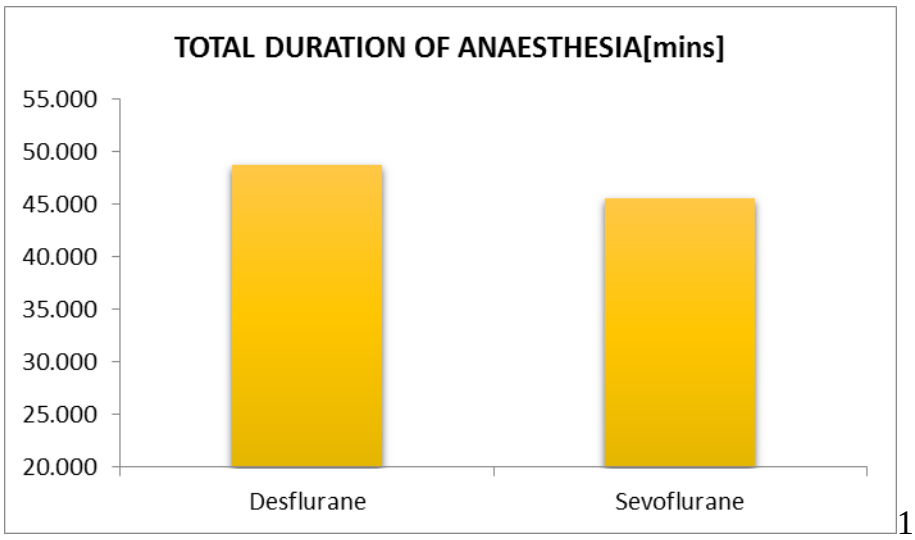
TOTAL DURATION OF ANAESTHESIA (minutes)

Table 9: TOTAL DURATION OF ANAESTHESIA

GROUP	MEAN (minutes)	STD DEVIATION	STD ERROR	P VALUE
Desflurane	48.67	5.9904	1.0937	0.174
Sevoflurane	45.55	10.8449	1.9800	**(NIL SIGNIFICANCE)**

The mean total duration of anaesthesia in Desflurane group was 48.667 minutes and in the Sevoflurane group it was 45.552 minutes. On analysing this, the p value was 0.174 which was not significant and were comparable in both the groups.

Figure 15: TOTAL DURATION OF ANAESTHESIA



1

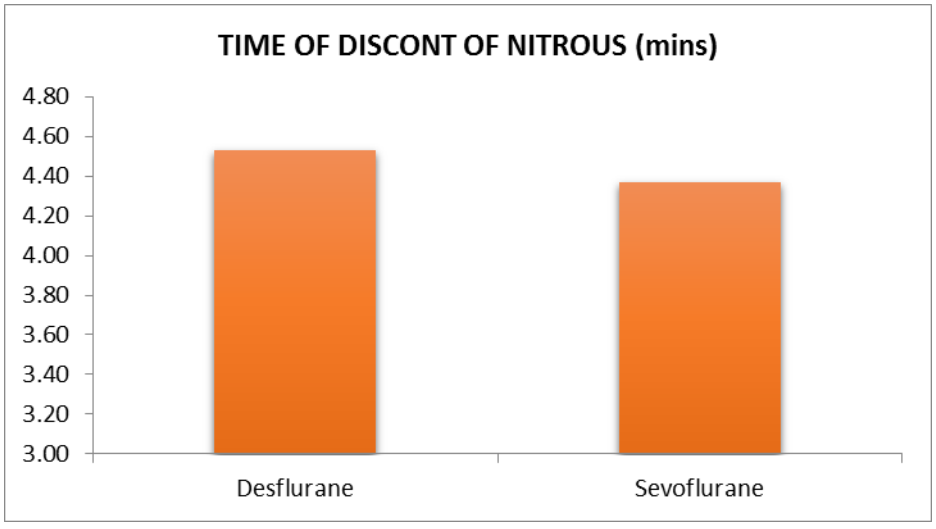
TIME TAKEN FOR DISCONTINUATION OF NITROUS OXIDE (minutes)

Table 10: TIME TAKEN FOR DISCONTINUATION OF NITROUS OXIDE:

GROUP	MEAN (minutes)	STD DEVIATION	STD ERROR	P VALUE
Desflurane	4.53	1.167	0.213	0.581
Sevoflurane	4.37	1.159	0.212	**(NIL SIGNIFICANCE)**

The mean duration of discontinuation of Nitrous oxide following discontinuation of the primary anaesthetic agent was 4.53 minutes in Desflurane group and 4.37 minutes in Sevoflurane group which is statistically significant as p value was 0.581

FIGURE 17:TIME TAKEN FOR DISCONTINUATION OF NITROUS OXIDE



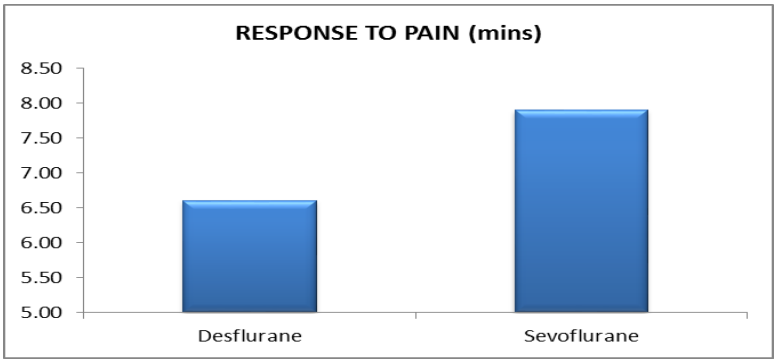
TIME TAKEN FOR RESPONSE TO PAINFUL STIMULUS:

Table 11: TIME TAKEN FOR RESPONSE TO PAINFUL STIMULUS (minutes)

GROUP	MEAN (minutes)	STD DEVIATION	STD ERROR	P VALUE
Desflurane	6.37	1.303	0.238	0.02
Sevoflurane	7.90	1.129	0.206	(SIGNIFICANCT)

The mean time taken for the patient to respond to painful stimulus following discontinuation of primary inhalational agent was 6.37 minutes and 7.90 minutes in Desflurane and Sevoflurane group respectively. On statistically analyzing the data, p value was 0.02, hence statistically significant. The time taken for the response to painful stimuli was longer with sevoflurane when compared with Desflurane.

Figure 18: TIME TAKEN FOR RESPONSE TO PAINFUL STIMULUS



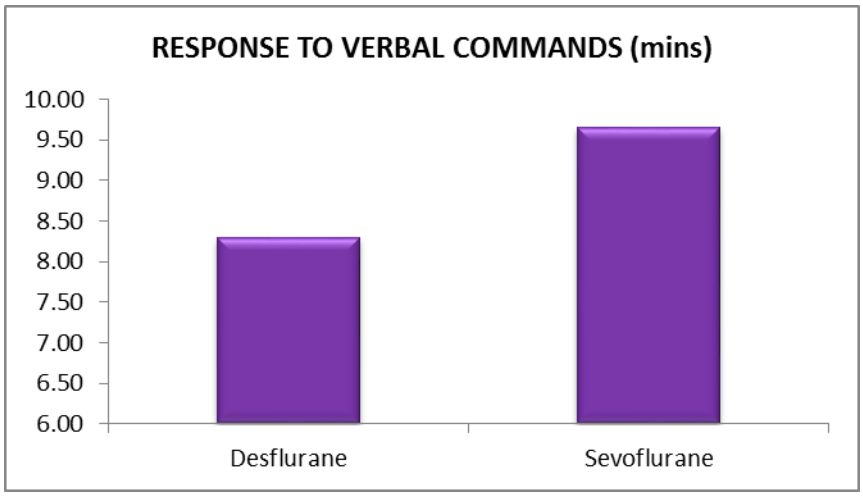
RESPONSE TO VERBAL COMMANDS (minutes)

Table 12: TIME TAKEN FOR RESPONSE TO VERBAL COMMANDS

GROUP	MEAN (minutes)	STD DEVIATION	STD ERROR	P VALUE
Desflurane	8.30	1.022	0.187	0.003
Sevoflurane	9.67	0.844	0.154	(**SIGNIFICANT)**

The mean time taken to respond to vocal commands was 8.30 minutes and 9.67 minutes in Desflurane and Sevoflurane group. The difference was statistically significant with Sevoflurane group taking longer time to respond to verbal commands.

Figure 19: TIME TAKEN FOR RESPONSE TO VERBAL COMMANDS



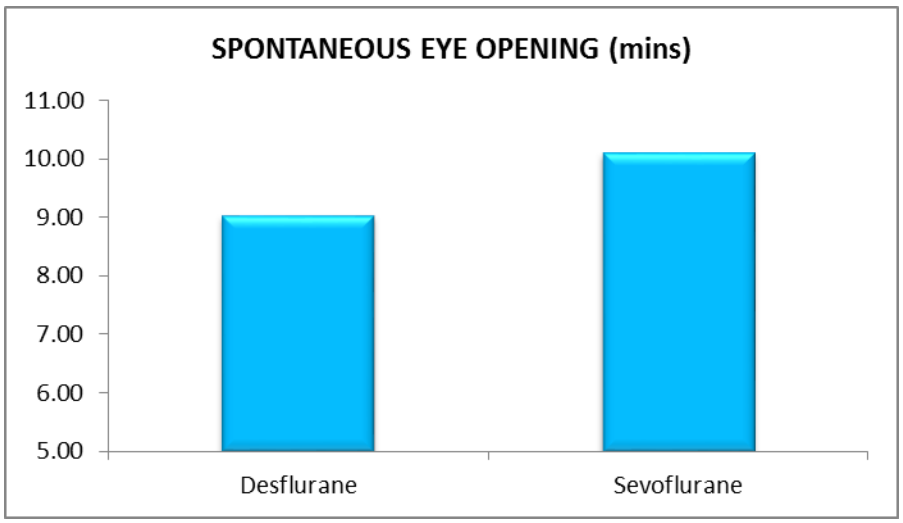
SPONTANEOUS EYE OPENING (minutes)

Table 13: TIME TAKEN FOR SPONTANEOUS EYE OPENING

GROUP	MEAN (minutes)	STD DEVIATION	STD ERROR	P value
Desflurane	9.03	1.221	0.223	0.028
Sevoflurane	10.10	1.185	0.216	(**SIGNIFICANT**)

There exist a statistical significant difference with the time taken for spontaneous eye opening in both the groups with a mean duration of 9.03 minutes in Desflurane group and 10.10 minutes in Sevoflurane group. The p value was 0.028.

