DISSERTATION ON

COMPARISON OF HAEMODYNAMIC STRESS RESPONSE DURING INSERTION OF LMA SUPREME VERSUS I–GEL IN PATIENTS UNDERGOING SHORT SURGERIES UNDER GENERAL ANAESTHESIA

Dissertation submitted in partial fulfilment of the regulations for the award

of the degree of

M.D.ANAESTHESIOLOGY

BRANCH-X

Of

THE TAMILNADU Dr.M.G.R.MEDICAL UNIVERSITY CHENNAI, TAMILNADU

ESIC MEDICAL COLLEGE & POSTGRADUATE INSTITUTE OF MEDICAL SCIENCE AND RESEARCH, K.K.NAGAR, CHENNAI – 78

April 2019

ENDORSEMENT BY THE DEAN/

THE HEAD OF THE INSTITUTION

This is to certify that this dissertation titled **"COMPARISON OF HAEMODYNAMIC STRESS RESPONSE DURING INSERTION OF LMA SUPREME VERSUS I-GEL IN PATIENTS UNDERGOING SHORT SURGERIES UNDER GENERAL ANAESTHESIA"** submitted by **Dr M.NALINA**, appearing for MD degree Branch - X ANAESTHESIOLOGY examination in April 2019 is a bonafide record of the work done by her under my direct guidance and supervision in partial fulfilment of the regulations of Tamil Nadu Dr MGR Medical University, Chennai, Tamil Nadu, India. I forward this to the Tamil Nadu Dr.M.G.R Medical University, Chennai Tamil Nadu, India.

Dean

Dr SOWMYA SAMPATH.,MD., D.N B.,

ESIC Medical College & PGIMSR.

K.K Nagar , Chennai

Date:

Place: Chennai.

CERTIFICATE BY THE HEAD OF THE DEPARTMENT

This is to certify that this dissertation titled **"COMPARISON OF HAEMODYNAMIC STRESS RESPONSE DURING INSERTION OF LMA SUPREME VERSUS I-GEL IN PATIENTS UNDERGOING SHORT SURGERIES UNDER GENERAL ANAESTHESIA"** is a bonafide research work done by **Dr M.ṆALINA,** in partial fulfilment of the requirement for the degree of M.D. in Anaesthesiology.

Dr Shirishkumar Chavan, MD.,

Professor & Head

Department of Anaesthesiology,

ESIC Medical College & PGIMSR

KK Nagar, Chennai 78

Date:

Place: Chennai

BONAFIDE CERTIFICATE

This is to certify that this dissertation titled **"COMPARISON OF HAEMODYNAMIC STRESS RESPONSE DURING INSERTION OF LMA SUPREME VERSUS I-GEL IN PATIENTS UNDERGOING SHORT SURGERIES UNDER GENERAL ANAESTHESIA"** submitted by **Dr. M.NALINA**, post graduate student, Department of Anaesthesiology, ESIC Medical college & PGIMSR, Chennai – 78, is a bonafide record of the work done by her under my direct guidance and supervision in partial fulfilment of the regulations of Tamil Nadu Dr MGR Medical University for the award of MD Degree during the academic year 2015-2019.

CO-GUIDE:

Dr. ILANGO GANESAN,M.D.,

Associate Professor

Department of Anaesthesiology

ESIC MC & PGIMSR

KK Nagar, Chennai 78

GUIDE:

Dr. K.RADHIKA,M.D.,

Associate Professor

Department of Anaesthesiology

ESIC MC & PGIMSR

KK Nagar, Chennai 78

DECLARATION

I solemnly declare that this dissertation titled "**COMPARISON OF HAEMODYNAMIC STRESS RESPONSE DURING INSERTION OF LMA SUPREME VERSUS I-GEL IN PATIENTS UNDERGOING SHORT SURGERIES UNDER GENERAL ANAESTHESIA"** was done by me at ESIC MC & PGIMSR, KK Nagar, Chennai under the guidance and supervision of Associate Professor Dr **K.RADHIKA., MD.** This dissertation is submitted to the Tamil Nadu Dr MGR medical university towards the partial fulfilment of requirement for the award of MD degree in Anaesthesiology, Branch – X.

Signature of candidate:

Dr M. Nalina

MD Post Graduate

Department of Anaesthesiology

Date: ESIC Medical College & PGIMSR

Place: Chennai

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Dr. M. NALINA.

PLAGIARISM CERTIFICATE

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LIST OF ABBREVIATIONS

- **LMA** – Laryngeal Mask Airway
- **SAD** – Supraglottic Airway Device
- **LMA-S** – Laryngeal Mask Airway – Supreme
- **GA** – General Anesthesia
- **ASA** – American Society of Anesthesiologists Classification
- **ECG** – Electrocardiogram
- **NIBP** – Non Invasive Blood Pressure
- **S** – Significant
- **SD** – Standard Deviation
- **SE** – Standard Error
- **BP** – Blood Pressure
- **POST OP** – Postoperatively
- **Hb %** - Hemoglobin Percentage
- **TC** – Total count
- **DC** – Differential count
- **PLT** – Platelet count
- **MAP** – Mean Arterial Pressure
- **mg** – milligram
- **mcg** - microgram

- **cm** – centimetre
- **dl** – decilitre
- **gm** – gram
- **hrs** – hours
- **IM** – Intramuscular
- **IV** – Intravascular
- **Kg** – Kilogram
- **Min** – minutes
- **ml** – millilitre
- **mm of Hg –** millimetres of Mercury
- **OPLP –** Oropharyngeal leak pressure.

TABLE OF CONTENTS

INTRODUCTION

The major responsibility of the Anaesthesiologist is to provide adequate ventilation to the patient. Tracheal intubation is the gold standard method to maintain patent airway during anesthesia. Laryngoscopy and endotracheal intubation produce reflex sympathetic stimulation, which could lead to hypertension, tachycardia, myocardial ischemia, ventricular arrhythmias and increased intracranial tension.

Supraglottic Airway Devices [SADs] are increasingly being used as an excellent alternative to mask ventilation and tracheal intubation with less complications. The airway devices with gastric access tubes are increasingly being used in surgery requiring general anesthesia and positive airway ventilation. Many types of SADs are now available for clinical use. To ensure patient safety it is important that their advantages and limitations be studied. In this study two newer generation SADs- LMA SUPREME AND I-GEL are compared.

Supraglottic airway device provide hands free airway management and are included in American Society of Anaesthesiologists (ASA) emergency airway algorithm as rescue airway device in anticipated and unanticipated difficult airway situations.

AIMS AND OBJECTIVES

AIM

To compare the haemo dynamic stress response during insertion of LMA – Supreme versus I- GEL for short procedures under general anaesthesia.

OBJECTIVES

Primary objective is

1. To compare the ease of insertion and the number of attempts for insertion.
2. To determine the changes in Heart rate

   Diastolic blood pressure

   Systolic blood pressure

   Mean arterial pressure

   with LMA – Supreme and I-GEL insertion.

Secondary objective is

1. To compare the postoperative airway morbidity - blood on LMA after removal and postoperative sore-throat.

HISTORY OF SUPRAGLOTTIC AIRWAY DEVICES

Dr. Archie.I.J. Brain, a British Anaesthesiologist, was the prime brain behind the recognition of the principle of LMA in 1981. He experimented with the Goldman dental nasal mask cuff and inserted the prototype laryngeal mask made from black rubber cuff and a plastic tracheal tube in cadavers in 1981.

Brain's prototype are displayed in the Royal Berkshire Hospital, England, where we can see the detailed round of the evolution of the LMAs. The first study and paper regarding LMA was presented in 1983 in the British journal of Anaesthesia with 23 patients. That study did not attract much attention.

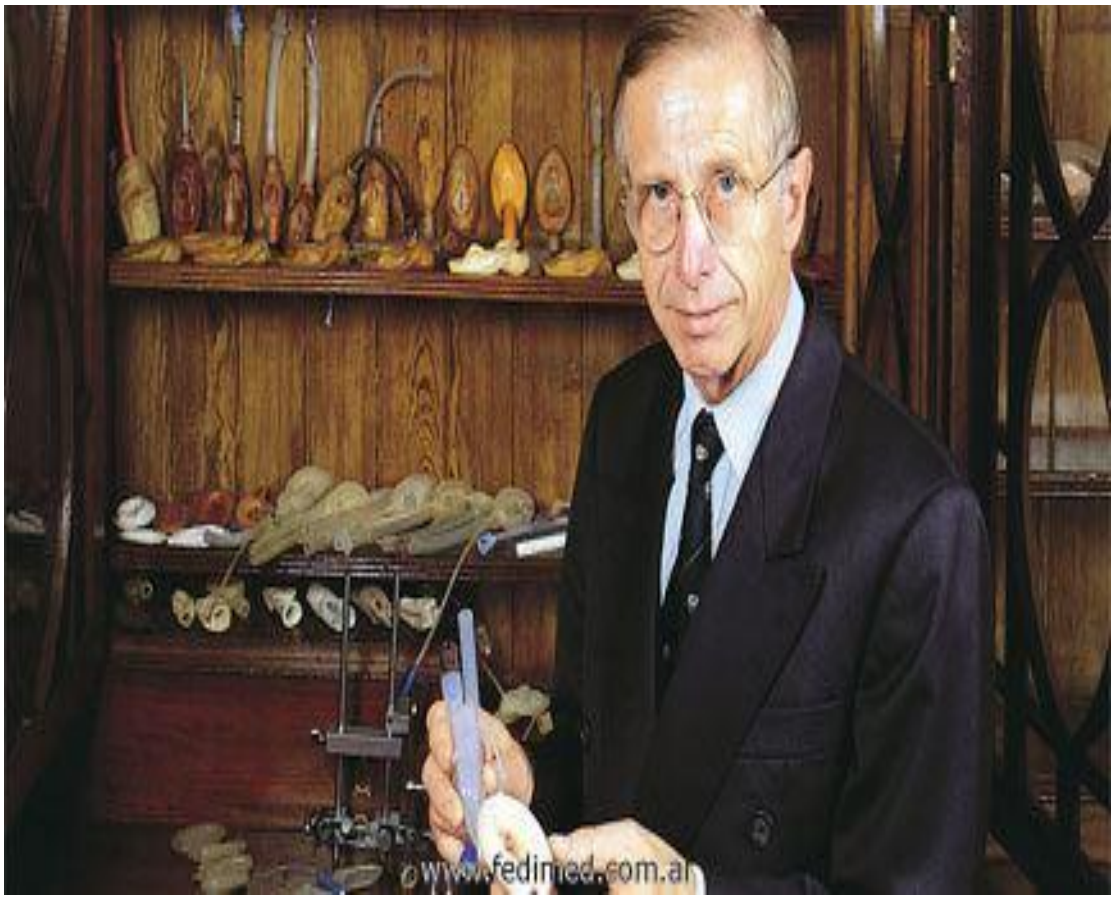
Brain encountered several problems including looking for suitable device materials (latex, pvc , silicon), difficulties with insertion, creating an effective airway seal, problem of epiglottic down folding and protection against aspiration. Brain tried several techniques and modifications. Brain's prototype LMA was first used in a 40 year old male patient undergoing an elective inguinal hernia repair in 1981. The next study regarding SADs with 118 patients was published under the heading "development and trials of a new type of airway".

The classic LMA was first officially released in England in 1988. The FDA approved its use in USA only in 1991. Within 3 years of launch, the LMAs had been used in atleast 2 million patients and was available in every hospital.

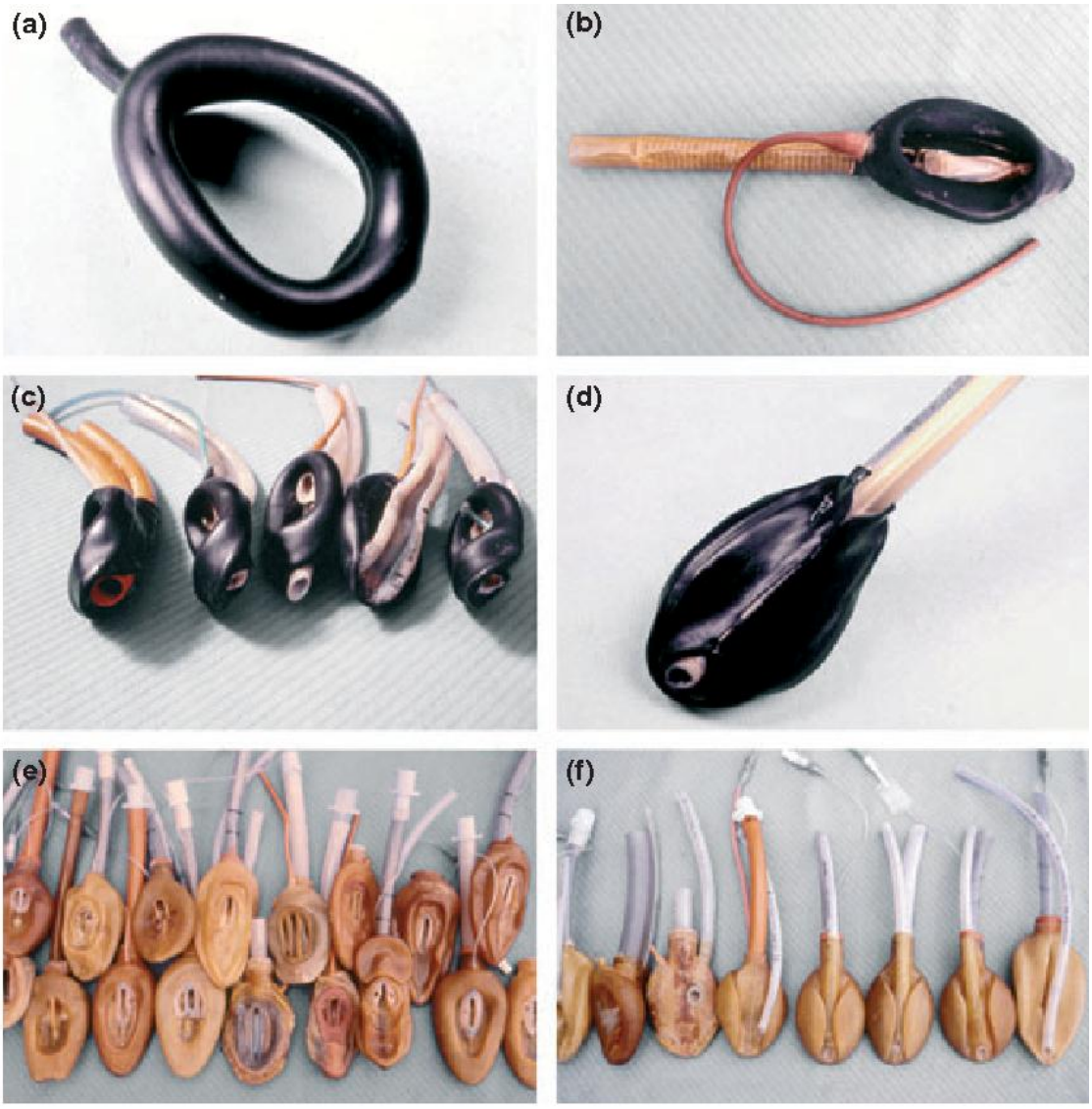
The ASA algorithm for difficult airways was published in 1993 and stressed an early attempt of insertion of the SADs if face mask ventilation was not adequate.

Dr. Mohammed Aslam Nasir, a Pakistani doctor, now a British Anaesthesiologist, after working for nearly a decade work launched I-GEL in January 2007 at the Association of Anaesthesiologists of great Britain. LMA supreme is also a UK contribution by Intraventorthofix, maidenhead, introduced in the late 2007.

The SADs revolutionised anaesthesia practice. Between 1989 & 2000 a variety of LMA s were released.



Professor ARCHIE BRAIN



The Goldman mask cuff [a],attached to a 10 mm plastic tube [b-d],was the basis of large number of LMA prototypes [e,f].

THE PHARYNX

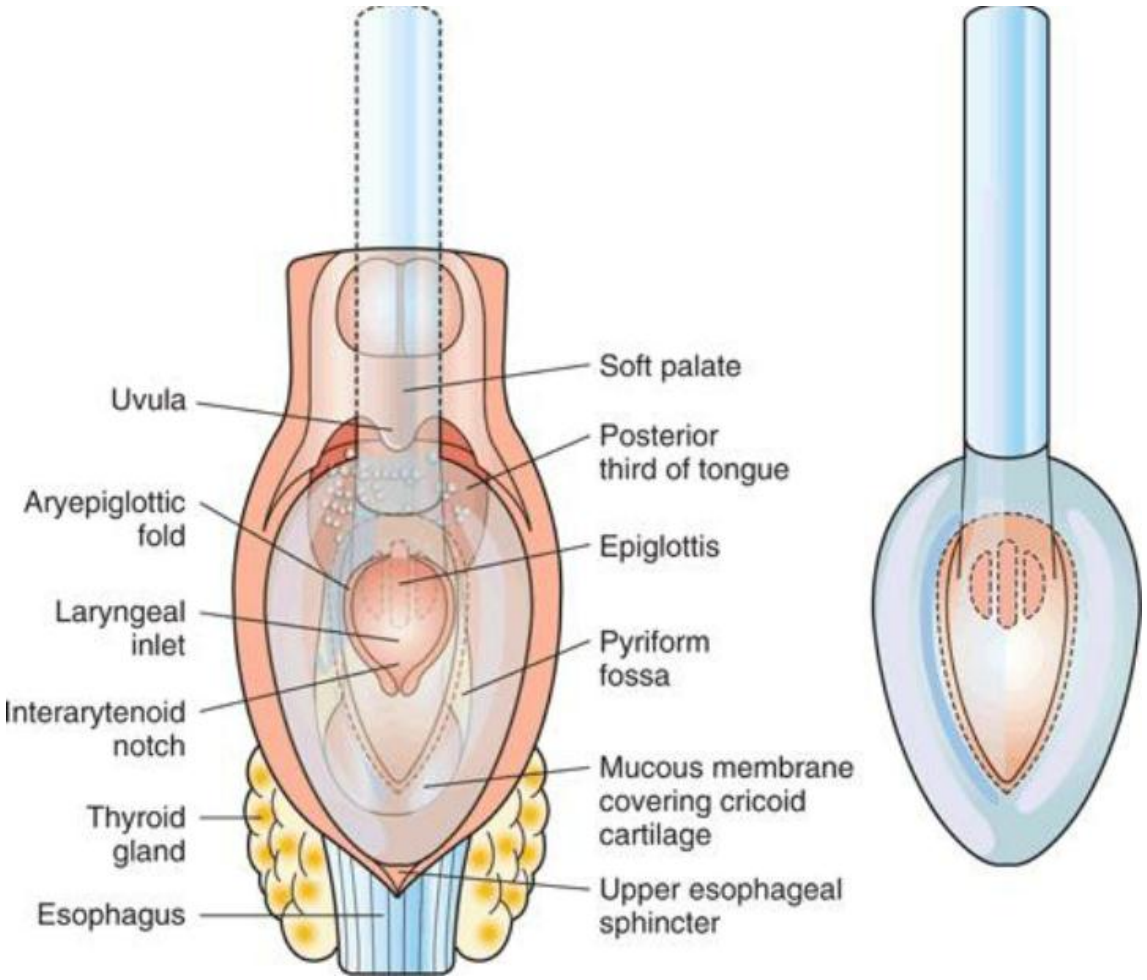
The pharynx is made up of a broad tube of muscles and fibrous tissue that forms the common pathway of the airway and gastrointestinal tract. It comprises of three divisions – the nasopharynx, the oropharynx and the laryngopharynx.

The nasopharynx extends from posterior nasal cavity in base of skull upto the soft palate. The function of the nasopharynx is primarily to transfer inhaled gases from nostrils to the lungs. The oropharynx begins after the soft palate and ends at the beginning of epiglottis.

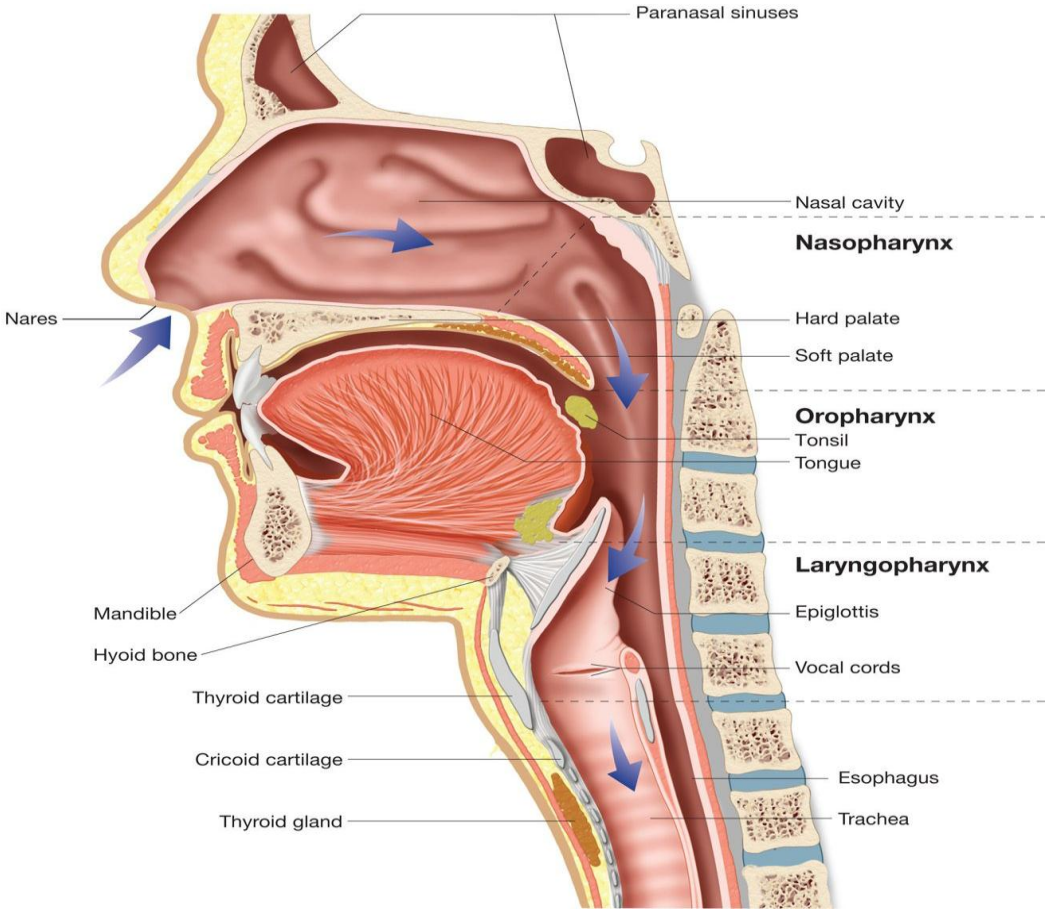
The laryngopharynx or hypopharynx begins from epiglottis and ends at the inferior border of the cricoid cartilage. Here it tapers and continues as oesophagus. This is the portion of pharynx that is related to the insertion and seat of the SADs.

CONFORMATION AND ALIGNMENT WITH PHARYNX DURING ANAESTHESIA

When a person is given general anaesthesia in supine position, the airway gets obstructed due to loss of muscle tone of pharyngeal muscles and the tongue fall. The SADs provide an effective measure of relieving obstruction of the airway.



LMA & LARYNGEAL CONFORMATION



AIRWAY ANATOMY

LARYNGEAL CARTILAGES

The larynx is made up of nine cartilages- three unpaired and three paired ones. The unpaired are the thyroid, cricoid and epiglottis. The paired are the arytenoids, the corniculates and the cuneiforms. Of this the epiglottis is important in terms of SADs function.

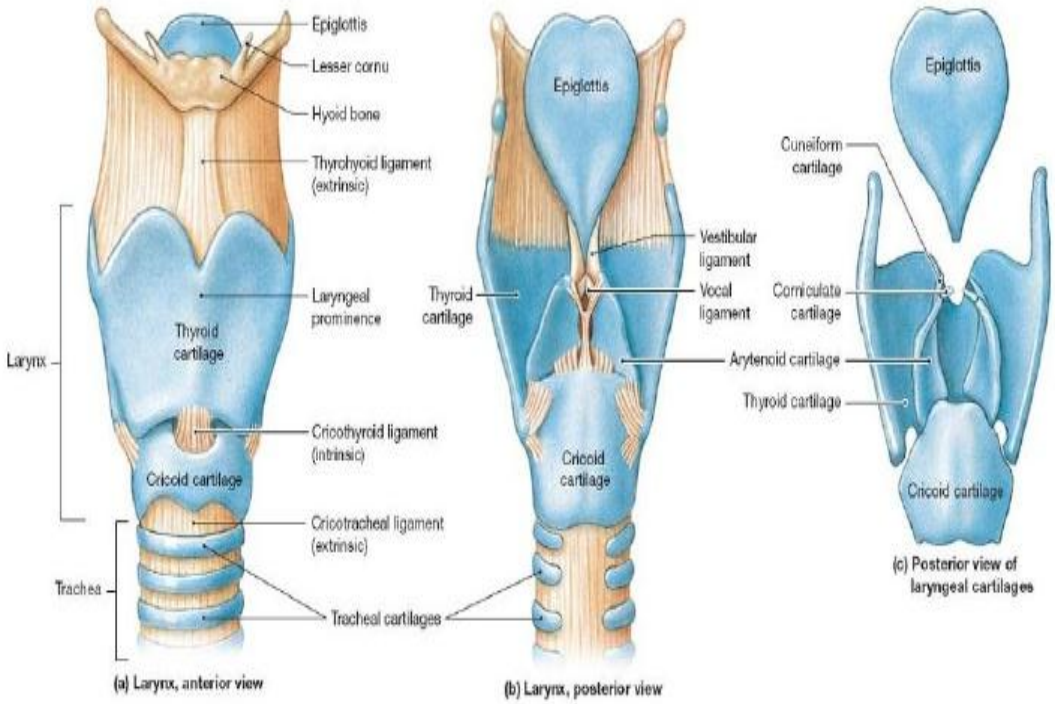
CAVITY OF LARYNX

The laryngeal cavity lies between the laryngeal inlet to inferior border of cricoid cartilage. It has two folds – the upper vestibular folds, or the false vocal cords and the lower vocal cords or the true vocal cords. The area lying between the true vocal cords is the rima glottidis or glottis. The pyriform sinus is the part of larynx lying on either side of the aryepiglottic fold.

EPIGLOTTIS

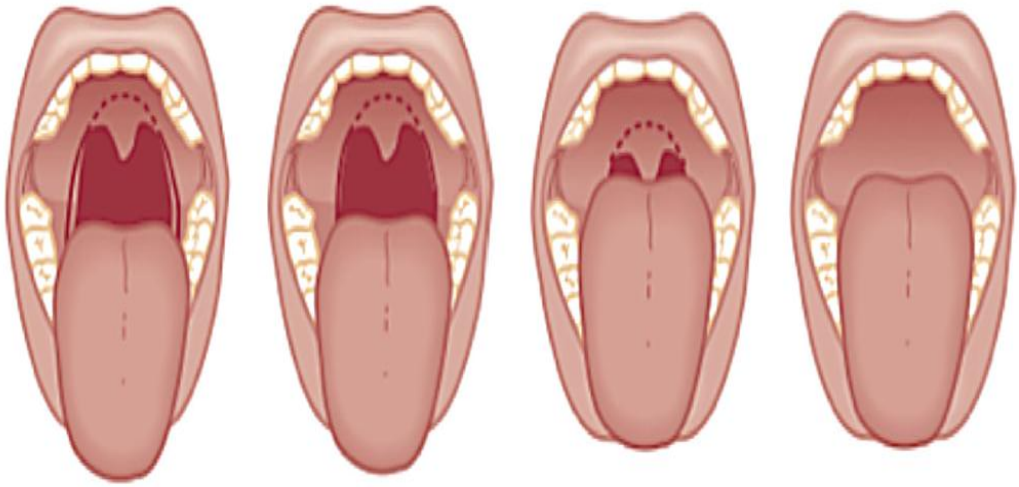
The epiglottis is a leaf shaped unpaired cartilage of the larynx that functionally separates the oropharynx and laryngopharynx. It is attached to lower end of thyroid cartilage by thyro epiglottic ligament. The upper part of epiglottis is free and is covered by mucous membrane. The depressions on either side of the median epiglottic fold is called the vallecula.