Figure 20: TIME TAKEN FOR SPONTANEOUS EYE OPENING



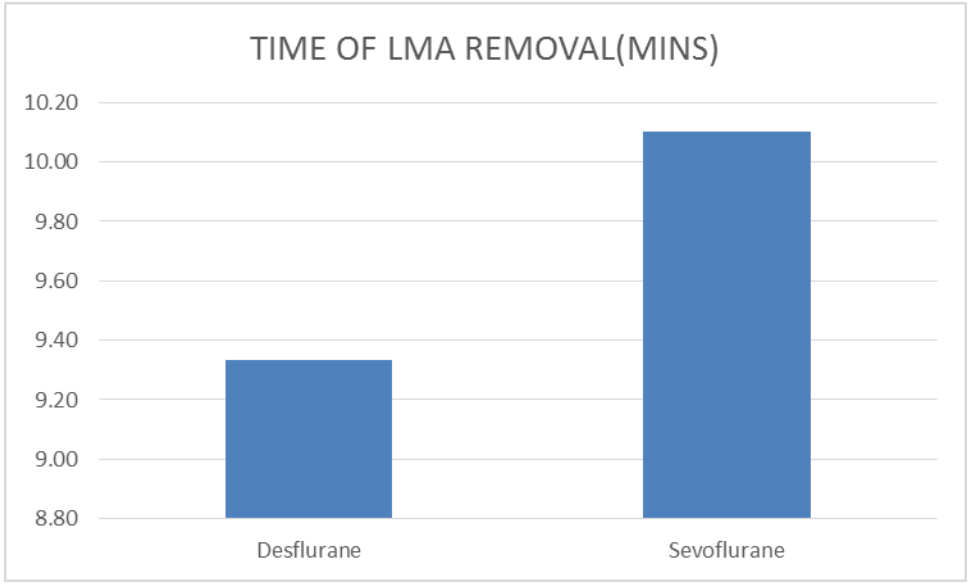
LMA REMOVAL (minutes)

Table 14: TIME TAKEN FOR LMA REMOVAL AFTER VOLATILE DISCONTINUATION (minutes)

GROUP	MEAN (minutes)	STD DEVIATION	STD ERROR	P VALUE
Desflurane	9.3	1.194	0.218	0.034
Sevoflurane	10.10	1.185	0.216	

The time taken for LMA removal in Sevoflurane group was significantly longer when compared to the Desflurane group with a mean time taken for LMA removal being 9.30 minutes and 10.10 minutes in Desflurane and Sevoflurane group respectively.

FIGURE 21: TIME TAKEN FOR LMA REMOVAL AFTER VOLATILE DISCONTINUATION



RECALL OF NAME (minutes)

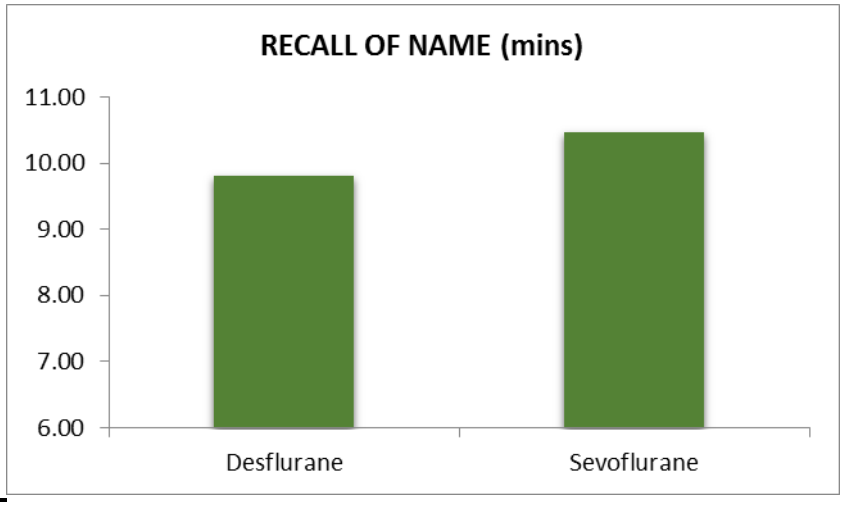
Table 15: TIME TAKEN FOR RECALL OF NAME (minutes)

GROUP	MEAN (minutes)	STD DEVIATION	STD ERROR	P VALUE
Desflurane	10.22	1.148	0.162	0.000 (SIGNIFICANT)
Sevoflurane	12.38	1.338	0.189	

``

The mean time taken to recall their name was prolonged in Sevoflurane group with the duration of 12.38 minutes when compared to Desflurane group which was 10.22 minutes which was statistically significant.

FIGURE 22:TIME TAKEN FOR RECALL OF NAME



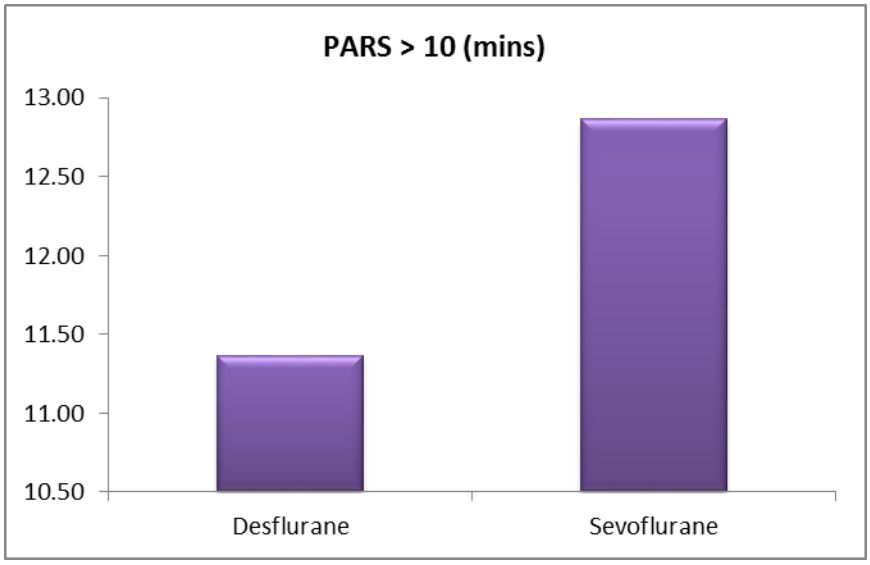
TIME TAKEN FOR POST ANAESTHESIA RECOVERY SCORE OF ALDRETE AND KROULIK(PARS)*>10

Table 16: TIME TAKEN FOR POST- ANAETHESIA RECOVERY SCORE >10 (MINUTES)

GROUPS	MEAN (minutes)	STANDARD DEVIATION	STANDARD ERROR	MEAN
DESFLURANE	11.37	1.671	0.305	0.000
SEVOFLURANE	12.87	1,456	0.266	(**SIGNIFICANT)**

The time taken for post anaesthesia recovery score of Aldrete and kroulik(PARS) score to attain more than 10 was 11.37 minutes and 12.87 minutes in Desflurane and Sevoflurane group respectively. On statistical analysis, the difference was significant, with Desflurane being faster when compared to Sevoflurane**.**

Figure 23: TIME TAKEN FOR POST- ANAETHESIA RECOVERY



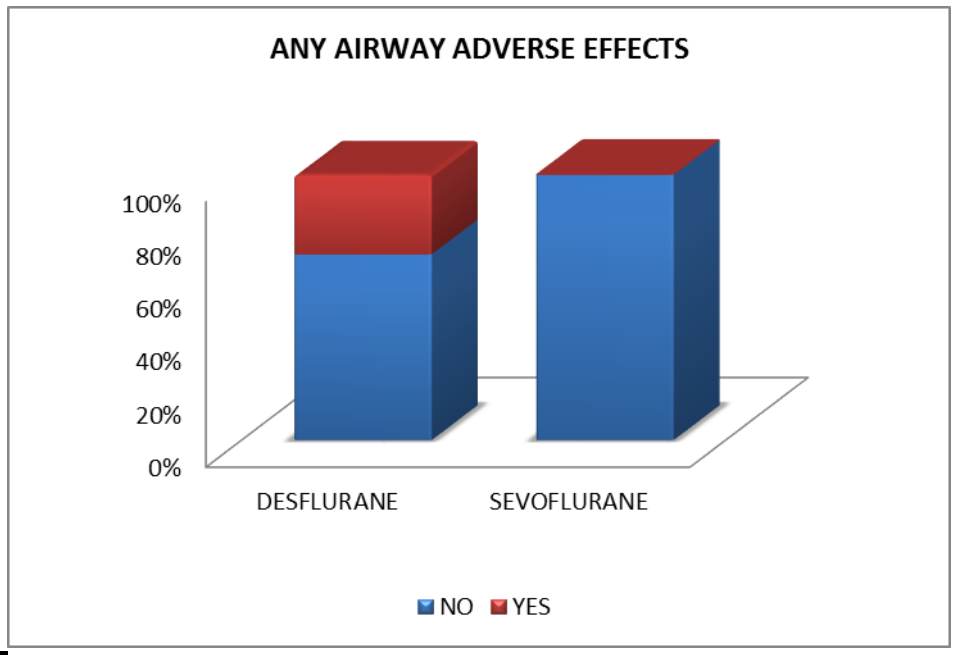
ADVERSE AIRWAY EFFECTS

TABLE 17: TABLE FOR ADVERSE AIRWAY EVENTS

ADVERSE EFFECTS	GROUP D(n=30)	GROUP S(n=30)
COUGH	9	1
LARYNGOSPASM	0	0
APNOEIC SPELLS	0	0
NAUSEA & VOMITING	0	0
OTHERS	0	0

AIRWAY ADVERSE EFFECTS		GROUPS		
		DESFLURANE	SEVOFLURANE	Total
COUGH	Count	9	1	10
	% within GROUPS	30.0%	3.3%	16.7%
LARYNGSPASM	Count	0	0	0
	% within GROUPS	0.0%	0.0%	0.0%
BREATH HOLDING	Count	0	0	0
	% within GROUPS	0.0%	0.0%	0.0%
NAUSEA AND VOMITING	Count	0	0	0
	% within GROUPS	0.0%	0.0%	0.0%
Total	Count	9	1	10
	% within GROUPS	30%	3.3%	16.7%