It is a common site for foreign body lodgement. The epiglottis prevents aspiration by covering the glottis during swallowing. It is the most common airway structure that interferes with the proper placement of the SADs.



ANATOMY OF LARYNX

MODIFIED MALLAMPATTI SCORING



Class I: Soft palate, uvula, fauces, pillars visible	Class II: Soft palate, uvula, fauces visible	Class III: Soft palate, base of uvula visible	Class IV: Only hard palate visible
No difficulty	**No difficulty**	**Moderate difficulty**	**Severe difficulty**

The Modified Mallampatti score relates the tongue size to pharyngeal size. Performed with patient in a sitting position, head neutral, mouth open wide and tongue protruding to the maximum (no gag / no phonation).

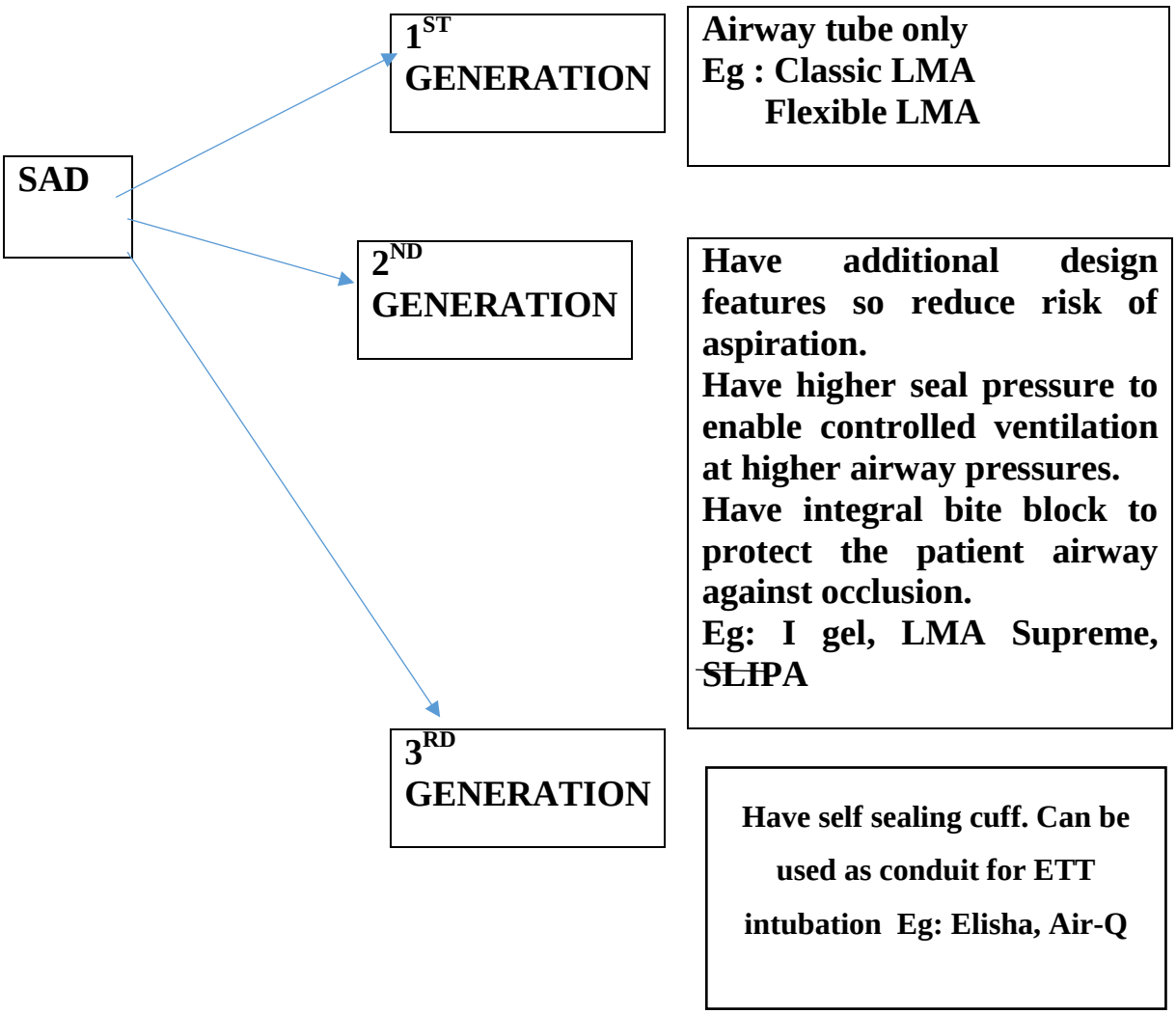
- Class 0: Epiglottis is visible.
- Class I: Visualization of the soft palate, fauces; uvula, anterior and the posterior pillars.
- Class II: Visualization of the soft palate, fauces and uvula.
- Class III: Visualization of soft palate.

In Samsoon and Young's modification of the Mallampati classification, IV class was added.

- Class IV: Only hard palate is visible. Soft palate is not visible at all.

TYPES OF SADs

BASED ON GENERATIONS – TIM COOKS CLASSIFICATION



EXTRA GLOTTIC AIRWAY DEVICE CLASSIFICATION:

1. EGA WITH AN INFLATABLE PERIGLOTTIC CUFF:

AMBU AURA LMA

KING LMA

LMA SUPREME

2. EGA WITH NO INFLATABLE CUFF

I-GEL

SLIPA

3. EGA WITH 2 INFLATABLE CUFFS

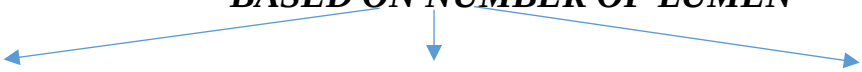
COMBITUBE

LARYNGEAL TUBE

4. EGA WITH SINGLE PHARYNGEAL INFLATABLE CUFF

COBRA

BASED ON NUMBER OF LUMEN



SINGLE LUMEN	DOUBLE LUMEN	TRIPLE LUMEN
1.SLIPA	**1. PROSEAL**	**1. ELISHA**
2. LMA UNIQUE	**2. COMBITUBE**	
	3. LMA - SUPREME	

SEALING MECHANISM CLASSIFICATION

1. CUFFED PERI LARYNGEAL SEALERS

- NON- DIRECTIONAL NON ESOPHAGEAL SEALERS- LMA CLASSIC
- ESOPHAGEAL SEALERS- PROSEAL LMA

  LMA SUPREME
- DIRECTIONAL NON ESOPHAGEAL SEALERS- FASTRACH LMA

2. CUFFED PHARYNGEAL SEALERS

- WITHOUT ESOPHAGEAL SEALING- COPA

- WITH ESOPHAGEAL SEALING- COMBITUBE

3. CUFFED ANATOMICALLY PRESHAPED SEALERS

- WITHOUT ESOPHAGEAL SEALING- STREAMLINED LINER OF THE PHARYNGEAL AIRWAY (SLIPA).

- WITH ESOPHAGEAL SEALING- BASKA, I-GEL.

LMA SUPREME

LMA Supreme is a new innovative supraglottic device that incorporates the features of LMA proseal and the LMA fastrach. LMA S is designed in such a way that cuff has a higher airway effective seal pressure than LMA classic and has a drain tube for the drainage of the stomach contents and also for the insertion of routine gastric tubes. These factors help to reduce the gastric insufflation, regurgitation and subsequent pulmonary aspiration. Consequently LMA supreme is preferred for airway management in patients with increased risk of pulmonary aspiration and in patients where a higher airway sealing pressure is needed.

Features

- single use, latex free
- made up of pvc on silicone
- an inflatable device
- cannot be used as conduit for intubation
- has a curved sniff shaft intended to bend with movements of head and neck. LMA Supreme has a manifold with an integral built-in bite block, an airway tube, gastric drainage tube and inflatable tube with pilot balloon.

Its anatomic curve facilitates easy insertion. Its elliptical airway shape facilitates insertion in patients with reduced interdental space without increasing the resistance to breathing. The drainage tube permits venting of stomach contents and insertion of standard gastric tubes. The cuff is high volume low pressure cuff that gives higher sealing pressure.

The mask is iso-oval shaped facilitating easy insertion without using fingers, or requiring introducer tool for insertion. The cuff bowl has epiglottic fins that prevent epiglottic occlusion.

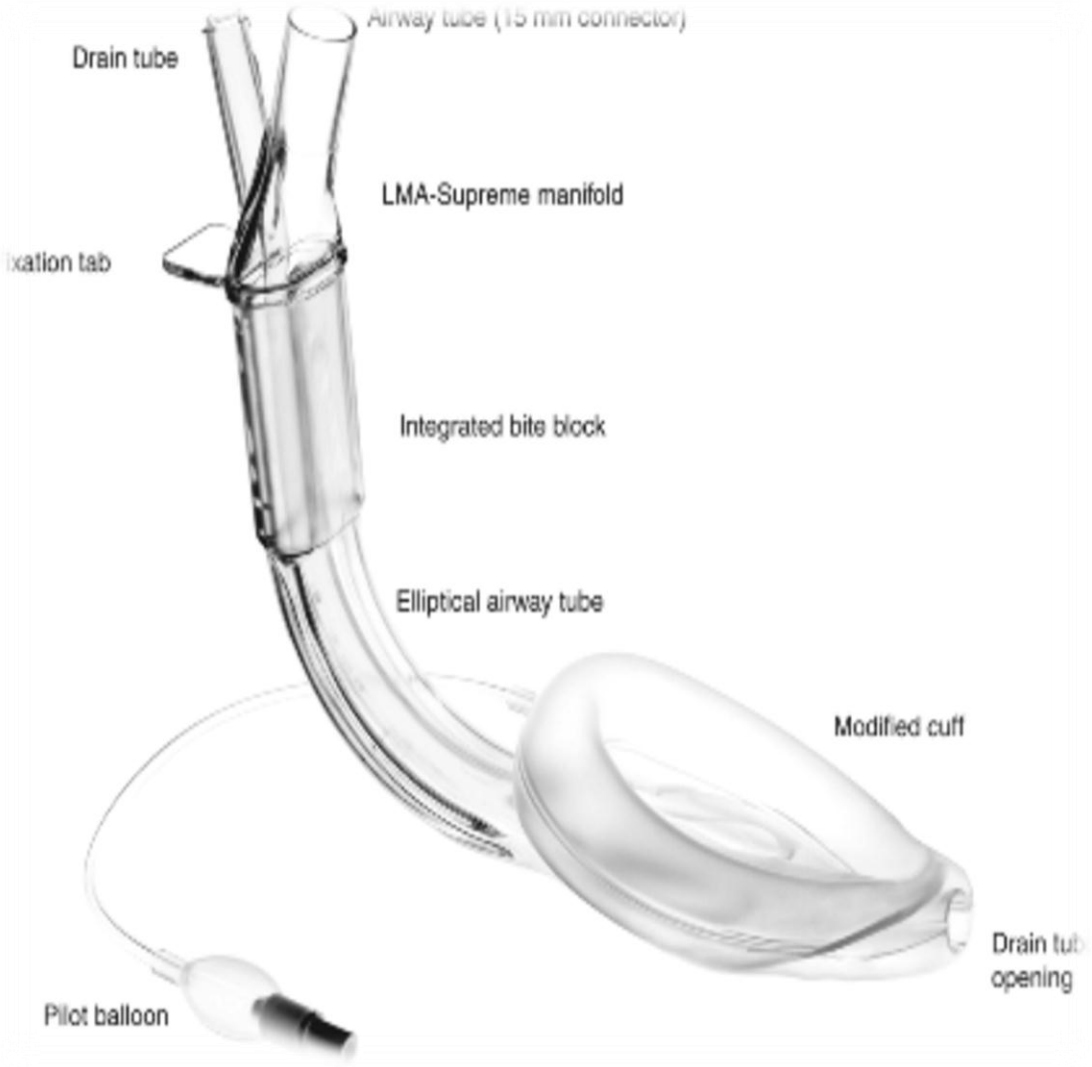
LMA Supreme has a fixation tube for securing the airway after insertion. Fixation tube also acts as a visual guide for correct size selection- that is, after inflation of cuff to 60cm H2O, fixation tube should be 1.5-2cm from upper lip.

The tip of LMA Supreme points more anteriorly to face the opening of upper oesophageal sphincter, sides face pyriform fossa and upper border rests against tongue base.

Has a specific feature- The epiglottic rest- an epiglottic- line protective ridge that prevents epiglottic downfolding and prevents the device from moving upwards out of position.

DISADVANTAGES

- The drain tube runs through the middle of airway tube dividing it into 2 narrow lumens. This limits it use for airway inspection and use as a conduit for intubation.
- Being made of PVC, it may cause more trauma than silicone devices.
- Insertion technique: Is inserted with cuff fully deflated using a single handed rotation technique. With one single swiping movement, it can be easily inserted into pharynx in semi supine position.


Airway tube (15 mm connector)
Drain tube
LMA-Supreme manifold
ixation tab
Integrated bite block
Elliptical airway tube
Modified cuff
Drain tub
opening
Pilot balloon

SIZE	WEIGHT AND AGE GROUP (kg)	CUFF VOLUME (ml)	SIZE OF GASTRIC TUBE (Fr)
1	Neonates/infants < 5 kg	5	6
1.5	Infants 5-10 kg	8	6
2	Infants 10-20 kg	12	10
2.5	Children 20-30 kg	20	10
3	Children 30-50 kg	30	14
4	Adults 50-70 kg	45	14
5	Adults 70-100 kg	45	14

LMA SUPREME SIZES

LMA Supreme™ Insertion Technique

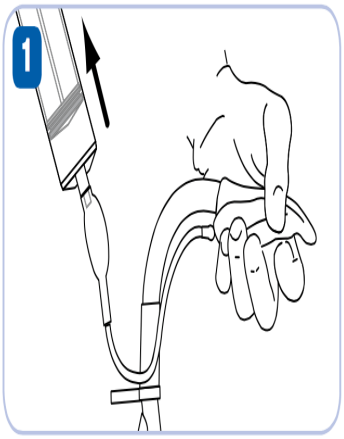


Figure 1: Fully deflate the mask for insertion. Attach a syringe. Compress the distal tip of the mask with thumb and index finger. Apply slight tension to the inflation line while removing all air until a vacuum is felt. Disconnect the syringe.

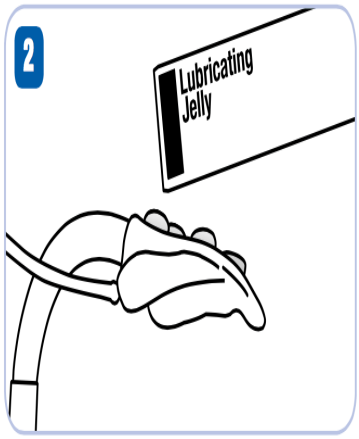


Figure 2: Generously lubricate the posterior surface of the cuff and airway tube.

Figure 3: Place the patient's head in a neutral or slight "sniffing" position. Hold the LMA Supreme™ at the proximal end with the connector pointing downward to the chest and the tip of the distal end pointing toward the palate.

Figure 4: Press the tip of the mask against the hard palate. Maintaining pressure against the palate, continue to rotate the mask inwards in a circular motion following the curvature of the hard and soft palate.

Figure 5: Continue until resistance is felt. The distal end of the mask should now be in contact with the upper esophageal sphincter. The device is now fully inserted.

Figure 6*: Maintaining inward pressure, secure the mask into position by taping cheek to cheek across the fixation tab. This should be done prior to inflation. Inflate with the minimum amount of air needed to achieve an effective seal. The recommended intracuff pressure should not exceed 60 cm H_2O.

I-GEL

- Latex free, sterile, single use device
- Made of soft gel like, transparent medical grade thermoplastic elastomer called styrene ethylene butadiene styrene.
- Has a non-inflatable cuff
- The gel like mask creates anatomical seal of pharyngeal, laryngeal and perilaryngeal structures. The perfect seal is leak proof and avoids any trauma, airway morbidity or distortion.
- Oropharyngeal seal pressure created is effective for both spontaneous and controlled ventilation.
- Can be used as conduit for endotracheal intubation.

FEATURES

- Has a distal soft non inflatable cuff. Its distal tip lies in the proximal opening of oesophagus. The proximal end of the cuff has an epiglottic rest that prevents the epiglottic downfolding. It also has an epiglottic ridge which lies in contact with tongue base and prevents upward and outward movement of the I-GEL.
- I-GEL has an elliptical buccal cavity stabilizer consisting of a circular airway lumen and a gastric lumen. The elliptical shape provides the stability and axial strength after insertion.
- Has a built in bite block with horizontal line which is a guide for correct depth of insertion.

15mm connector
Reliable connection to any standard catheter mount or connection

Proximal end of gastric channel

Clearly displayed product information
For quick easy reference. Includes confirmation of size and weight guidance

Position guide
(adult sizes only)

i-gel can be used as a conduit for intubation under fibreoptic guidance in a known or unexpectedly difficult intubation

Gastric channel
The i-gel incorporates a gastric channel (except size 1). It provides an early warning of regurgitation, allows for the passing of a nasogastric tube to empty the stomach contents and facilitates venting

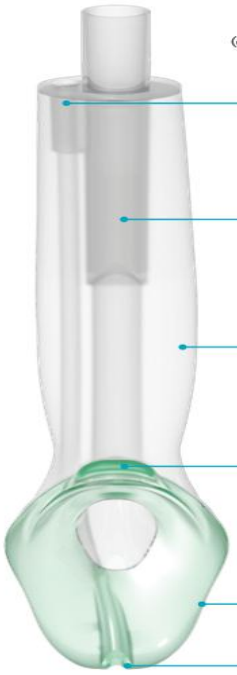
Integral bite block
Reduces the possibility of airway channel occlusion

Buccal cavity stabiliser
Aids insertion and eliminates the potential for rotation

Epiglottic rest
Reduces the possibility of epiglottic 'down folding' and airway obstruction

The non-inflatable cuff
Made from a unique soft gel-like material allowing ease of insertion and reduced trauma

Distal end of gastric channel

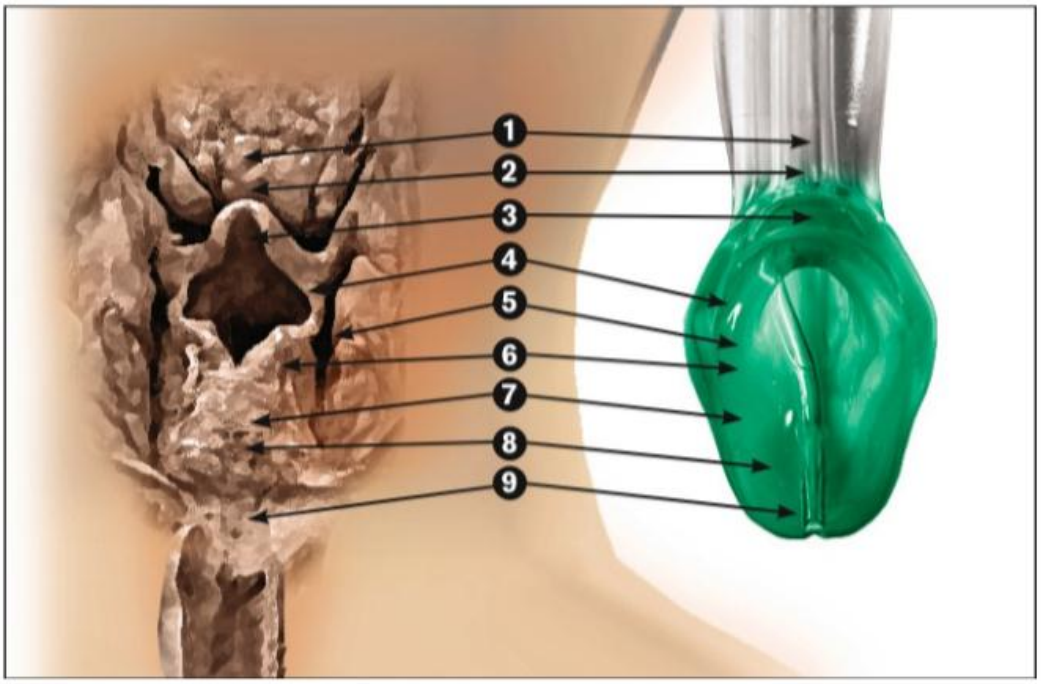


I-gel is available in seven sizes 1, 1.5, 2, 2.5, 3, 4, 5.

Size	Age group	Weight
1	Neonate	2-5kg
1.5	Infant	5-12kg
2	Small pediatric	10-25kg
2.5	Large pediatric	25-35kg
3	Small adult	30-60kg
4	Medium adult	50-90kg
5	Large adult	90+kg

INSERTION TECHNIQUE

- It does not require any manoeuvre.
- The patient is in “sniffing the morning air” position with head extension and neck flexion.
- The device is held at middle of shaft.
- The soft mask is inserted into the mouth towards the hard palate and advanced downwards, backwards until a definitive resistance is felt.



1. Tongue
2. Base of tongue
3. Epiglottis
4. Aryepiglottic folds
5. Piriform fossa
6. Posterior cartilages
7. Thyroid cartilage
8. Cricoid cartilage
9. Upper oesophageal opening

REVIEW OF LITERATURE

T.C.R.V. Van Zundert and J. R. Brimacombe et al [(1)] studied 150 patients (ASA 1-2, 18 – 80 years) randomly allocated for airway management with I-gel, LMA S, LMA P.Anaesthesia was given with fentanyl, propofol, sevoflurane mixture. Under laryngoscopic guidance, gastric tube guided technique was used for insertion. The ease of insertion, effective airway time, anatomical position and oropharyngeal leak pressure (OPLP) for each device during spontaneous breathing under anaesthesia were assessed. They found that LMA S was easier to insert and had a shorter effective airway time. Anatomical position was better for LMA S. Oropharyngeal leak pressures were similar among devices. There was no difference in performance for any variable between LMA P and I-gel

In the study 'Randomised comparison of the LMA S with I-gel in spontaneously breathing anaesthetised adult patients' by Chew EE, Hashim NH, Wang CY [(2),] ninety patients of ASA I & II were studied in a prospective randomised control study. The primary outcome measure was oropharyngeal leak pressure along with insertion success rate, ease of insertion and incidence of complications. The mean oropharyngeal leak pressure for LMA S was 25.6 cm H_2O which was greater than for I-gel 20.7cmH_2O p=0.001. The overall insertion success rates were similar p=0.132. The incidence of complications was low in both groups. The

grade of fibreoptic view was better with the I-gel than the LMA S p=0.001.

M Z Abdullah et al [3] had done a study in 150 ASA I and II non paralysed patients undergoing short surgeries under GA. The insertion time was significantly shorter with I- gel. The sealing pressure was better with LMA S. The sore throat was lower with I-gel compared with LMAS.

Srivatsava et al [4] study had compared I-gel and LMA S SAD in 100 patients randomised into two groups undergoing laparoscopic surgery. The patients were paralysed. The study showed that LMA S had better first time success rate in ease of insertion of device with minimal complications in mechanical ventilation.

Ana M Lopez et al [5] had done a cross over assessment of Ambu auragain, LMA supreme and I –gel in 7 fresh cadavers without difficult airway criteria. All devices were successfully inserted within three attempts, except for 1 case of LMA S, for which adjusting manoeuvres were required for correct insertion. Passage of 16G gastric tube was easy with LMA S. Fibreoptic tracheal intubation was easy with I-gel in less than 60 seconds. Lateral X-ray and neck dissections were done to confirm optimal alignment of all devices with the respiratory and digestive tracts.

V S Senthil Kumar et al [6] had done this study in 60 adult patients of ASA 1 and 2 of either sex undergoing GA for elective surgeries. The

mean insertion time for LMA S was significantly lower than I-gel ($p<0.05$). The airway leak pressures were comparable between the two devices. The first attempt success rate and ease of insertion were better with LMA S ($p<0.05$). There was no significant variation in the hemodynamic response in both the groups. Postoperative sore throat was noted in LMA S and blood staining was noted in I-gel group.

Surya Gowthami Katika et al [7] had compared I-gel and LMA S in 60 patients undergoing elective surgeries under GA. Mean time for placement of I-gel was greater than LMA S ($p=0.0001$). LMA S was easily inserted in 93% when compared to 57% with I-gel. Blood staining was noted with I-gel and postoperative sore throat was seen with LMA S. There was no incidence of desaturation, dental trauma or laryngospasm in both the groups.

Reyhan Polet et al [8] had compared I-gel and LMA classic in 120 patients undergoing urologic surgeries under GA without muscle relaxant. It was done by the same anaesthesiologist experienced in use of both the devices with a first time failure rate of <5%. Methylene blue method was used to detect gastric regurgitation. The insertion time with I-gel was significantly shorter. The fibreoptic glottis view for I-gel was significantly better. There was no difference between the two groups for incidence of sore throat 24 hours after the procedure.

Swathi Gupta et al [9] had compared I-gel and LMA S in 60 children for surgeries requiring flexion and extension of neck like thyroid surgery, tonsillectomy and neck exploration. The study was done to demonstrate the effect of neck flexion and extension in spontaneously breathing anesthetised pediatric patients. They measured OPLP with manometer connected at machine end. They had concluded that neck flexion significantly increased the leak pressure in both I-gel and LMA S. The OPLP was found to be slightly higher in flexion, lower in extension. Ventilation worsening occurred in flexion which was evident from decreasing tidal volume.

Joly N, Poulin LP et al [10] had done a trial comparing I-gel and LMA S in 100 adult patients undergoing elective surgery under GA. The devices were inserted successfully in 92% patients in both groups. There was no significant difference in the mean leak pressures. The insertion time was shorter with I-gel (19s) than with LMA S (17s) (p=0.003). There was no difference between the two groups regarding postoperative complications.

W.H.L Teoh, K M Lee et al [11] had compared the LMA S vs. the I-gel in 100 paralysed patients undergoing gynaecological laparoscopic surgery with controlled ventilation. There was no difference in

oropharyngeal leak pressure between the two groups (p=0.18), 96% of I-gels and 94% of LMA S were successfully inserted in the first attempt with similar ease (p=0.4). Gastric tube insertion was easy and quick with LMA S.

Hyuk Kim et al [12] had done a study comparing I-gel and LMA S in 100 anaesthetised and paralysed children. The insertion time of I-gel was longer than that of LMA S (p=0.004) . OPLP in the I-gel was higher than in LMA S (p=0.013) .On fibreoptic examination the vocal cord visualization was 90% in I-gel and 96% in LMA S. The number of airway manipualtions required were more with I-gel than LMA S (p<0.001).

Ricardo Ragazzi et al [13] had done a comparison of insertion success in novices between I-gel and LMA S. Inexperienced operators were given a short lecture and mannequin training. Trial was done in 80 patients undergoing breast surgery. First time insertion success was more with LMA S (p=0.029). More placement failure occurred with I-gel (p=0.025). Mean leak pressure and expired tidal volume were greater with LMA S. It was inferred from the study that LMA S may be preferable for emergency airway use by novices.

MATERIALS AND METHODS

STUDY CENTRE

ESIC Medical College & PGIMSR, K.K Nagar, Chennai-78

DURATION OF THE STUDY

January 2017-May 2018

STUDY DESIGN

Randomized , prospective, comparative interventional study

METHODS

Eighty patients between 18-60 years of age of either sex, weighing 50-90 kgs, ASA- I and ASA- II undergoing elective short surgeries of less than one hour duration under general anaesthesia were included in this study after approval of institutional ethical committee and with informed consent.

SAMPLE SIZE

The sample size was calculated based on n.Master 2.0 software with alpha error of 5% and power of 80%. Sample size was found to be

38 per group. Considering the dropouts (failed insertion), we rounded the number to 40 per group.

ANALYSIS PLAN

Collected data were analysed using statistical package IBM SPSS version 16.

INCLUSION CRITERIA

1. 18-60 years old of either sex
2. Weight 50-90 kgs
3. ASA-I & II patients scheduled for elective surgeries of less than one hour duration under general anaesthesia.
4. Body mass index – 20-30kg/m2
5. Modified Mallampati grade 1 & 2

EXCLUSION CRITERIA

1. Patient unwilling
2. Mallampati 3 & 4
3. Pregnancy
4. Chronic alcoholism , obstructive sleep apnoea
5. Anticipated airway difficulty, reduced cervical spine mobility
6. Hypertension, patients on beta blockers and anti hypertensive drugs

7. Patients at increased aspiration risk
8. Preoperative sore throat, respiratory infection, lung diseases
9. Neck or oropharyngeal airway surgery

Preoperative evaluation done included- age, weight, ASA status, and baseline vital parameters, history regarding previous anaesthesia, surgery, any significant illness, medications, and allergy were recorded. Complete physical examination and airway examination were done.