FIGURE 24:AIRWAY ADVERSE EVENTS

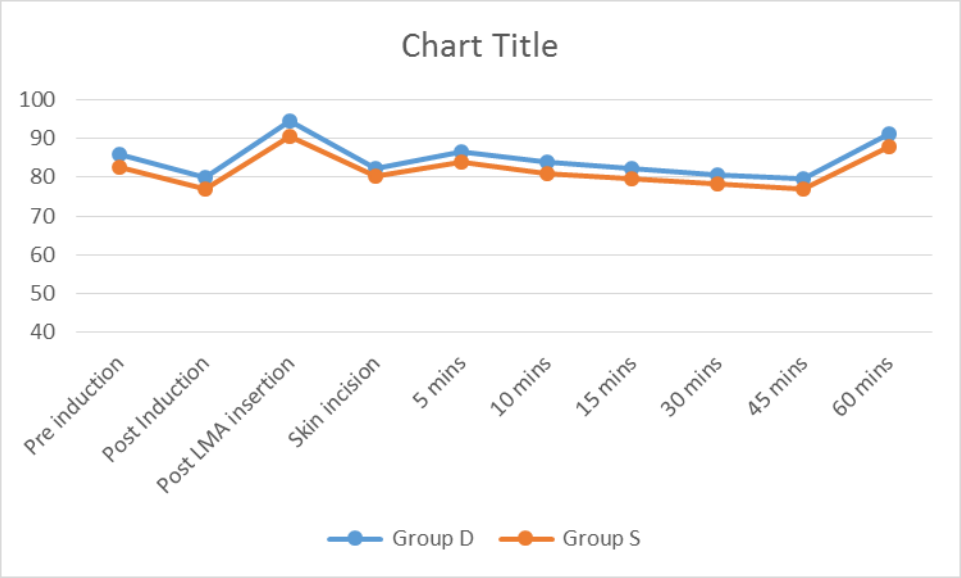


Cough of grade 1 was noted in 9 patients in desflurane group and in 1 patient in sevoflurane group. On statistical analysis p value was 0.04 and hence significant. Other adverse airway events like laryngospasm, apnoeic spells, nausea and vomiting were not noted in both the groups hence they are comparable.

Table 19: INTRA-OPERATIVE HERAT RATE

	GROUP	MEAN	p VALUE
PRE INDUCTION	DESFLURANE	85.53	0.05
	SEVOFLURANE	82.56	
POST INDUCTION	DESFLURANE	79.93	0.06
	SEVOFLURANE	76.9	
POST LMA INSERTION	DESFLURANE	94.4	0.05
	SEVOFLURANE	90.50	
SKIN INCISION	DESFLURANE	82.36	0.06
	SEVOFLURANE	80.4	
5 MINUTES	DESFLURANE	86.4	0.06
	SEVOFLURANE	83.8	
10 MINUTES	DESFLURANE	83.86	0.07
	SEVOFLURANE	81.06	
15 MINUTES	DESFLURANE	82.4	0.05
	SEVOFLURANE	79.6	
30 MINUTES	DESFLURANE	80.6	0.06
	SEVOFLURANE	78.16	
45 MINUTES	DESFLURANE	79.7	0.05
	SEVOFLURANE	76.96	
60 MINUTES	DESFLURANE	91.06	0.06
	SEVOFLURANE	88	

FIGURE 26: INTRA OPERATIVE HEART RATE RANGE



In both the groups, there was fall in heart rate post induction by 15% of baseline value. Post LMA insertion there was increase in heart rate by 10% of baseline value. On statistical analysis, p value was 0.06 which is not significant and hence heart rates were comparable between both the groups.

INTRA-OPERATIVE MEAN ARTERIAL PRESSURE:

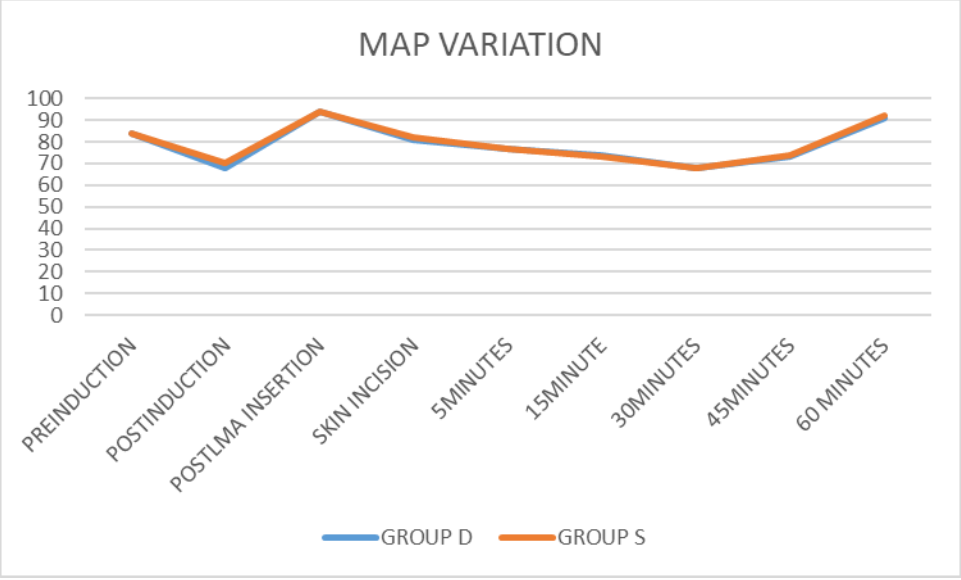
Table 20: INTRA-OPERATIVE MEAN ARTERIAL PRESSURE

TIME	GROUP	MEAN(mmhg)	p value
PRE INDUCTION	DESFLURANE	84	0.23
	SEVOFLURANE	84	
POST INDUCTION	DESFLURANE	68	0.27
	SEVOFLURANE	70	
POST LMA INSERTION	DESFLURANE	94	0.31
	SEVOFLURANE	94	
SKIN INCISION	DESFLURANE	81	0.25
	SEVOFLURANE	82	
5 MINUTES	DESFLURANE	77	0.6
	SEVOFLURANE	77	
15 MINUTES	DESFLURANE	74	0.27
	SEVOFLURANE	73	
30 MINUTES	DESFLURANE	68	0.23
	SEVOFLURANE	68	
45 MINUTES	DESFLURANE	73	0.12
	SEVOFLURANE	74	
45 MINUTES	DESFLURANE	91	0.07
	SEVOFLURANE	92	

In both the groups, there was fall of mean arterial pressure post induction by 15% of baseline value and post LMA insertion there was increase in mean arterial pressure by 10% of baseline value. On statistical analysis p value was not significant and hence mean arterial pressure measurements were comparable between both the groups.

The haemodynamic changes were comparable between both the groups.

Figure 27: INTRA-OPERATIVE MEAN ARTERIAL PRESSURE



DISCUSSION

Fibroadenoma is a benign superficial tumour in the breast commonly found in younger age groups under 30.The benign tumour consists of breast tissue and stromal or connective tissue with or without calcification.It may be single or multiple. Fibroadenoma excision being a superficial surgery it does not require muscle relaxation and at the same time it warrants rapid emergence from anesthesia as it is a short surgical procedure. Management of early recovery without any airway adverse effects and hemodynamic instability is the most important part of a standardized balanced general anaesthesia technique[25].

The newer inhalational anaesthetics allow rapid emergence from anaesthesia because of easy titratability and their low blood: gas partition coefficient. To avoid deep airway manipulation and to avoid muscle relaxation which this surgery does not require, we decided to allow patients in spontaneous respiration throughout the procedure. Therefore we decided to administer General anaesthesia via Proseal LMA with patient in spontaneous ventilation throughout the procedure.

Hence, this study was planned to compare the emergence, recovery profile and Airway adverse effects of Desflurane and Sevoflurane as primary objective and heamodynamic variations as secondary objective. The study was a prospective, randomized comparative observational study.

In our study the sample size was calculated as 60 with a power of 95% and a significance level of 0.05.

60 female patients undergoing Fibroadenoma surgery between the age of 18 and 50 were selected, since the minimum alveolar concentration of the volatile anaesthetics differs in extremes of age. This study was conducted via a closed circuit as **JY Park et al** study showed Closed circuit mode allowed a faster and more reliable induction, lower inhalational anaesthetic consumption and stable haemodynamic and recovery profiles. Patients were included and excluded as per the inclusion and exclusion criteria[12].

On analysing the demographic profile, the distribution of age and weight of the patients in both the groups were comparable. Also, there was no significant difference in the ASA PS status and duration of anaesthesia and surgical duration between the two groups.The time taken to achieve desired endtidal concentration was comparable in both the groups.This was similar to S.cregin et al study[2].

We observed emergence, recovery and airway adverse effects as our primary objectives.The time taken for response to painful stimulus and response to verbal commands and spontaneous eye opening as emergence parameters . In my study the emergence parameters were faster in Desflurane group when compared with Sevoflurane group.

The time taken to recall of name, time taken for LMA removal and time taken to achieve PARS score >10 were considered as recovery parameters.

The mean duration of time taken for response to painful stimulus was 7.90 minutes in Sevoflurane group and 6.37 minutes in Desflurane group. The mean time of time taken for response to verbal stimulus was 9.67 minutes in Sevoflurane group and 8.30 minutes in Desflurane group. The mean duration of time taken for spontaneous eye opening was 9.03 minutes in Sevoflurane group and 10.10 minutes in Desflurane group. This was similar to the **S Gergin et al** study which showed a faster emergence in Desflurane group[2].

Recovery parameters such as Time taken for LMA removal, Recall of name and time taken to achieve PARS score >10 were faster in Desflurane group in comparison with Sevoflurane group and this was statistically significant($p<0.05$).

The mean duration of time taken for response LMA removal was 10.10minutes in Sevoflurane group and 9.3 minutes in Desflurane group. The mean time taken for recall of names was 12.38 minutes in Sevoflurane group and 10.22 minutes in Desflurane group. This was similar to the **S Gergin et al** study which showed a faster recovery in Desflurane group.

Nathanson MH et al also concluded in his study which he performed on 42 women undergoing laproscopic sterilization to compare emergence and recovery of Desflurane and sevoflurane that Desflurane had faster emergence when compared to sevoflurane[5].**McKay RE et al** concluded in their study that the time taken to response to verbal commands was significantly longer with sevoflurane when compared to Desflurane[6.]

The mean duration for PARS >10 was 11.37 minutes and 12.87 minutes in Desflurane and Sevoflurane group respectively. This was similar to **Isik y et al** study which concluded PARS >10 was significantly rapid in and its 11 minutes and 12.5 minutes in Desflurane group and Sevoflurane group[9].

L. E. C. De Baerdemaeker et al conducted a study regarding optimization of Desflurane and Sevoflurane doses in morbidly obese patients using a inhalational bolus technique. In this study they concluded Immediate recovery was significantly faster in the Desflurane group. Similar results were obtained in my study.

Airway adverse effects like cough ,laryngospasm, breath holding are noted. In my study in 9 patients in Desflurane group had bout of cough with SPO2 >95% and only one patient in Sevoflurane group had one bout of cough and this was statistically significant($p<0.05$).Other airway adverse effects were not noted among both groups.

White PF Tang J et al concluded that Desflurane had high incidence of cough during recovery when compared to Sevoflurane .**KLOCK PA Czeslick et al** also

concluded that desflurane has more incidence of cough at 1MAC which was similar to our study.

Haemodynamic variations SUCH AS Heart rate variability and mean arterial pressure were secondary objectives. both the groups, there was fall in heart rate post induction by 15% of baseline value. Post LMA insertion there was increase in heart rate by 10% of baseline value. On statistical analysis, p value was 0.06 which is not significant and hence heart rates were comparable between both the groups.

In both the groups, there was fall of mean arterial pressure post induction by 15% of baseline value and post LMA insertion there was increase in mean arterial pressure by 10% of baseline value. On statistical analysis p value was not significant and hence mean arterial pressure measurements were comparable between both the groups. Haemodynamic variations were comparable between both Desflurane and Sevoflurane groups.

Several studies found no significant difference in haemodynamic changes between Desflurane and Sevoflurane.

The occurrence of immediate postoperative nausea and vomiting (PONV) was noted for 30 minutes. No significant differences were detected in nausea and vomiting. Our study agreed with the **Alex Macario et al** study which also found that there was no significant occurrence of nausea and vomiting[25].

CONCLUSION:

In this randomized comparative study between Desflurane and sevoflurane for Fibroadenoma excision under general anaesthesia with spontaneous respiration , I conclude that Desflurane had rapid emergence and recovery when compared with sevoflurane. However the incidence of cough was significantly higher in Desflurane. Haemodynamic parameters and other adverse airway affects are comparable in both the groups.

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INSTITUTIONAL ETHICAL COMMITTEE,
STANLEY MEDICAL COLLEGE, CHENNAI-1

Title of the Work : A comparative study of Desflurane and sevoflurane in short surgical procedures in Fibroadenoma under spontaneous respiration.

Principal Investigator : Dr. R Prema

Designation : PG MD (Anaesthesiology)

Department : Department of Anaesthesiology
Government Stanley Medical College,
Chennai-01

The request for an approval from the Institutional Ethical Committee (IEC) was considered on the IEC meeting held on 24.02.2017 at the Council Hall, Stanley Medical College, Chennai-1 at 2PM

The members of the Committee, the secretary and the Chairman are pleased to approve the proposed work mentioned above, submitted by the principal investigator.

The Principal investigator and their team are directed to adhere to the guidelines given below:

1. You should inform the IEC in case of changes in study procedure, site investigator investigation or guide or any other changes.
2. You should not deviate from the area of the work for which you applied for ethical clearance.
3. You should inform the IEC immediately, in case of any adverse events or serious adverse reaction.
4. You should abide to the rules and regulation of the institution(s).
5. You should complete the work within the specified period and if any extension of time is required, you should apply for permission again and do the work.
6. You should submit the summary of the work to the ethical committee on completion of the work.

MEMBER SECRETARY, 1/3/17
IEC, SMC, CHENNAI

MEMBER SECRETARY
ETHICAL COMMITTEE,
STANLEY MEDICAL COLLEGE
CHENNAI-600 001.

PROFORMA:

NAME: AGE/SEX: IP NO.:

DATE: Wt.: Ht: GROUP:

DIAGNOSIS:

SURGERY:

CO-MORBID ILLNESS:

INVESTIGATIONS:

Hb: BLOOD UREA: BLOOD GROUP:

BLOOD SUGAR: SERUM CREATININE:

CXR: ECG:

ANESTHESIA DETAILS:

TYPE OF ANAESTHESIA: LMAGA WITH SPONTANEOUS RESPIRATION

ASSESSMENT: ASA I / ASA II

PRE-OP:

HR: BP: SPO2:

CVS: RS:

PREMEDICATION:

INDUCTION:

MAINTENANCE:

INTRA-OP:

TIME	HR	BP	MAP	VOLATILE%	$ET_{VOLATILE}$	ETCO2

- ANY OTHER DRUGS GIVEN:
- T IME TO ACHIEVE DESIRED END TIDAL CONCENTRATION:
- TOTAL DURATION OF ANAESTHESIA
- TOTAL DURATION OF SURGERY:
- TIME OF DISCONTINUATION OF VOLATILE AGENT (TIME 0):
- TIME OF DISCONTINUATION OF NITROUS OXIDE:

RECOVERY TIME FROM THE DISCONTINUATION OF INHALED AGENT (mins):

- RESPONSE TO PAINFUL STIMULUS:
- RESPONSE TO VERBAL COMMANDS:
- SPONTANEOUS EYE OPENING:
- TIME OF LMA REMOVAL:
- RECALL OF NAME
- PARS >10
- ANY AIRWAY ADVERSE EFFECTS:

POSTOPERATIVE COMPLICATIONS (IF ANY):

ஆராய்ச்சியில் பங்கு பெற ஒப்புதல் உறுதிமொழி அளிக்கும் படிவம்

ஆராய்ச்சியின் தலைப்பு

அறுசை சிகிச்சை முடிந்தபின் முழு மயக்கத்திலிருந்து விரைவாக சுய நினைவு திரும்புவதற்கு உகந்த மருந்து டெஸ்ப்லூரேன் (அ) சிவோஃப்லூரேன் இந்த ஆராய்ச்சியைப் பற்றிய முழுவிவரங்களும் என் தாய் மொழியில் தரப்பட்டன. இந்த ஆராய்ச்சியைப் பற்றி முழுமையாக தெரிந்து கொண்டேன். இதில் நான் பங்கு பெறுவதினால் எனக்கு ஏற்படக்கூடிய அசௌகரியங்கள் மற்றும் தன்மைகள் பற்றியும் தெரிந்து கொண்டேன்.

இந்த ஆராய்ச்சியிலிருந்து என் சுய விருப்பப்படி, எந்த நேரமும் விலகிக் கொள்ள முடியும் என்றும், அதனால் இம்மருத்துவமனையில் எனக்கு கிடைக்க வேண்டிய மருத்துவ உதவிகள் அனைத்தும் எந்த பாரபட்சமும் இல்லாமல் தொடர்ந்து கிடைக்கும் என்றும் தெரிந்து கொண்டேன்.

இதில் பங்குபெற எனக்கு எந்தவித சன்மானமும் தரப்பட மாட்டாது என்று புரிந்து கொண்டேன்.

இந்த ஆராய்ச்சியின் முடிவுகள் என்னைப் பற்றிய தனிப்பட்ட தகவல் எதும் தராமல் இருந்தால், மருத்துவம் சார்ந்த பத்திரிக்கைகளில் பிரசுரமாவதற்கு எதிர்ப்பு தெரிவிக்க மாட்டேன்.

இந்த ஆராய்ச்சியில் பங்கு பெற நான் என் செய்ய வேண்டும் என்று தெரிந்து கொண்டேன். அதன்படி முழு ஒத்துழைப்பு கொடுக்க தயராக உள்ளேன்.

பங்குபெறுவோரின் கையொப்பம் **தேதி** **முகவரி**

ஆராய்ச்சியாளரின் கையொப்பம் **தேதி**

தகவல் தாள்

இந்த ஆராய்ச்சியை பற்றிய முக்கியமான தகவல்களை தெரிந்து கொண்டு, இதில் பங்கேற்க உங்கள் சம்மதத்தை தெரிவிக்குமாறு நாங்கள் விடுத்த வேண்டுகோளை ஏற்றுக் கொண்டமைக்கு நன்றி. இந்த ஆராய்ச்சி சம்மந்தமான தகவல்கள், இதில் பங்கு பெறுவதினால் உங்களுக்கு ஏற்படக்கூடிய அசௌகரியங்கள், பாதிப்புகள் மற்றும் நன்மைகள் அனைத்தும் இப்படிவத்தில் கொடுக்கப்பட்டிருக்கின்றன. இதை நீங்களாகவே படித்து தெரிந்து கொள்ளலாம் அல்லது நீங்கள் விருப்பப்பட்டால் நாங்கள் உங்களுக்கு படித்துக் காட்டி புரியும்படி சொல்லுவதற்கு தயாராக இருக்கிறோம். உங்களுக்கு ஏதேனும் புரியவில்ல என்றாலும் அல்லது கூடுதல் தகவல்கள் ஏதேனும் தேவை என்றாலும் நாங்கள் உங்களுக்கு உதவ தாயராக இருக்கிறோம்.

1. இந்த ஆய்வின் நோக்கம் என்ன?

இந்த ஆய்வின் நோக்கம் அறுவை சிகிச்சை முடித்த பின் முழு மயக்கத்திலிருந்து விரைவாக சுய நினைவு திரும்புவதற்கு உகந்த டெஸ்ப்லூரேன் அல்லது சிவோஃப்லூரேன்.

2. இந்த மருத்துவ சோதனையில் யார் பங்கேற்க முடியும்?

இதில் முன்பதிவு செய்து, முழு மயக்கத்துடன் ஃபெஸ் (Fess) அறுவை சிகிச்சை செய்ய வயது 18 முதல் 65 வயது உள்ளவர்கள் பங்கேற்கலாம்

3. இந்த ஆய்வில் யார் பங்கேற்க கூடாது?

அதிகரித்த எடை, நுரையீரல் பாதிப்பு உள்ளவர்கள், சமீபத்தில் மயக்கமருந்து எடுத்துக் கொண்டவர்கள் (7 நாட்களுக்குள்) இரண்டரை மணிக்கு மேல் ஃபெஸ் அறுவை சிகிச்சை ஏற்பட்டால், வெகு நாட்களாக ஒபியாயிடு மருந்து எடுத்துக் கொண்டவர்கள், அவசர அறுவை சிகிச்சை செய்ய வேண்டியவர்கள்.

4. இந்த மருத்துவ சோதனை நடைமுறை என்ன?

இந்த சோதனையை ஏற்றுக் கொண்ட நோயாளிகளை தோராயமாக இரு பிரிவுகளாகப் பிரித்து மேற்கண்ட இரு வெவ்வேறு மருந்துகள் செலுத்தப்படும். 1) டெஸ்ப்லூரேன் என்ற மயக்க மருந்து வைத்து முழு மயக்கம் கொடுக்கப்படும். 2) சிவோப்லூரேன் என்ற மயக்க மருந்து வைத்து முழு மயக்கம் கொடுக்கப்படும்.

5. இந்த செய்முறையின் நன்மைகள் என்ன?