Preoperative investigations done were

- biochemical (renal and liver function tests)
- haematological (Hb % TC, DC, Platelet count)
- blood sugar (R)
- chest x-ray
- 12 lead ECG
- Bleeding time, clotting time
- Urine routine
- The patients were divided into two groups by slips in box technique,

GROUP 1: I-GEL

GROUP 2: LMA-SUPREME

Standard monitors- pulse oximetry for saturation(Spo2), non-invasive blood pressure monitoring(NIBP), electrocardiogram(ECG) were attached and the baseline heart rate, diastolic blood pressure, systolic blood pressure, mean arterial pressure , oxygen saturation and ETCO2 were recorded.

An intravenous line was started before procedure with 18G cannula and crystalloid infusion commenced. Preoxygenation was done in supine position with oxygen via face mask at flow rate of 8L/min for 3 minutes. Premedication was given with injection midazolam 0.03 mg/kg, injection glycopyrrolate 5mcg/kg and injection fentanyl 2mcg/kg intravenously 5 minutes prior to induction.

Heart rate, diastolic blood pressure, systolic blood pressure and mean arterial pressure were recorded before induction. All patients were induced with injection propofol 2.5mg/kg. No muscle relaxant was used. The patients were bag and mask ventilated with 100% O2 after confirming

- Lack of response to verbal commands.
- Lack of eyelash reflex.

The SAD was inserted by the trained anaesthesiologist. Airway manipulations required were neck extension and flexion, jaw thrust or a chin lift. The selected size of the SAD depended on patients' weight in accordance with the manufacturers' recommendations.

I-GEL SIZES

3: <50kg.

4: 50-90kg.

5: >90kg.

LMA- SUPREME SIZES

3: <50kg.

4: 50-70kg.

5: 70-100kg.

All the SADs were tested for leak before insertion.

Both the SADs were lubricated with 2% lignocaine jelly and inserted to the allotted group as per the standard insertion protocol. The cuff was inflated after the device was in place. The volume of air injected was according to the manufacturers recommendations. The leak was detected by auscultating over the neck with a stethoscope, auscultation over the epigastrium or an EtCO2> 45 mmHg. If there was airway

obstruction or a critical air leakage, then the device was removed and a different sized device was reinserted. If the insertion of a SAD required more than 4 attempts, or adequate ventilation was not achieved, it was considered a failure and tracheal tube was inserted, without giving muscle relaxant.

Effective ventilation was confirmed with,

1. Bilateral air entry.
2. Thoraco-abdominal movements
3. Square wave capnograph.
4. ETCO2 values of 30-45 cm H20
5. Stable oxygenation not less than 95%.

Anaesthesia was maintained with sevoflurane (1 MAC), 33% O2 and 67% N2O, connected to circle anaesthesia breathing system. After appropriate placement of SAD, pulse rate, diastolic blood pressure, systolic blood pressure, mean arterial pressure, Spo2, ETCO2 were recorded at 1min, 2min, 3 min.

If there was any increase in the mean arterial pressure and heart rate more than 20% of the induction values, an additional dose of injection propofol 40 mg was given to maintain the haemodynamics. Muscle relaxant was not given and patient was maintained on spontaneous

ventilation. Nitrous oxide and the volatile anaesthetic were discontinued after the last skin suture and fresh gas inflow rate was changed to 6L/min of oxygen. After return of the airway reflexes, and after the patient became conscious, the SAD was removed after thorough suctioning of the oral cavity.

Complications investigated:

1. Any visible blood stain of the device was noted on removal.

2. Each patient was questioned in the recovery room and 24 hours post operatively for sore throat (constant pain independent of swallowing).

PATIENT FLOW CHART

↓

ASSESSMENT

↓

ASA I,II OF THE EITHER SEX
18-60 YEARS
50-90 KG
INFORMED CONSENT

↓

ON THE DAY OF SURGERY
RANDOMISATION
(SEALED ENVELOPE)

↓

GROUP 1/ GROUP 2
PATIENT SHIFTED TO THE OPERATION THEATRE BY A TRAINED PERSONNEL IN A TROLLEY

↓

INSIDE THEATRE

↓

MONITORS CONNECTED
INTRAVENOUS LINE ACCESS AIRWAY CART AND RESCUE MEASURES
WHO CHECKLIST

↓

PREMEDICATION- INJECTION MIDAZOLAM 0.03mg/Kg

INJECTION GLYCOPYRROLATE 5mcg/Kg

INJECTION FENTANYL 2mcg/Kg

↓

INDUCTION	**INJECTION PROPOFOL 2.5mg/Kg.**

↓

LMA SUPREME OR I-GEL INSERTED.

NUMBER OF INSERTION ATTEMPTS WERE NOTED. IF NUMBER OF ATTEMPTS WERE MORE THAN 4, PATIENT WAS INTUBATED WITH ETT.

MAINTAINED WITH SEVOFLURANE 1 MAC
O2 33 %/N2O 67%

↓

VENTILATION WAS ASSISTED TO MAINTAIN ETCO2 BETWEEN 32 AND 36 mmHg.

↓

MEAN ARTERIAL PRESSURE, DIASTOLIC BLOOD PRESSURE, SYSTOLIC BLOOD PRESSURE, HEART RATE WAS NOTED BEFORE INSERTION AND AT 1 MIN, 2 MIN, 3 MIN AFTER INSERTION.

↓

N20/ VOLATILE ANESTHETIC DISCONTINUED AFTER LAST SKIN SUTURE.

↓

WHEN ADEQUATE SPONTANEOUS REGULAR BREATHING PATTERN WAS RE ESTABLISHED AND WHEN THE PATIENT WAS ABLE TO OPEN THE EYES ON COMMAND. LMA SUPREME/ I GEL WAS REMOVED.

↓

THE SAD WAS EXAMINED FOR PRESENCE OF BLOOD AFTER REMOVAL.

↓

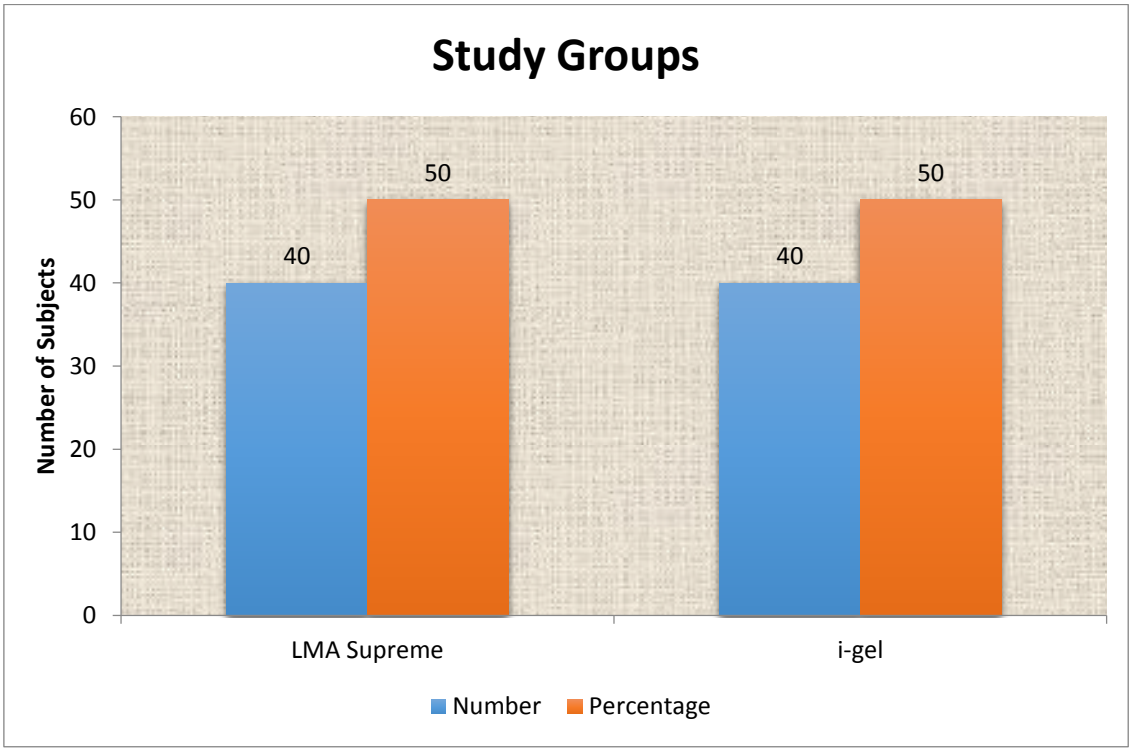
POST OPERATIVE PERIOD

IN THE RECOVERY ROOM AND AFTER 24 HOURS, PATIENT WAS QUESTIONED ABOUT SORE THROAT

STATISTICAL ANALYSIS

Groups

Study Groups	Intervention	Number	%
LMA Supreme	Insertion of LMA Supreme for short procedures under General Anesthesia	40	50.00
I-gel	Insertion of I-gel for short procedures under General Anesthesia	40	50.00
Total		80	100.00



Null Hypothesis

Null Hypothesis : H0	Insertion of LMA Supreme is equal to Insertion of I-gel for short procedures under General Anesthesia with respect to hemodynamic stress
Alternate Hypothesis : H1	Insertion of LMA Supreme is superior/inferior to Insertion of I-gel for short procedures under General Anesthesia with respect to hemodynamic stress

DATA ANALYSIS

Descriptive statistics was done for all data and were reported in terms of mean values and percentages. Suitable statistical tests of comparison were done. Continuous variables were analysed with the unpaired t test.. Categorical variables were analysed with the Chi-Square Test and Fisher Exact Test. Statistical significance was taken as $P < 0.05$. The data was analysed using SPSS version 16 and Microsoft Excel 2007.

SAMPLE SIZE ESTIMATION

Sample size was determined based on

Study

Application of the LMA-Supreme_ and I-gel laryngeal masks during pelvic operations in adults.

Authored by

Fei Wang et al [37]

Published in

Asian Journal of Surgery (2016) 39, 1e5

In this study, I-gel group had fewer complications (p Z 0.03 (9% difference)

Description

- The confidence level is estimated at 95%
- with a z value of 1.96
- Power of study at 80%
- the confidence interval or margin of error is estimated at +/-9
- Assuming p% =9 and q%=91

$n = p\% \times q\% \times [z/e\%]^2$

$n = 9 \times 91 \times [1.96/9]^2$

n= 38 (per group)

Therefore 76 is the minimum sample size required for the study.In our study we planned to recruit a minimum of 80 subjects (40 per intervention arm)

OBSERVATION AND RESULTS

This prospective randomized comparative interventional study was conducted in 80 patients of either gender of ASA I & II in the age group of 18 to 60 years of either sex posted for short procedures under GA. The patients were randomly divided into two groups by slips in the box technique.

Group 1 - I- gel

Group 2 - LMA- Supreme

Picture 1 : Age distribution

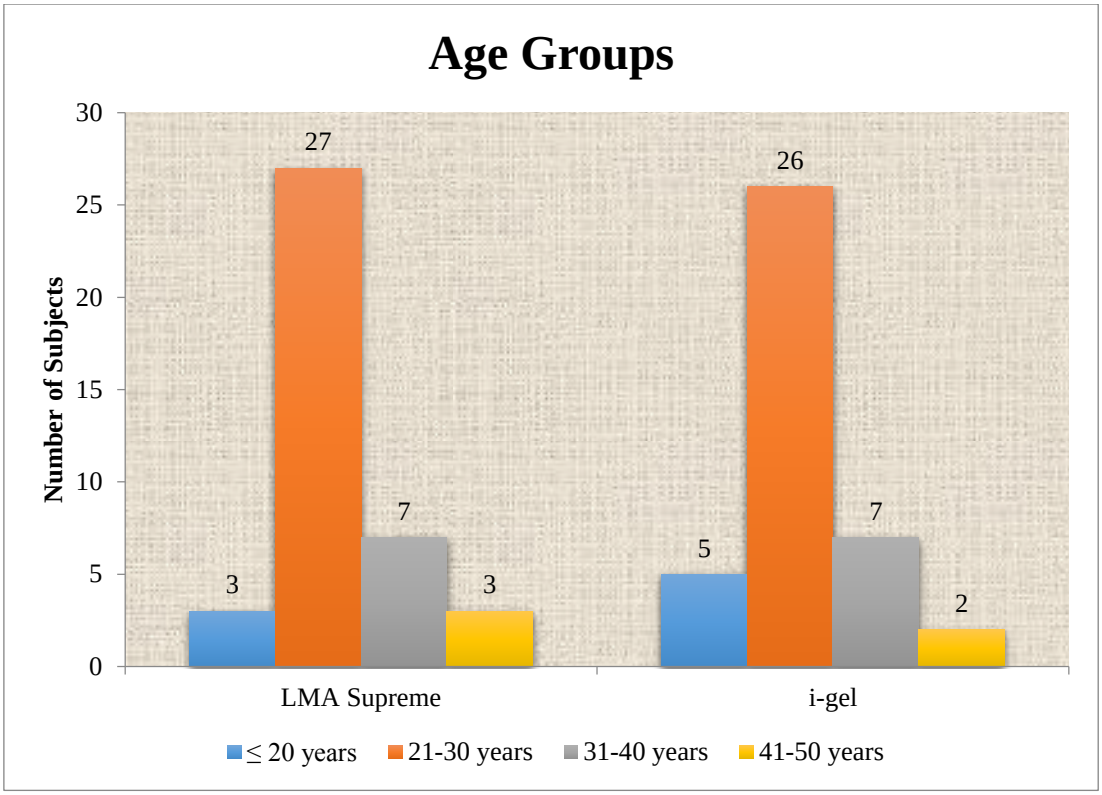


Table 1 : Age distribution

Age Groups	LMA Supreme	%	I gel	%
≤ 20 years	3	7.50	5	12.50
21-30 years	27	67.50	26	65.00
31-40 years	7	17.50	7	17.50
41-50 years	3	7.50	2	5.00
Total	40	100.00	40	100.00

Note: p value < 0.05 is significant.