இந்த அறுவை சிகிச்சை முடிந்தபின் மேற்குறிப்பிட்டுள்ள இரு மருந்துகளில் நோயாளியை விரைவாகவும், பூரண நலத்துடனும், சுய நினைவுக்கு கொண்டுவருவது எவை என்பது கண்டறியலாம்.

6. இந்த செயல்முறையின் பின்விளைவுகள் என்ன?

இந்த சோதனையின் வெற்றி நோயாளியின் உடல் நிலை பொருத்துள்ளது.

7. இந்த மருத்துவ சோதனையில் சேருவது கட்டாயமா?

இல்லை. இந்த மருத்துவ சோதனையில் சேருவது உங்கள் விருப்பம். நீங்கள் எந்த நேரத்திலும் இந்த மருத்துவ சோதனையை விட்டுச் செல்ல முடியும்.

8. என்னைப் பற்றிய தகவல் இரகசியமாக இருக்குமா?

ஆம். உங்கள் பெயர் மற்றும் தனிப்பட்ட விவரங்கள் இரகசியமாக இருக்கும்.

9. இந்த ஆராய்ச்சியின் முடிவுகள் எனக்குத் தெரிவிக்கப்படுமா?

RECOVERY CHART

S. NO	DATE	IP NO	NAME	ASA PS	AGE	GROUP	TIME TO ACHIEVE DESIRED END TIDAL CONCENTRATION(MINS)	TOTAL DURATION OF SURGERY [mins]	TOTAL DURATION OF ANAESTHESIA [mins]	TIME OF DISCONT OF NITROUS (mins)	RESPONSE TO PAIN (mins)	RESPONSE TO VERBAL COMMANDS (mins)	SPONTANEOUS EYE OPENING (mins)
1	02/06/2017	1711973	LAKSHMI	I	50	D	3.42	43.00	54.00	4	5	8	8
2	02/11/2017	1705945	NAFEEZA	I	35	S	4.22	44.00	54.00	4	4	9	10
3	15/2/2017	1708016	NITHYA KUMARI	I	48	D	3.58	42.00	56.00	5	5	10	11
4	17/2/2017	17089312	FATHIMA	I	19	S	4.15	45.00	58.00	4	5	9	10
5	22/2/2017	1706269	RAMANI	I	44	D	3.54	35.00	48.00	3	6	8	9
6	03/02/2017	1711377	ZAIRABANU	I	29	S	4.26	40.00	54.00	3	8	9	10
7	25/3/2017	1714397	AROKIYAM	I	43	S	3.47	36.00	46.00	5	7	9	12
8	04/05/2017	1718065	DHANABAKIYAM	I	28	S	4.14	44.00	56.00	5	6	9	10
9	04/06/2017	1718473	JANSIRANI	I	20	D	3.42	44.00	57.00	5	6	9	10
10	04/08/2017	1718309	MEENA	I	22	D	3.28	35.00	44.00	4	5	10	12
11	04/10/2017	567310	SHAMEENA	II	21	D	3.39	46.00	56.00	4	8	9	10
12	18/4/2017	1720026	AMUDHA	I	41	S	4.04	48.00	56.00	7	7	8	10
13	21/4/2017	1722449	AFRINBANU	I	18	D	3.23	53.00	59.00	7	8	8	9
14	22/4/2017	1721515	MANJULA	I	35	S	4.03	45.00	53.00	2	6	8	10
15	22/4/2017	1717286	PAVITHRA	I	17	D	3.41	36.00	42.00	5	8	7	8
16	05/06/2017	1722870	SUMATHI	I	36	S	4.12	44.00	52.00	5	6	8	10
17	05/10/2017	123060	JAYANTHI	I	20	D	3.54	46.00	53.00	6	7	8	9
18	17/5/2017	1715127	LALITHA	I	42	S	4.21	38.00	47.00	5	5	9	10
19	17/5/2017	1715146	VARSHINI	I	19	S	4.08	40.00	48.00	3	6	10	12
20	18/5/2017	1727036	TAMILSELVI	II	17	D	3.49	42.00	51.00	6	6	7	8
21	19/5/2017	1727103	MADHUMATHI	I	20	D	3.54	37.00	46.00	4	7	9	10
22	22/5/2017	1727775	ANANDHI	I	19	S	4.12	41.00	48.00	4	7	8	10
23	23/5/2017	1727264	MYTHILI	I	29	S	4.11	52.00	58.00	3	5	8	10
24	26/5/2017	1728189	VARSHINI	I	19	D	3.52	46.00	53.00	4	6	8	9
25	28/5/2017	1730552	TAMILSELVI	I	27	D	3.47	42.00	50.00	5	4	7	8
26	29/5/2017	1723404	DHARSHINI	II	13	D	3.44	34.00	41.00	2	8	7	8
27	29/5/2017	1708633	DHANALAKSHMI	II	39	S	4.1	39.00	46.00	6	7	9	10
28	06/01/2017	37783	LATHA	I	38	S	4.09	42.00	51.00	4	6	10	12
29	06/01/2017	1729957	DHANALAKSHMI	I	44	D	3.52	37.00	45.00	6	6	8	9
30	06/06/2017	1707810	KARTHIKA	I	24	S	4.21	36.00	44.00	3	8	7	8
31	06/06/2017	1730643	SAROJA	I	50	S	4.18	43.00	49.00	6	7	9	10
32	06/12/2017	1730387	DEEPA	II	20	S	4.16	26.00	32.00	4	7	10	12
33	17/6/2017	1732850	ASAIVENI	I	40	D	3.38	36.00	43.00	5	7	8	9

S. NO	DATE	IP NO	NAME	ASA PS	AGE	GROUP	TIME TO ACHIEVE DESIRED END TIDAL CONCENTRATION(MINS)	TOTAL DURATION OF SURGERY [mins]	TOTAL DURATION OF ANAESTHESIA [mins]	TIME OF DISCONT OF NITROUS (mins)	RESPONSE TO PAIN (mins)	RESPONSE TO VERBAL COMMANDS (mins)	SPONTANEOUS EYE OPENING (mins)
34	29/6/2017	1735197	PAVITHRA	I	21	S	4.14	43.00	51.00	5	7	10	12
35	07/08/2017	1735360	VALLI	II	35	D	3.41	42.00	49.00	5	7	9	10
36	07/12/2017	1726630	GAYATHRI	I	25	S	4.02	38.00	44.00	4	6	8	10
37	18/07/2017	1738834	AKILA	I	19	D	3.44	42.00	49.00	3	9	7	8
38	28/07/2017	1742302	MOHANA	I	29	S	4.11	39.00	46.00	6	5	10	12
39	06/06/2017	1742310	JEYAPRIYA	I	15	D	3.42	44.00	53.00	3	7	6	8
40	06/10/2017	1732008	RANJITHA	I	25	S	4.09	33.00	44.00	4	6	9	10
41	06/12/2017	1732014	RENUGA DEVI	I	19	D	3.37	38.00	46.00	4	6	8	9
42	15/6/2017	1732498	PANTHANAM	I	20	D	3.46	42.00	50.00	4	7	9	10
43	24/6/2017	1732534	MANYAKARASI	I	15	S	4.03	44.00	51.00	5	8	9	10
44	28/6/2017	1735333	NANCY	I	25	S	4.12	36.00	43.00	5	7	9	10
45	07/10/2017	1737881	LALITHA	I	38	D	3.48	47.00	54.00	5	8	8	9
46	19/7/2017	1711902	TAMILRANI	I	30	D	3.49	44.00	52.00	6	6	10	12
47	24/7/2017	1740977	REKHA	II	24	S	4.14	29.00	35.00	3	6	8	10
48	08/03/2017	1741642	SELVI	I	41	D	3.41	52.00	58.00	5	7	9	10
49	14/8/2017	1741750	NIVEDHITA	I	25	S	4.21	44.00	53.00	5	5	7	8
50	14/8/2017	1744041	ASHWINI	I	19	D	3.43	36.00	44.00	3	7	8	8
51	21/8/2017	1747301	JAMUNA	II	38	S	4.11	38.00	46.00	3	5	9	10
52	24/8/2017	1712296	SELVI	I	35	D	3.52	42.00	51.00	3	8	8	9
53	31/8/2017	1745829	BHAVANI	I	37	S	4.18	38.00	45.00	5	5	8	10
54	08/03/2017	1741642	SELVI	II	40	D	3.36	27.00	34.00	4	6	9	10
55	14/8/2017	1742658	NIVEDHA	I	19	D	3.42	34.00	41.00	5	8	8	8
56	24/8/2017	1748218	SELVI	I	30	S	4.06	33.00	40.00	6	8	10	12
57	31/8/2017	1745829	BHARANI	I	34	S	4.13	29.00	36.00	5	7	9	10
58	09/11/2017	1745948	KALA	I	34	D	3.52	36.00	42.00	6	8	9	10
59	13/9/2017	1746014	PARVATHY	I	21	S	4.21	38.00	45.00	3	7	8	10
60	14/9/2017	1746234	SARASWATHY	I	46	S	4.16	40.00	47.00	3	7	10	12

S. NO	DATE	IP NO	NAME	TIME OF LMA REMOVAL (MINS)	RECALL OF NAME (mins)	PARS >10 (mins)	NO OF ATTEMPTS OF LMA INSERTION	ANY AIRWAY ADVERSE EFFECTS	COUGH	SPO2<_95 % IN 5 MINUTES	LARYNGO SPASM	PONV
1	02/06/2017	1711973	LAKSHMI	8	10	11	1	YES	GRADE 1	95%	no	no
2	02/11/2017	1705945	NAFEEZA	10	11	12	1	NO	no	no	no	no
3	15/2/2017	1708016	NITHYA KUMARI	11	11	13	1	YES	GRADE 1	no	no	no
4	17/2/2017	17089312	FATHIMA	10	10	12	1	NO	no	no	no	no
5	22/2/2017	1706269	RAMANI	9	9	10	1	YES	GRADE 1	no	no	no
6	03/02/2017	1711377	ZAIRABANU	10	10	13	2	NO	no	no	no	no
7	25/3/2017	1714397	AROKIYAM	12	13	15	1	NO	no	no	no	no
8	04/05/2017	1718065	DHANABAKIYAM	10	10	13	1	NO	no	no	no	no
9	04/06/2017	1718473	JANSIRANI	10	10	12	1	NO	no	no	no	no
10	04/08/2017	1718309	MEENA	12	13	15	2	YES	GRADE 1	no	no	no
11	04/10/2017	567310	SHAMEENA	10	10	13	1	NO	no	no	no	no
12	18/4/2017	1720026	AMUDHA	10	10	13	1	NO	no	no	no	no
13	21/4/2017	1722449	AFRINBANU	9	9	10	1	NO	no	no	no	no
14	22/4/2017	1721515	MANJULA	10	10	13	2	NO	no	no	no	no
15	22/4/2017	1717286	PAVITHRA	8	9	10	1	YES	GRADE 1	95%	no	no
16	05/06/2017	1722870	SUMATHI	10	10	13	2	NO	no	no	no	no
17	05/10/2017	123060	JAYANTHI	9	9	10	1	NO	no	no	no	no
18	17/5/2017	1715127	LALITHA	10	10	13	1	NO	no	no	no	no
19	17/5/2017	1715146	VARSHINI	12	13	15	1	YES	GRADE1	95%	no	no
20	18/5/2017	1727036	TAMILSELVI	8	9	10	1	YES	GRADE1	no	no	no
21	19/5/2017	1727103	MADHUMATHI	10	10	12	1	NO	no	no	no	no
22	22/5/2017	1727775	ANANDHI	10	10	13	1	NO	no	no	no	no
23	23/5/2017	1727264	MYTHILI	10	10	13	1	NO	no	no	no	no
24	26/5/2017	1728189	VARSHINI	9	9	10	1	NO	no	no	no	no
25	28/5/2017	1730552	TAMILSELVI	8	10	10	2	NO	no	no	no	no
26	29/5/2017	1723404	DHARSHINI	8	9	10	1	NO	no	no	no	no
27	29/5/2017	1708633	DHANALAKSHMI	10	10	12	1	NO	no	no	no	no
28	06/01/2017	37783	LATHA	12	13	15	1	NO	no	no	no	no
29	06/01/2017	1729957	DHANALAKSHMI	9	9	10	1	YES	GRADE1	no	no	no
30	06/06/2017	1707810	KARTHIKA	8	9	10	1	NO	no	no	no	no
31	06/06/2017	1730643	SAROJA	10	10	13	1	NO	no	no	no	no
32	06/12/2017	1730387	DEEPA	12	13	15	1	NO	no	no	no	no
33	17/6/2017	1732850	ASAIVENI	9	9	10	1	NO	no	no	no	no

S. NO	DATE	IP NO	NAME	TIME OF LMA REMOVAL (MINS)	RECALL OF NAME (mins)	PARS >10 (mins)	NO OF ATTEMPTS OF LMA INSERTION	ANY AIRWAY ADVERSE EFFECTS	COUGH	SPO2<_95 % IN 5 MINUTES	LARYNGO SPASM	PONV
34	29/6/2017	1735197	PAVITHRA	12	13	15	1	NO	no	no	no	no
35	07/08/2017	1735360	VALLI	10	10	12	1	NO	no	no	no	no
36	07/12/2017	1726630	GAYATHRI	10	10	13	1	NO	no	no	no	no
37	18/07/2017	1738834	AKILA	8	9	10	1	YES	GRADE1	no	no	no
38	28/07/2017	1742302	MOHANA	12	13	15	1	NO	no	no	no	no
39	06/06/2017	1742310	JEYAPRIYA	9	9	10	2	NO	no	no	no	no
40	06/10/2017	1732008	RANJITHA	10	10	13	1	NO	no	no	no	no
41	06/12/2017	1732014	RENUGA DEVI	9	9	10	1	NO	no	no	no	no
42	15/6/2017	1732498	PANTHANAM	10	10	12	1	YES	no	no	no	no
43	24/6/2017	1732534	MANYAKARASI	10	10	13	2	NO	no	no	no	no
44	28/6/2017	1735333	NANCY	10	10	13	1	NO	no	no	no	no
45	07/10/2017	1737881	LALITHA	9	9	10	1	NO	no	no	no	no
46	19/7/2017	1711902	TAMILRANI	12	13	15	1	YES	GRADE 1	no	no	no
47	24/7/2017	1740977	REKHA	10	10	13	1	NO	no	no	no	no
48	08/03/2017	1741642	SELVI	10	10	12	2	NO	no	no	no	no
49	14/8/2017	1741750	NIVEDHITA	8	9	10	1	NO	no	no	no	no
50	14/8/2017	1744041	ASHWINI	8	9	11	1	NO	no	no	no	no
51	21/8/2017	1747301	JAMUNA	10	10	13	1	NO	no	no	no	no
52	24/8/2017	1712296	SELVI	9	9	10	1	NO	no	no	no	no
53	31/8/2017	1745829	BHAVANI	10	10	13	1	N0	no	no	no	no
54	08/03/2017	1741642	SELVI	10	10	12	1	NO	no	no	no	no
55	14/8/2017	1742658	NIVEDHA	8	9	11	1	NO	no	no	no	no
56	24/8/2017	1748218	SELVI	12	13	15	1	NO	no	no	no	no
57	31/8/2017	1745829	BHARANI	10	10	13	1	NO	no	no	no	no
58	09/11/2017	1745948	KALA	10	10	12	1	NO	no	no	no	no
59	13/9/2017	1746014	PARVATHY	10	10	13	1	NO	no	no	no	no
60	14/9/2017	1746234	SARASWATHY	12	13	15	1	NO	no	no	no	no

S. No	DATE	IP NO	NAME	ASA PS	AGE	GROUP	HR PREINDUCTION	HR INDUCTION	HR POST LMA PLACEMENT	HR SKIN INCISION	HR 5MINS	HR 10 MINS
1	02/06/2017	1711973	LAKSHMI	I	50	D	85	80	94	82	84	82
2	02/11/2017	1705945	NAFEEZA	I	35	S	82	78	90	80	90	88
3	15/2/2017	1708016	NITHYA KUMARI	I	48	D	96	92	105	95	97	96
4	17/2/2017	17089312	FATHIMA	I	19	S	76	70	84	70	74	72
5	22/2/2017	1706269	RAMANI	I	44	D	82	75	90	80	84	86
6	03/02/2017	1711377	ZAIRABANU	I	29	S	80	76	88	76	82	78
7	25/3/2017	1714397	AROKIYAM	I	43	S	76	70	84	74	74	70
8	04/05/2017	1718065	DHANABAKIYAM	I	28	S	84	78	90	80	82	78
9	04/06/2017	1718473	JANSIRANI	I	20	D	89	82	96	87	92	86
10	04/08/2017	1718309	MEENA	I	22	D	95	90	103	93	96	90
11	04/10/2017	567310	SHAMEENA	II	21	D	92	88	101	91	94	90
12	18/4/2017	1720026	AMUDHA	I	41	S	90	86	98	88	80	78
13	21/4/2017	1722449	AFRINBANU	I	18	D	80	72	99	77	80	79
14	22/4/2017	1721515	MANJULA	I	35	S	76	70	84	72	74	72
15	22/4/2017	1717286	PAVITHRA	I	17	D	100	92	108	98	102	101
16	05/06/2017	1722870	SUMATHI	I	36	S	88	80	96	86	86	86
17	05/10/2017	123060	JAYANTHI	I	20	D	72	68	80	70	74	70
18	17/5/2017	1715127	LALITHA	I	42	S	76	70	84	75	74	73
19	17/5/2017	1715146	VARSHINI	I	19	S	68	64	76	67	66	65
20	18/5/2017	1727036	TAMILSELVI	II	17	D	76	72	83	75	79	75
21	19/5/2017	1727103	MADHUMATHI	I	20	D	93	87	101	92	96	93
22	22/5/2017	1727775	ANANDHI	I	19	S	92	86	104	90	96	90
23	23/5/2017	1727264	MYTHILI	I	29	S	80	74	88	79	85	79
24	26/5/2017	1728189	VARSHINI	I	19	D	89	82	97	88	92	90
25	28/5/2017	1730552	TAMILSELVI	I	27	D	75	70	82	74	78	74
26	29/5/2017	1723404	DHARSHINI	II	13	D	95	90	104	90	94	92
27	29/5/2017	1708633	DHANALAKSHMI	II	39	S	92	86	93	87	93	88
28	06/01/2017	37783	LATHA	I	38	S	78	72	87	77	86	76
29	06/01/2017	1729957	DHANALAKSHMI	I	44	D	97	89	108	88	94	91

S. No	DATE	IP NO	NAME	ASA PS	AGE	GROUP	HR PREINDUCTION	HR INDUCTION	HR POST LMA PLACEMENT	HR SKIN INCISION	HR 5MINS	HR 10 MINS
30	06/06/2017	1707810	KARTHIKA	I	24	S	88	82	96	87	86	84
31	06/06/2017	1730643	SAROJA	I	50	S	74	68	82	72	78	72
32	06/12/2017	1730387	DEEPA	II	20	S	76	70	84	75	78	74
33	17/6/2017	1732850	ASAIVENI	I	40	D	81	75	88	74	78	75
34	29/6/2017	1735197	PAVITHRA	I	21	S	85	80	93	82	88	86
35	07/08/2017	1735360	VALLI	II	35	D	83	78	90	77	81	78
36	07/12/2017	1726630	GAYATHRI	I	25	S	82	75	91	81	84	83
37	18/07/2017	1738834	AKILA	I	19	D	79	72	86	70	74	70
38	28/07/2017	1742302	MOHANA	I	29	S	95	90	104	93	96	93
39	06/06/2017	1742310	JEYAPRIYA	I	15	D	95	90	103	89	94	90
40	06/10/2017	1732008	RANJITHA	I	25	S	76	72	84	75	79	78
41	06/12/2017	1732014	RENUGA DEVI	I	19	D	72	68	80	69	76	72
42	15/6/2017	1732498	PANTHANAM	I	20	D	102	94	110	95	98	96
43	24/6/2017	1732534	MANYAKARASI	I	15	S	93	87	102	92	96	94
44	28/6/2017	1735333	NANCY	I	25	S	89	82	96	87	90	88
45	07/10/2017	1737881	LALITHA	I	38	D	76	70	81	71	75	72
46	19/7/2017	1711902	TAMILRANI	I	30	D	85	79	95	78	83	80
47	24/7/2017	1740977	REKHA	II	24	S	83	78	91	80	84	82
48	08/03/2017	1741642	SELVI	I	41	D	82	78	92	81	86	85
49	14/8/2017	1741750	NIVEDHITA	I	25	S	81	75	89	80	84	82
50	14/8/2017	1744041	ASHWINI	I	19	D	75	70	84	72	75	73
51	21/8/2017	1747301	JAMUNA	II	38	S	74	68	83	72	76	75
52	24/8/2017	1712296	SELVI	I	35	D	76	70	82	74	77	75
53	31/8/2017	1745829	BHAVANI	I	37	S	88	82	96	86	90	88
54	08/03/2017	1741642	SELVI	II	40	D	95	91	104	94	96	95
55	14/8/2017	1742658	NIVEDHA	I	19	D	86	78	98	82	86	85
56	24/8/2017	1748218	SELVI	I	30	S	92	86	101	90	94	93
57	31/8/2017	1745829	BHARANI	I	34	S	79	73	88	77	84	82
58	09/11/2017	1745948	KALA	I	34	D	84	76	93	80	88	87
59	13/9/2017	1746014	PARVATHY	I	21	S	84	79	91	82	87	85
60	14/9/2017	1746234	SARASWATHY	I	46	D	88	80	95	85	89	88