Age Distribution	LMA Supreme	I-gel
Mean	27.63	27.18
SD	6.98	6.96
P value Unpaired t Test		0.774

The youngest patient was 18 years and the oldest patient was 60 years old. Majority of patients fell into age group of 21 – 30 yrs. The distribution of patients with respect to age was comparable in both the groups [p = 0.774]. The mean age of patients who were inserted with LMA – S group was 27.63 ± 6.98 yrs and those who were inserted with I-gel group was 27.18 ±6.96 yrs. There was no statistically significant difference between the mean ages of the two groups. The two groups were comparable in age.

Picture 2 : Gender distribution of patients studied

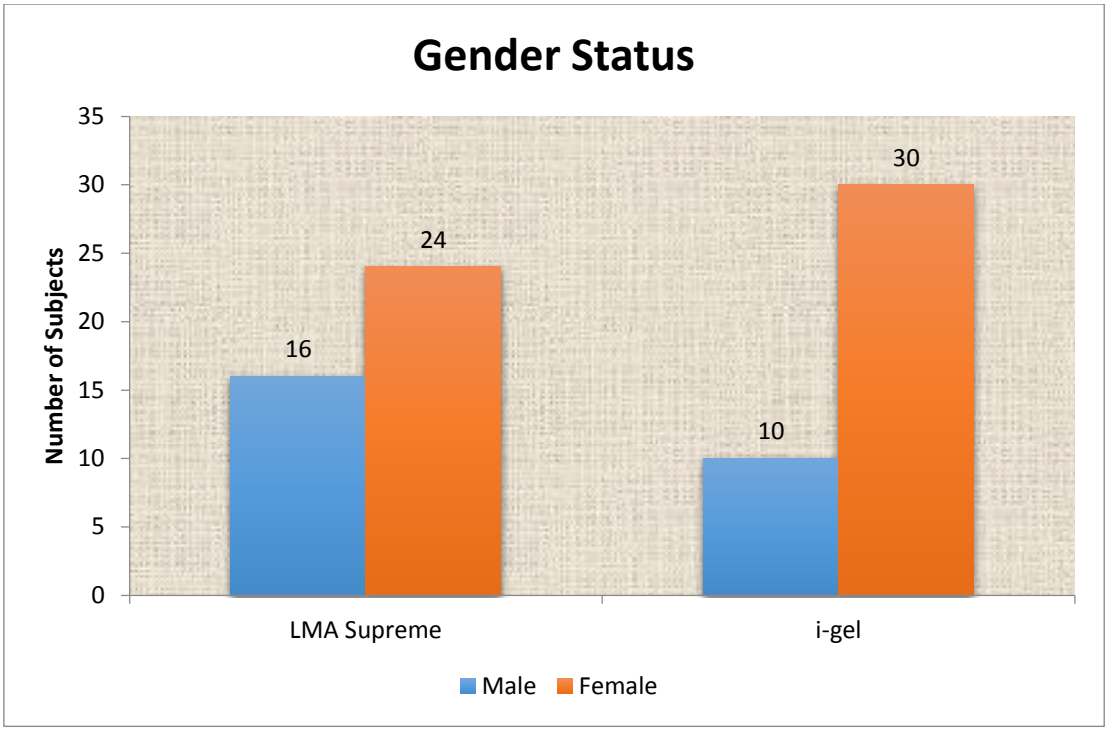


Table 2 : Gender distribution between the two groups

Gender Status	LMA Supreme	%	I-gel	%
Male	16	40.00	10	25.00
Female	24	60.00	30	75.00
Total	40	100.00	40	100.00
P value Chi Squared Test	0.152			

Note : $p < 0.05$ is significant

Patients of either gender were randomly selected for this study. LMA – S group had 16 males and 24 females while I – gel group had 10 males and 30 females. The p value is 0.152 and it is not significant. So the two groups were comparable in terms of gender ratio.

Picture 3 : Weight of patients

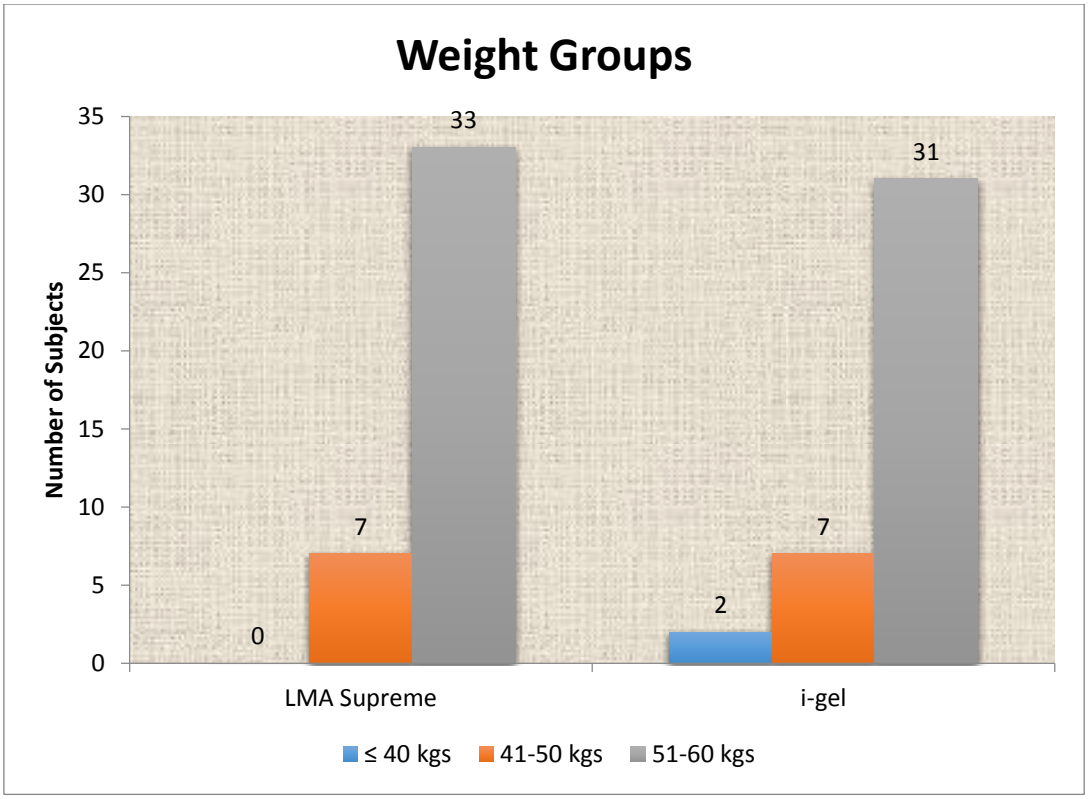


Table 3 : Weight of patients

Weight Groups	LMA Supreme	%	I-gel	%
≤ 40 kgs	0	0.00	2	5.00
41-50 kgs	7	17.50	7	17.50
51-60 kgs	33	82.50	31	77.50
Total	40	100.00	40	100.00

Note : p value < 0.05 is significant.

Weight Distribution	LMA Supreme	i-gel
Mean	55.60	53.58
SD	5.09	5.85
P value Unpaired t Test		0.103

The mean weight in LMA – S group was 55.60 ± 5.09 Kgs and I – gel group was 53.58 ± 5.85 Kgs with p = 0.103. There was no statistically significant difference between mean weight of patients in two groups. Hence the two groups were comparable in terms of weight.

Picture 4 : Number of attempts of device insertion

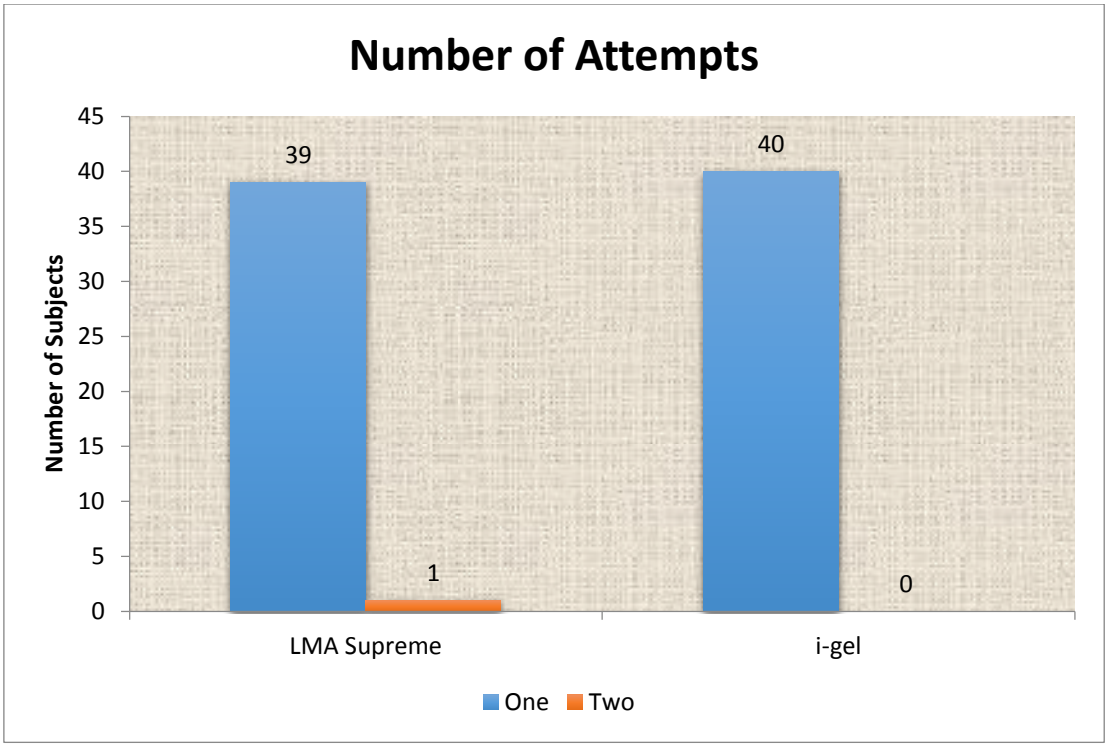


Table 4 : Number of attempts of insertion

Number of Attempts	LMA Supreme	%	I-gel	%
One	39	97.50	40	100.00
Two	1	2.50	0	0.00
Total	40	100.00	40	100.00
P value Chi Squared Test	>0.999			

Note : p valuve < 0.05 is significant.

The insertion success rate for the airway device in LMA – S group was 97.50 % in first attempt and 2.50 % in second attempt while in I – gel group it was 100 % in first attempt. The results were found to be statistically not significant with p value > 0.999.

Graph 1 : Systolic blood pressure changes between two groups

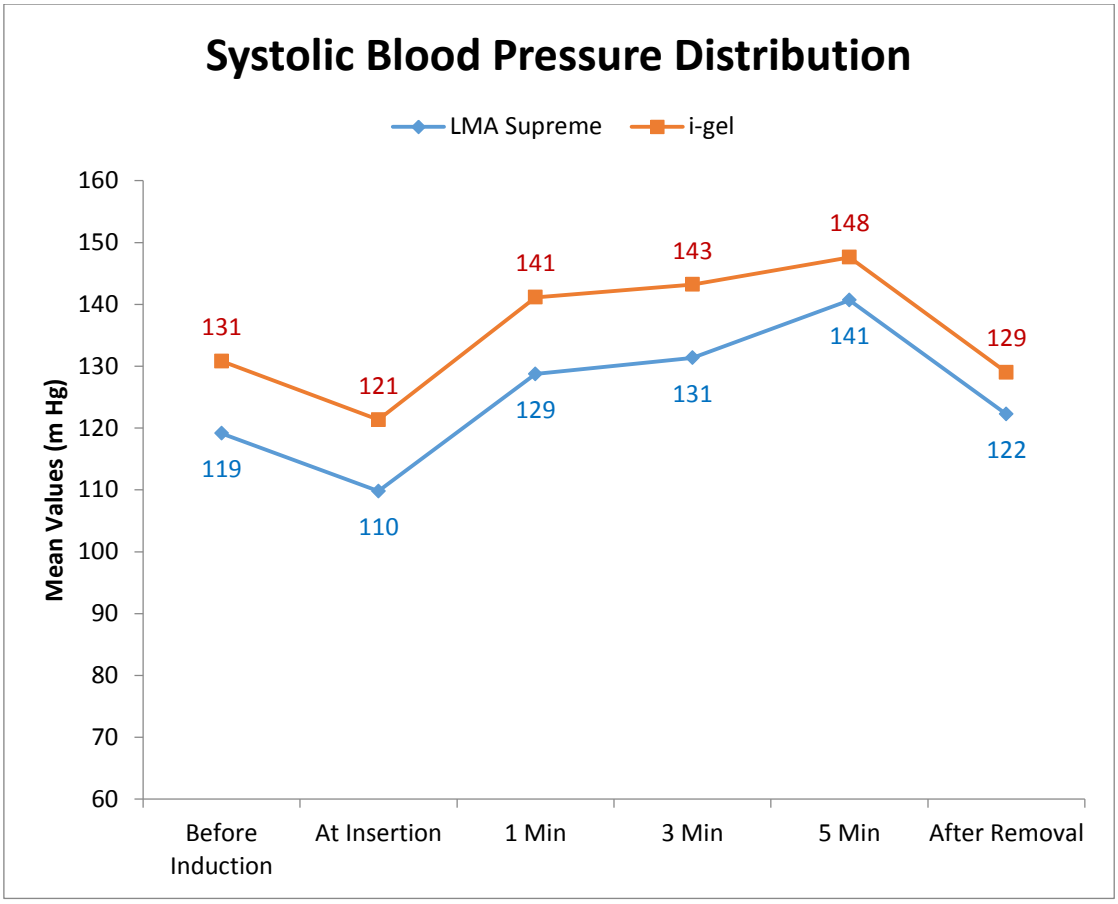


Table 5 : Systolic blood pressure changes between two groups

Systolic Blood Pressure Distribution	LMA Supreme		I-gel		P value Unpaired t Test
	Mean	SD	Mean	SD	
Before Induction	119.13	11.64	130.80	5.28	0.588
At Insertion	109.80	11.14	121.35	5.55	0.619
1 Min	128.75	11.80	141.15	5.38	0.554
3 Min	131.35	11.91	143.20	5.20	0.521
5 Min	140.68	9.14	147.60	5.80	0.471
After Removal	122.25	12.20	129.00	5.45	0.804

Note : p value < 0.05 is significant.