S. No	DATE	IP NO	NAME	HR 15MINS	HR 30 MINS	HR 45 MINS	HR 60 MINS
1	02/06/2017	1711973	LAKSHMI	80	78	79	88
2	02/11/2017	1705945	NAFEEZA	86	78	76	90
3	15/2/2017	1708016	NITHYA KUMARI	94	92	90	95
4	17/2/2017	17089312	FATHIMA	71	70	68	80
5	22/2/2017	1706269	RAMANI	82	81	80	86
6	03/02/2017	1711377	ZAIRABANU	76	74	74	88
7	25/3/2017	1714397	AROKIYAM	68	72	68	84
8	04/05/2017	1718065	DHANABAKIYAM	76	70	70	92
9	04/06/2017	1718473	JANSIRANI	84	80	78	92
10	04/08/2017	1718309	MEENA	88	86	86	98
11	04/10/2017	567310	SHAMEENA	88	86	86	97
12	18/4/2017	1720026	AMUDHA	76	76	74	88
13	21/4/2017	1722449	AFRINBANU	78	77	76	88
14	22/4/2017	1721515	MANJULA	70	73	70	84
15	22/4/2017	1717286	PAVITHRA	99	98	97	106
16	05/06/2017	1722870	SUMATHI	84	84	83	82
17	05/10/2017	123060	JAYANTHI	73	69	68	78
18	17/5/2017	1715127	LALITHA	72	70	68	84
19	17/5/2017	1715146	VARSHINI	65	64	62	76
20	18/5/2017	1727036	TAMILSELVI	74	72	71	82
21	19/5/2017	1727103	MADHUMATHI	91	90	89	97
22	22/5/2017	1727775	ANANDHI	88	88	86	98
23	23/5/2017	1727264	MYTHILI	76	74	72	82
24	26/5/2017	1728189	VARSHINI	89	86	85	94
25	28/5/2017	1730552	TAMILSELVI	72	72	70	83
26	29/5/2017	1723404	DHARSHINI	91	89	88	100
27	29/5/2017	1708633	DHANALAKSHMI	89	86	87	98
28	06/01/2017	37783	LATHA	74	72	72	84
29	06/01/2017	1729957	DHANALAKSHMI	90	88	88	105

S. No	DATE	IP NO	NAME	HR 15MINS	HR 30 MINS	HR 45 MINS	HR 60 MINS
30	06/06/2017	1707810	KARTHIKA	86	84	82	94
31	06/06/2017	1730643	SAROJA	70	68	70	80
32	06/12/2017	1730387	DEEPA	72	70	70	84
33	17/6/2017	1732850	ASAIVENI	72	71	70	86
34	29/6/2017	1735197	PAVITHRA	85	83	84	92
35	07/08/2017	1735360	VALLI	77	75	75	89
36	07/12/2017	1726630	GAYATHRI	82	80	79	88
37	18/07/2017	1738834	AKILA	71	69	70	84
38	28/07/2017	1742302	MOHANA	92	90	88	96
39	06/06/2017	1742310	JEYAPRIYA	88	86	84	102
40	06/10/2017	1732008	RANJITHA	75	74	72	83
41	06/12/2017	1732014	RENUGA DEVI	72	71	70	78
42	15/6/2017	1732498	PANTHANAM	94	93	90	105
43	24/6/2017	1732534	MANYAKARASI	91	90	88	96
44	28/6/2017	1735333	NANCY	86	85	84	95
45	07/10/2017	1737881	LALITHA	70	68	69	84
46	19/7/2017	1711902	TAMILRANI	78	76	76	89
47	24/7/2017	1740977	REKHA	81	80	79	87
48	08/03/2017	1741642	SELVI	84	83	82	89
49	14/8/2017	1741750	NIVEDHITA	81	80	78	87
50	14/8/2017	1744041	ASHWINI	72	70	70	80
51	21/8/2017	1747301	JAMUNA	73	72	71	79
52	24/8/2017	1712296	SELVI	74	72	71	82
53	31/8/2017	1745829	BHAVANI	87	85	84	94
54	08/03/2017	1741642	SELVI	93	92	90	99
55	14/8/2017	1742658	NIVEDHA	84	82	80	92
56	24/8/2017	1748218	SELVI	92	90	88	98
57	31/8/2017	1745829	BHARANI	81	80	80	87
58	09/11/2017	1745948	KALA	85	84	83	90
59	13/9/2017	1746014	PARVATHY	84	83	82	90
60	14/9/2017	1746234	SARASWATHY	85	84	82	94

S. No	DATE	IP NO	NAME	ASA PS	AGE	GROUP	PRE INDUCTION			POST INDUCTION			POST LMA INSERTION			SKIN INCISION			AT 5 MINUTES		
							SBP	DBP	Mean	SBP	DBP	MEAN	SBP	DBP	MEAN	SBP	DBP	MAP	SBP	DBP	MEAN
1	02/06/2017	1711973	LAKSHMI	I	50	D	104	78	86	99	60	72	120	96	103	110	72	83	114	62	78
2	02/11/2017	1705945	NAFEEZA	I	35	S	112	70	83	98	65	75	123	98	106	112	74	85	110	58	74
3	15/2/2017	1708016	NITHYA KUMARI	I	48	D	108	74	84	96	53	66	115	91	98	115	75	87	102	65	76
4	17/2/2017	17089312	FATHIMA	I	19	S	106	78	86	99	56	69	116	90	98	110	74	85	102	62	74
5	22/2/2017	1706269	RAMANI	I	44	D	122	80	93	100	59	71	120	86	96	100	65	76	103	60	73
6	03/02/2017	1711377	ZAIRABANU	I	29	S	107	74	84	97	51	65	130	89	101	100	64	75	104	58	72
7	25/3/2017	1714397	AROKIYAM	I	43	S	115	71	84	100	50	65	125	85	97	125	64	82	106	56	71
8	04/05/2017	1718065	DHANABAKIYAM	I	28	S	109	75	85	102	58	71	126	74	90	102	68	78	110	66	79
9	04/06/2017	1718473	JANSIRANI	I	20	D	120	74	88	95	56	68	120	78	91	125	69	86	112	62	77
10	04/08/2017	1718309	MEENA	I	22	D	123	79	92	94	59	70	116	89	97	116	72	85	130	63	83
11	04/10/2017	567310	SHAMEENA	II	21	D	109	80	89	96	60	71	119	85	95	119	68	83	105	62	75
12	18/4/2017	1720026	AMUDHA	I	41	S	107	84	91	92	61	70	118	89	98	118	69	84	108	66	79
13	21/4/2017	1722449	AFRINBANU	I	18	D	104	82	89	93	66	74	120	87	97	102	65	76	106	64	77
14	22/4/2017	1721515	MANJULA	I	35	S	109	81	89	90	62	70	123	78	92	125	75	90	104	68	79
15	22/4/2017	1717286	PAVITHRA	I	17	D	107	74	84	102	56	70	120	75	89	124	65	83	106	60	74
16	05/06/2017	1722870	SUMATHI	I	36	S	106	77	86	94	54	66	116	79	90	117	64	80	105	62	75
17	05/10/2017	123060	JAYANTHI	I	20	D	108	74	84	96	59	70	115	78	89	118	62	79	103	64	76
18	17/5/2017	1715127	LALITHA	I	42	S	122	73	88	98	69	78	119	72	86	119	63	80	102	64	75
19	17/5/2017	1715146	VARSHINI	I	19	S	109	72	83	100	65	76	124	82	95	125	69	86	100	68	78
20	18/5/2017	1727036	TAMILSELVI	II	17	D	115	70	84	93	52	64	127	83	96	102	68	78	104	62	75
21	19/5/2017	1727103	MADHUMATHI	I	20	D	104	65	77	100	53	67	128	86	99	116	64	80	108	62	76
22	22/5/2017	1727775	ANANDHI	I	19	S	123	75	89	100	51	66	123	87	98	110	65	79	110	64	78
23	23/5/2017	1727264	MYTHILI	I	29	S	108	74	84	97	59	70	130	85	99	115	63	79	112	68	81
24	26/5/2017	1728189	VARSHINI	I	19	D	122	64	81	98	55	68	120	95	103	119	65	81	114	70	83
25	28/5/2017	1730552	TAMILSELVI	I	27	D	106	61	75	93	54	66	125	90	101	114	67	81	120	57	76
26	29/5/2017	1723404	DHARSHINI	II	13	D	113	66	80	91	56	67	116	84	94	125	61	80	121	56	76
27	29/5/2017	1708633	DHANALAKSHMI	II	39	S	104	67	78	90	60	69	119	85	95	126	62	81	116	55	73
28	06/01/2017	37783	LATHA	I	38	S	119	62	79	96	55	67	118	89	98	114	60	76	118	54	73
29	06/01/2017	1729957	DHANALAKSHMI	I	44	D	115	68	82	95	54	66	123	86	97	119	63	80	110	56	72
30	06/06/2017	1707810	KARTHIKA	I	24	S	108	80	88	98	57	69	119	82	93	120	69	84	118	57	75
31	06/06/2017	1730643	SAROJA	I	50	S	128	63	83	94	58	69	120	78	91	118	75	88	116	59	76
32	06/12/2017	1730387	DEEPA	II	20	S	118	69	84	95	59	70	125	87	98	117	78	90	114	58	75
33	17/6/2017	1732850	ASAIVENI	I	40	D	109	70	82	96	51	65	109	89	95	119	70	85	118	56	75

S. No	DATE	IP NO	NAME	ASA PS	AGE	GROUP	PRE INDUCTION			POST INDUCTION			POST LMA INSERTION			SKIN INCISION			AT 5 MINUTES		
							SBP	DBP	Mean	SBP	DBP	MEAN	SBP	DBP	MEAN	SBP	DBP	MAP	SBP	DBP	MEAN
34	29/6/2017	1735197	PAVITHRA	I	21	S	104	71	81	92	52	64	124	79	93	120	62	79	112	66	80
35	07/08/2017	1735360	VALLI	II	35	D	121	72	87	93	56	67	127	76	91	130	67	86	110	67	80
36	07/12/2017	1726630	GAYATHRI	I	25	S	108	78	87	89	59	68	128	75	91	116	75	87	114	62	78
37	18/07/2017	1738834	AKILA	I	19	D	107	79	87	88	65	72	129	78	93	114	69	83	116	65	80
38	28/07/2017	1742302	MOHANA	I	29	S	117	75	88	100	69	78	125	77	91	119	62	79	114	62	78
39	06/06/2017	1742310	JEYAPRIYA	I	15	D	104	74	83	93	68	76	126	71	88	100	68	78	116	65	80
40	06/10/2017	1732008	RANJITHA	I	25	S	109	86	93	106	50	67	129	73	90	105	64	76	118	56	75
41	06/12/2017	1732014	RENUGA DEVI	I	19	D	106	66	78	102	52	67	130	70	88	105	61	74	114	58	75
42	15/6/2017	1732498	PANTHANAM	I	20	D	115	65	80	100	51	66	116	74	87	109	63	77	106	68	79
43	24/6/2017	1732534	MANYAKARASI	I	15	S	109	72	83	96	53	66	119	87	97	119	69	84	108	65	78
44	28/6/2017	1735333	NANCY	I	25	S	107	77	86	95	55	67	120	89	98	108	68	80	102	58	71
45	07/10/2017	1737881	LALITHA	I	38	D	123	61	80	98	56	69	133	85	99	116	64	80	108	56	72
46	19/7/2017	1711902	TAMILRANI	I	30	D	118	63	80	97	59	70	128	78	93	117	69	83	106	56	71
47	24/7/2017	1740977	REKHA	II	24	S	104	69	80	95	55	67	129	75	91	120	69	84	104	68	79
48	08/03/2017	1741642	SELVI	I	41	D	107	78	87	89	58	67	125	79	93	116	65	80	108	65	78
49	14/8/2017	1741750	NIVEDHITA	I	25	S	109	68	80	90	55	66	120	72	86	116	68	82	110	64	78
50	14/8/2017	1744041	ASHWINI	I	19	D	116	69	83	91	54	65	113	74	86	122	63	81	106	64	77
51	21/8/2017	1747301	JAMUNA	II	38	S	104	70	80	96	59	70	126	76	91	112	60	76	108	66	79
52	24/8/2017	1712296	SELVI	I	35	D	125	61	80	100	56	69	110	75	86	130	61	82	103	62	74
53	31/8/2017	1745829	BHAVANI	I	37	S	113	63	78	98	65	75	118	84	94	140	69	90	114	62	78
54	08/03/2017	1741642	SELVI	II	40	D	123	73	88	92	62	71	117	87	96	126	64	83	118	64	80
55	14/8/2017	1742658	NIVEDHA	I	19	D	104	78	86	93	56	67	127	89	100	128	69	87	116	68	82
56	24/8/2017	1748218	SELVI	I	30	S	109	79	88	94	63	72	128	78	93	130	68	87	112	68	81
57	31/8/2017	1745829	BHARANI	I	34	S	107	80	88	96	65	74	124	89	100	132	70	89	110	63	77
58	09/11/2017	1745948	KALA	I	34	D	115	65	80	93	58	69	120	87	97	125	67	84	115	64	79
59	13/9/2017	1746014	PARVATHY	I	21	S	104	63	75	92	59	69	116	85	94	112	61	76	112	65	79
60	14/9/2017	1746234	SARASWATHY	I	46	D	108	69	81	91	51	63	123	75	89	114	70	83	114	62	78

S. No	DATE	IP NO	NAME	AT 15 MINUTES			AT 30 MINUTES			AT 45 MINUTES			AT 60 MINUTES		
				SBP	DBP	MEAN	SBP	DBP	MEAN	SBP	DBP	MEAN	SBP	DBP	MEAN
1	02/06/2017	1711973	LAKSHMI	96	68	76	92	64	72	94	62	72	120	82	93
2	02/11/2017	1705945	NAFEEZA	98	70	78	94	62	72	96	64	74	124	84	96
3	15/2/2017	1708016	NITHYA KUMARI	94	74	80	94	60	70	94	62	72	124	78	92
4	17/2/2017	17089312	FATHIMA	96	64	74	96	61	72	92	68	75	126	88	99
5	22/2/2017	1706269	RAMANI	92	68	75	94	67	75	96	66	75	128	56	78
6	03/02/2017	1711377	ZAIRABANU	92	64	72	98	62	73	94	66	74	124	84	96
7	25/3/2017	1714397	AROKIYAM	98	63	74	94	64	73	92	68	75	124	82	95
8	04/05/2017	1718065	DHANABAKIYAM	96	66	75	94	66	74	92	64	72	122	84	95
9	04/06/2017	1718473	JANSIRANI	92	62	71	96	68	76	96	62	72	114	84	93
10	04/08/2017	1718309	MEENA	94	62	72	94	62	72	94	70	77	116	82	92
11	04/10/2017	567310	SHAMEENA	98	64	74	92	61	70	96	68	76	114	78	89
12	18/4/2017	1720026	AMUDHA	96	62	72	94	64	73	98	64	74	112	80	90
13	21/4/2017	1722449	AFRINBANU	92	64	72	95	62	72	96	64	74	118	82	93
14	22/4/2017	1721515	MANJULA	94	66	74	92	64	72	96	62	72	114	74	86
15	22/4/2017	1717286	PAVITHRA	98	69	78	92	60	70	94	60	70	116	78	89
16	05/06/2017	1722870	SUMATHI	93	63	72	92	54	65	98	62	73	112	76	87
17	05/10/2017	123060	JAYANTHI	97	67	76	92	54	65	92	62	71	118	74	87
18	17/5/2017	1715127	LALITHA	96	66	75	90	72	77	96	64	74	112	72	84
19	17/5/2017	1715146	VARSHINI	94	64	73	94	59	70	98	68	77	114	76	87
20	18/5/2017	1727036	TAMILSELVI	97	68	77	94	58	69	95	65	74	116	78	89
21	19/5/2017	1727103	MADHUMATHI	92	58	68	90	50	62	94	63	72	114	74	86
22	22/5/2017	1727775	ANANDHI	95	54	66	96	52	65	96	62	72	118	78	90
23	23/5/2017	1727264	MYTHILI	96	56	68	92	52	64	92	64	72	114	78	89
24	26/5/2017	1728189	VARSHINI	92	54	65	94	54	66	92	62	71	126	74	90
25	28/5/2017	1730552	TAMILSELVI	90	74	79	92	52	64	94	62	72	124	75	90
26	29/5/2017	1723404	DHARSHINI	94	52	65	88	56	66	98	64	74	126	76	91
27	29/5/2017	1708633	DHANALAKSHMI	92	84	86	86	58	66	96	64	74	124	78	92
28	06/01/2017	37783	LATHA	93	76	81	92	54	65	92	64	72	118	72	86
29	06/01/2017	1729957	DHANALAKSHMI	92	75	80	86	54	64	92	64	72	122	78	91
30	06/06/2017	1707810	KARTHIKA	90	45	59	88	70	75	94	62	72	128	84	97
31	06/06/2017	1730643	SAROJA	96	62	72	84	54	63	92	62	71	120	84	95
32	06/12/2017	1730387	DEEPA	98	75	82	82	54	62	92	64	72	122	84	95
33	17/6/2017	1732850	ASAIVENI	98	45	61	86	56	65	92	62	71	124	82	95

S. No	DATE	IP NO	NAME	AT 15 MINUTES			AT 30 MINUTES			AT 45 MINUTES			AT 60 MINUTES		
				SBP	DBP	MEAN	SBP	DBP	MEAN	SBP	DBP	MEAN	SBP	DBP	MEAN
34	29/6/2017	1735197	PAVITHRA	96	62	72	88	56	66	92	64	72	120	88	98
35	07/08/2017	1735360	VALLI	94	75	81	82	58	65	92	62	71	124	85	97
36	07/12/2017	1726630	GAYATHRI	98	54	67	84	62	69	94	62	72	114	86	94
37	18/07/2017	1738834	AKILA	92	64	72	86	60	68	96	68	76	116	84	94
38	28/07/2017	1742302	MOHANA	90	52	63	94	56	67	94	68	76	118	86	96
39	06/06/2017	1742310	JEYAPRIYA	94	71	78	98	60	71	101	60	72	118	82	93
40	06/10/2017	1732008	RANJITHA	98	74	81	96	56	68	102	62	74	120	84	95
41	06/12/2017	1732014	RENUGA DEVI	96	76	82	94	58	69	104	62	75	120	84	95
42	15/6/2017	1732498	PANTHANAM	92	78	82	96	54	67	104	60	73	124	80	93
43	24/6/2017	1732534	MANYAKARASI	92	72	78	88	52	63	108	64	77	124	72	88
44	28/6/2017	1735333	NANCY	90	74	79	89	55	65	104	60	73	126	78	92
45	07/10/2017	1737881	LALITHA	94	76	81	92	52	64	110	62	76	124	78	92
46	19/7/2017	1711902	TAMILRANI	98	78	84	90	58	68	112	64	78	128	72	89
47	24/7/2017	1740977	REKHA	91	54	65	90	54	65	110	62	76	124	74	89
48	08/03/2017	1741642	SELVI	96	53	66	86	52	62	114	60	76	124	70	86
49	14/8/2017	1741750	NIVEDHITA	94	69	77	90	56	66	112	58	74	128	75	91
50	14/8/2017	1744041	ASHWINI	92	58	68	90	58	68	110	54	71	130	74	91
51	21/8/2017	1747301	JAMUNA	90	65	73	94	60	70	114	56	73	140	72	92
52	24/8/2017	1712296	SELVI	92	56	67	92	62	71	112	58	74	136	71	91
53	31/8/2017	1745829	BHAVANI	90	52	63	88	60	68	110	52	69	132	72	90
54	08/03/2017	1741642	SELVI	90	64	72	95	58	69	106	56	71	124	76	90
55	14/8/2017	1742658	NIVEDHA	94	62	72	96	52	65	108	58	73	124	72	88
56	24/8/2017	1748218	SELVI	92	65	73	94	56	67	108	60	74	124	74	89
57	31/8/2017	1745829	BHARANI	94	52	65	92	52	64	104	60	73	128	74	90
58	09/11/2017	1745948	KALA	96	56	68	94	54	66	108	62	76	132	74	91
59	13/9/2017	1746014	PARVATHY	98	58	70	92	54	65	104	62	75	132	76	93
60	14/9/2017	1746234	SARASWATHY	94	56	67	92	52	64	102	64	75	142	78	97