The SBP decreased by around 10 mm Hg after induction in both the groups. One minute after insertion of LMA, the SBP increased about 10 mm Hg above the baseline value. Both the groups showed similar trend and there was no significant difference between them.

Graph 2 : Diastolic blood pressure changes between two groups

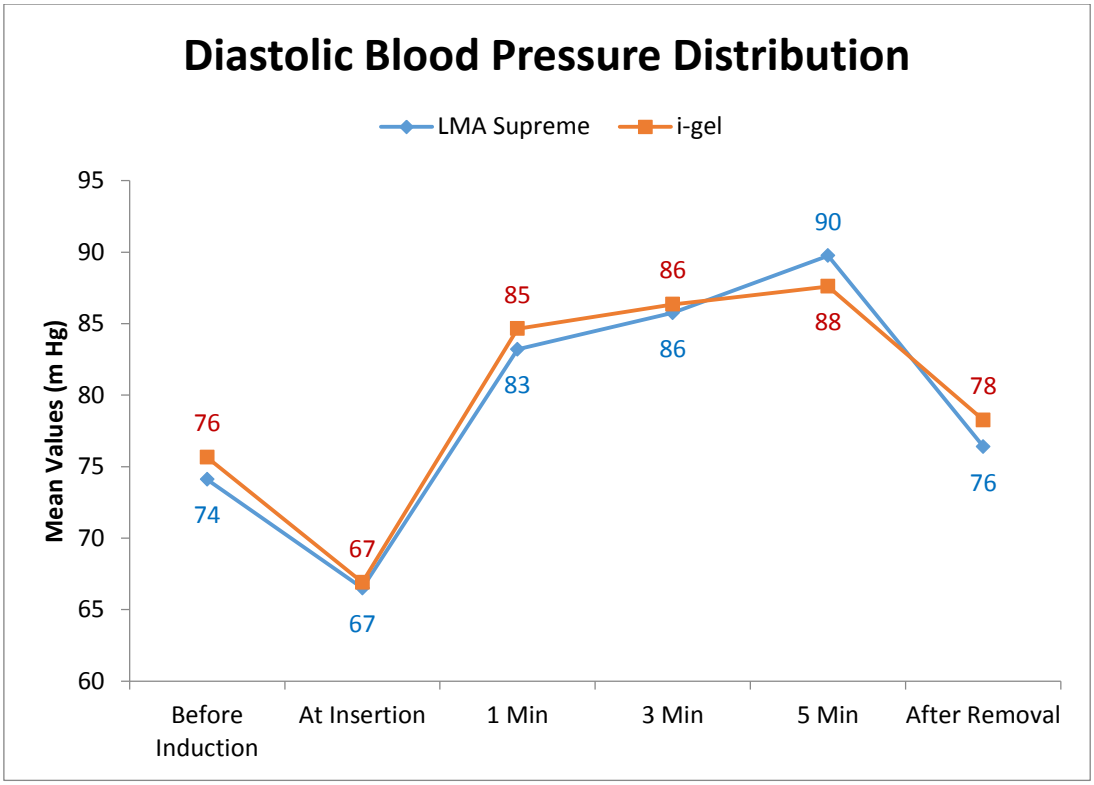


Table 6 : Diastolic blood pressure changes between two groups

Diastolic Blood Pressure Distribution	LMA Supreme		i-gel		P value Unpaired t Test
	Mean	SD	Mean	SD	
Before Induction	74.10	7.19	75.65	6.88	0.420
At Insertion	66.50	7.30	66.90	6.93	0.349
1 Min	83.20	7.20	84.65	6.66	0.421
3 Min	85.75	7.85	86.35	6.61	0.429
5 Min	89.75	5.25	87.60	15.29	0.394
After Removal	76.40	5.62	78.25	5.80	0.865

Note : p value < 0.05 is significant. The DBP variation between the two groups followed the same trend as the SBP variation.

Graph 3 : Heart rate changes between two groups

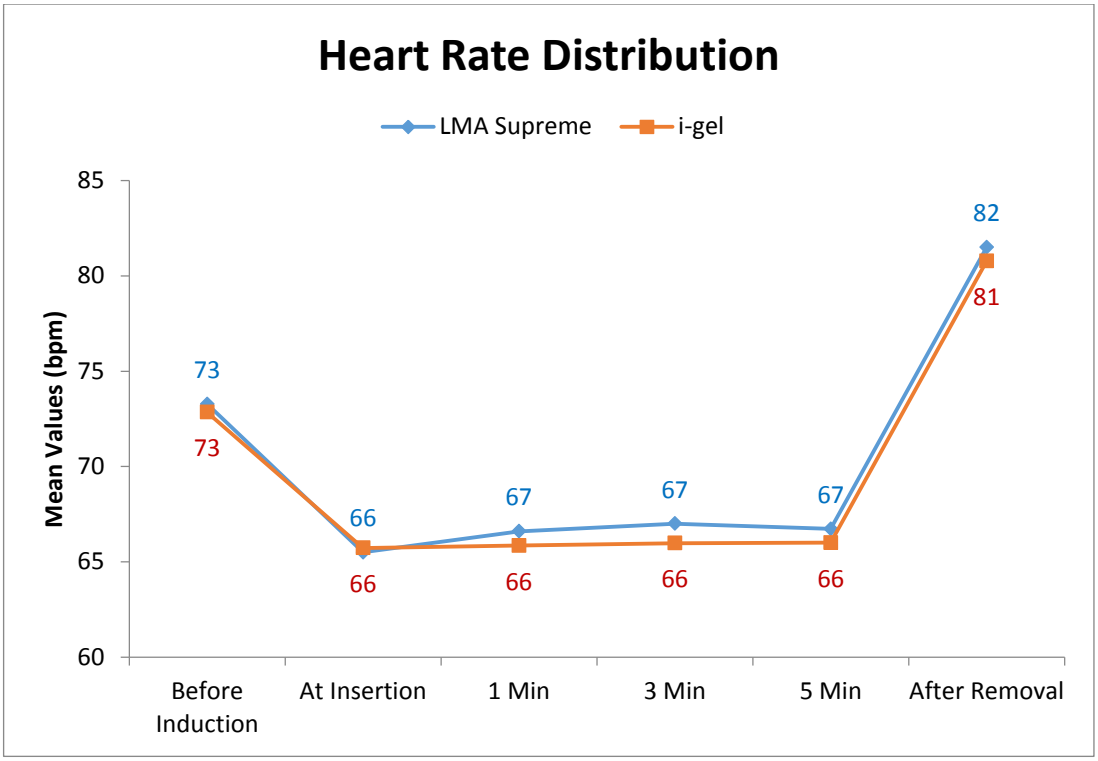


Table:7. Heart rate variation between two groups.

Heart Rate Distribution	LMA Supreme		i-gel		P value Unpaired t Test
	Mean	SD	Mean	SD	
Before Induction	73.28	6.62	72.85	2.50	0.795
At Insertion	65.50	3.44	65.73	2.60	0.875
1 Min	66.60	3.51	65.85	2.54	0.788
3 Min	67.00	2.11	65.98	3.17	0.954
5 Min	66.73	2.47	66.00	2.20	0.783
After Removal	81.50	6.36	80.78	5.29	0.856

Note : p value < 0.05 is significant.

Heart rate variations between the two groups follow a similar trend. The hemodynamic changes observed during insertion and removal of the two SADs were within normal ranges. Propofol and sevoflurane used for GA could have obtunded the stress response. But when compared with the stress response associated with laryngoscopy, the use of SADs was found to be less traumatic. The hemodynamic changes were mild, and did not require any corrective measures.

Graph 4: MAP variation between two groups

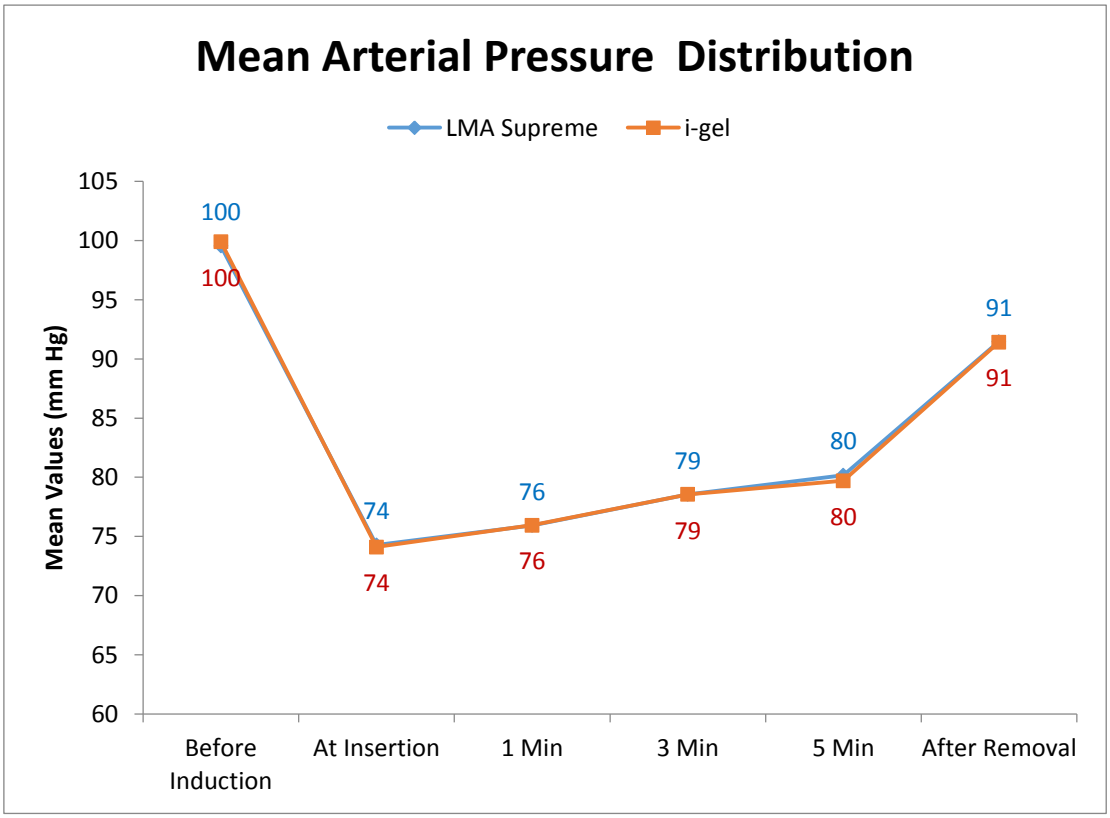


Table:8. MAP variation between two groups

Mean Arterial Pressure Distribution	LMA Supreme		I-gel		P value Unpaired t Test
	Mean	SD	Mean	SD	
Before Induction	99.55	5.78	99.90	6.45	0.821
At Insertion	74.28	2.75	74.10	2.76	0.986
1 Min	75.93	2.06	75.95	2.07	0.662
3 Min	78.55	4.30	78.55	3.37	0.950
5 Min	80.18	3.37	79.70	2.59	0.890
After Removal	91.48	3.44	91.43	3.35	0.961

Note : p value < 0.05 is significant.

The MAP determines the perfusion pressure of the heart , brain and kidneys. The MAP is regulated within a stipulated range, that is : coronary : 50 to 150 mm Hg, brain : 60 to 160 mm Hg, kidneys : 80 to 180 mm Hg. As long as MAP lies within this range of values , the vital organs are able to maintain their functional state. The hemodynamic changes observed at the time of insertion, 1 min., 3 min., 5 mins., after insertion and after removal of the device where within the limits of auto regulation. This showed that both insertion as well as removal of the SADs were associated with stable hemodynamics. No significant change was observed between the two groups.

Graph 5 : Changes in O2 saturation between two groups

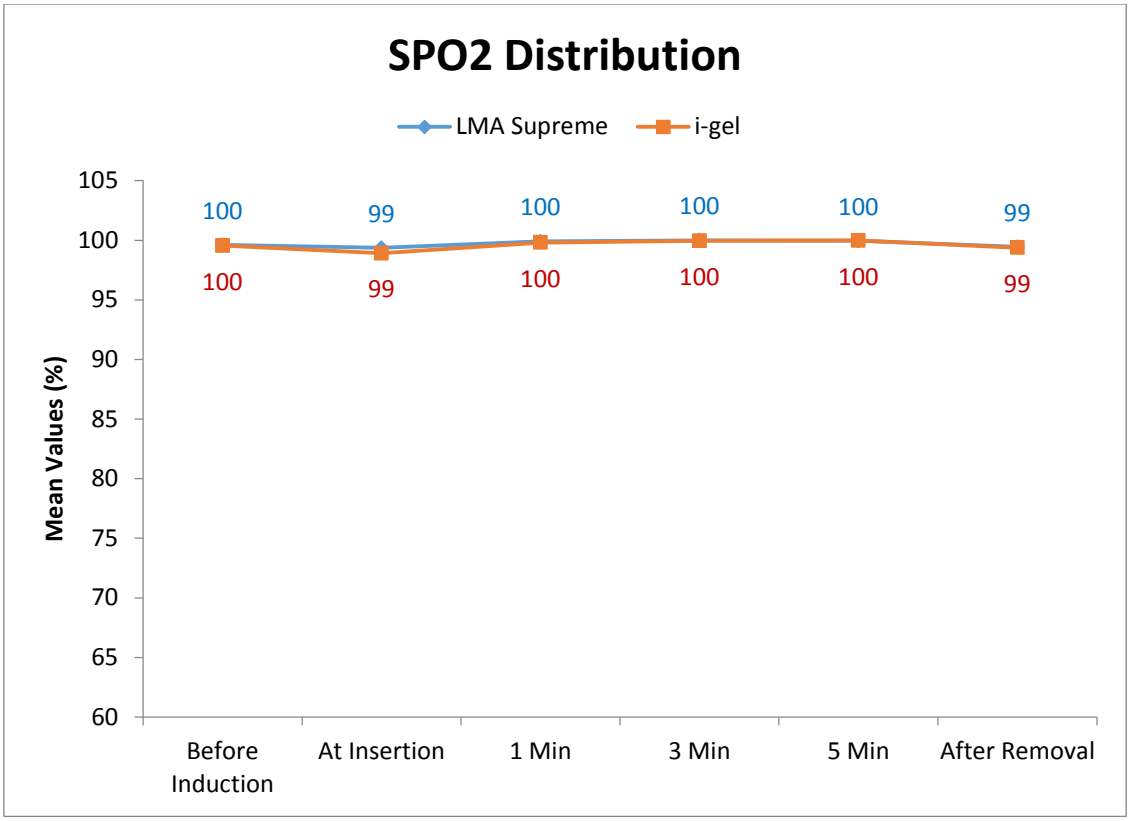


Table 9 : Changes in O2 saturation between two groups

SPO2 Distribution	LMA Supreme		i-gel		P value Unpaired t Test
	Mean	SD	Mean	SD	
Before Induction	99.60	0.59	99.55	0.64	0.837
At Insertion	99.36	0.78	98.90	0.71	0.974
1 Min	99.90	0.30	99.80	0.52	0.835
3 Min	100.00	0.00	99.95	0.22	>0.999
5 Min	99.95	0.22	99.98	0.16	0.642
After Removal	99.45	0.68	99.38	0.63	0.818

Note : p value < 0.05 is significant .

As both the SADs were inserted easily, there was no drop in oxygen saturation during the use of the LMA – S and I – gel. No significant change was observed between the groups.

Graph 6 : Changes in EtCO2 between two groups

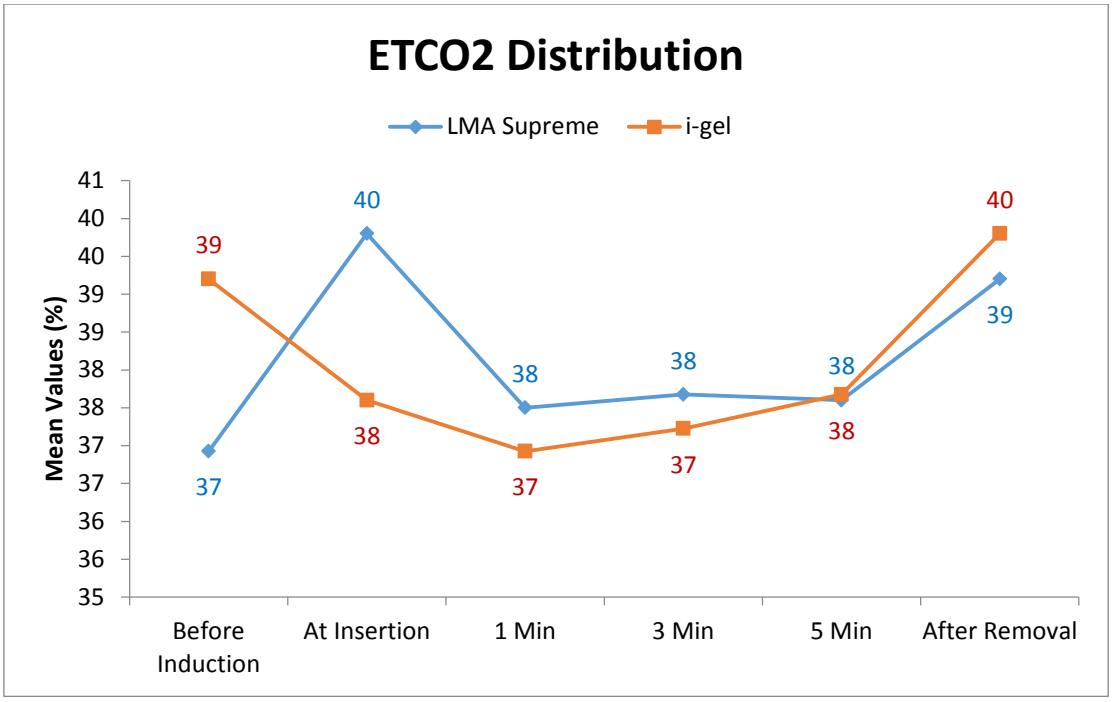


Table 10 : Changes in EtCO2 between two groups

ETCO2 Distribution	LMA Supreme		i-gel		P value Unpaired t Test
	Mean	SD	Mean	SD	
Before Induction	36.93	1.54	39.20	1.71	0.608
At Insertion	39.80	1.65	37.60	1.82	0.884
1 Min	37.50	1.28	36.93	1.54	0.886
3 Min	37.68	1.65	37.23	1.83	0.963
5 Min	37.60	1.82	37.68	1.65	>0.999
After Removal	39.20	1.71	39.80	1.65	>0.999

Note : p value < 0.05 is significant.

There were no significant changes in EtCO2 between the two groups.

Picture 5 : Post-operative complications

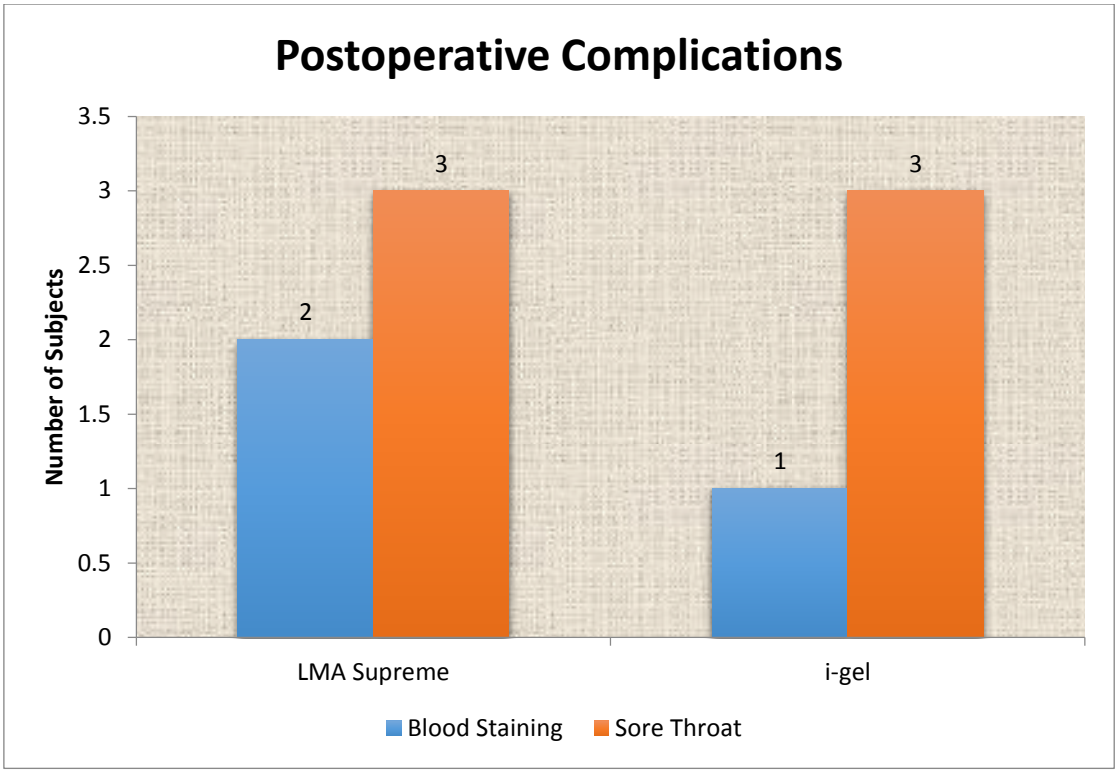


Table 11 : Comparison of post-op complications between the two groups

Postoperative Complications	LMA Supreme	%	I-gel	%	P value Fishers Exact Test
Blood Staining	2	5.00	1	2.50	0.879
Sore Throat	3	7.50	3	7.50	>0.999

Note : p value < 0.05 is significant.

With respect to postoperative complications table, it was evident that the incidence of blood staining was 5.00% in LMA Supreme group and 2.50% in i-gel group. Similarly incidence of sore throat was 7.50% in LMA Supreme group and 7.50% in i-gel group. When analysed statistically using chi squared test, the increased difference in the incidence of blood staining in LMA Supreme group compared to i-gel group (percentage difference = 2.50 points, 50% higher) was found to be statistically insignificant ($p > 0.05$). Similarly the equivocal difference in the incidence of sore throat in LMA Supreme group compared to i-gel group was found to be statistically insignificant ($p > 0.05$). Therefore we fail to reject the null hypothesis, which assumes that there is no difference in postoperative complications between the intervention groups.

DISCUSSION

The supraglottic airway devices have revolutionized anaesthesia practice and are now increasingly being used as an excellent alternative to mask ventilation and endotracheal intubation with minimal complications.

The I-gel is a novel SAD made up of thermoplastic elastomer with a non-inflatable cuff. It fits snugly onto the peri laryngeal structures, offering a good seal during anaesthesia for both controlled and spontaneous ventilation.

The LMA supreme has a curved rigid airway tube made up of medical grade poly vinyl chloride with an inflatable cuff. Both the devices have an inbuilt drainage tube for gastric aspiration.

This study was conducted at a medical college in South India to compare the hemodynamic stress response during insertion of LMA. Supreme versus I-gel in patients undergoing short surgeries under GA along with their ease of insertion and postoperative morbidity. This is a prospective randomised comparative interventional study conducted in 80 patients of either gender, aged 18-60 years, of ASA I & II.

Our study was conducted on spontaneously breathing patients without using muscle relaxants. Gasteiger et al, Eschertzhuber et al[29], Sang Yoong Park et al[28] have used muscle relaxants for SAD insertion in their studies. Franeksen et al in their studies compared LMA unique and I - gel in anaesthetized non paralysed patients

In our study we found that there was no significant difference between I - gel and LMA supreme in the success rate at first attempt insertion. Our finding is consistent with a study by Teoh et al[11] and Theiler et al[24] that showed 94 % with LMA supreme and 96 % with I-gel, successful insertion with first attempt. Raggazi et al[13] in the study found that LMA – S has fewer insertion failures than I - gel because of it's inflatable cuff which caused transient peri laryngeal pain.

In our study the HR, SBP , DBP , MAP , EtCO2 , SpO2 in LMA-S and I-gel groups were observed before insertion, at insertion and at 1,3,5 min and after removal of SAD. We found no significant difference between the two groups. Our observations were consistent with Singh et al[23] study in which they have concluded that both LMA-S and I-gel showed no significant statistical difference with HR. Shin WJ et al[26] study also showed that there was no difference in the hemodynamic data between the two SADs.

Our study showed no significant post operative complications – blood on the surface the device on removal or post operative sore throat – were observed between LMA-S and I -gel. Ragazzi et al[13] reported that sore throat was more common with LMA-S as it's inflatable cuff can cause compression of peri laryngeal tissues. Our findings were consistent with Helmy Am et al[27] study which also concluded no significant statistical difference regarding post opertative sore throat, hoarseness, between LMA-S and I-gel .

Our study did not limit, standardise or record the use of peri operative analgesics. We also did not use fibreoptic bronchoscope to confirm the position of the airway device. We have studied only low risk patients (ASA I &II) who had normal airways and were mostly not obese.These were the limitations of our study.

CONCLUSION

We concluded that,

- The SADs are recommended in the difficult airway algorithms . Several types of SADs are available and it is important to know which airway device performs with a high success rate with less complications.

- The I-gel was easier to insert and required less attempts of insertion when compared with LMA-Supreme. The I-gel's non inflatable thermoplastic elastomer cuff fitted snugly creating a good anatomical seal. The inflatable cuff of LMA-S caused transient pharyngolaryngeal slipping.

- The bulky design of the I-gel may make its insertion less predictable and tongue size more influential. The insertion time for LMA-S was longer possibly because of the extra time taken to inflate the cuff.

- Both LMA Supreme and I – gel did not cause any significant hemodynamic instability during insertion and removal. Both show comparable performance.

- The I – gel showed less post operative morbidity – blood on removal, sore throat – as it's non inflatable cuff probably decreased the risk of airway tissue compression and hence tissue ischaemia.

- Both I-gel and LMA-S showed no incidence of severe airway trauma, such as laryngeal stridor , laryngospasm , bronchospasm , hypoxia or aspiration.

We conclude that both LMA Supreme, as well as I-gel are both comparable with respect to ease of insertion, and safe , since there was no laryngospasm or bronchospasm , in either of the groups.

BIBLIOGRAPHY

1. T.C.R.V Van Zundert and J.R Brimacombe et al similar oropharyngeal leak pressures during anaesthesia with I-gelTM, LMA prosealTM and LMA supreme TM laryngeal masks (Acta Anaesth. Belg., 2012,63,35-41)

2. Chew EE, Hashim NH, Wang CY. Randomised comparison of the LMA supreme with the I-gel in spontaneously breathing anaesthetised adult patients. Anaesth Intensive care 2010 Nov;38(6)1018-22.

3. MZ Abdullah, Alzaham, N A Manap, R A Rahman, J M Zain, A Dan. Comparison of I-gel TM and LMA supreme TM with respect to ease of insertion, sealing airway pressure and postoperative throat complications. The internet journal of anaesthesiology. 2015 Volume 34 number 1

4. Srivatsava ,Jindal P, Rizvi A, Sharma JP. Is I-gel a new revolution among supraglottic airway devices? A comparative evaluation. Middle East J Anesthesiol. 2009;20:53–8. [PubMed]

5. Ana M Lopez Bamgbade OA et al : Evaluation of i-gel airway in patients undergoing general surgeries under general anaesthesia. Eus j Anaesthesiology.2008 Oct; 25(10); 865-26

6. V S Senthil Kumar et al. Comparision of clinical performance of I – gel with LMA supreme in elective surgeries.Indian J Anaesth.2010;53:302 – 305.

7. Surya GowthamiKatika et al. Comparative study of I – gel and LMA supreme in gynaecological laparoscopic surgeries. Scientific world journal.2015; 634 – 320.

8. ReyhanPolet et al. Comparative study of I – gel and LMA classic in urological surgeries in non paralysed patients Can J Anaesth.2014;61:794 – 800.

9. Swathi Gupta et al. Comparative study of I – gel and LMA supreme in children undergoing neck and head surgeries.Indian J Anaesth 2005 ;49:275 – 280.

10. Joly N, Poulin LP Hagberg CA, A randamozied clinical comparison of the intersurgical I- gel and LMA unique in non obese adults during general surgery. Minerva Anestesiol.2011; 77:292 – 297.

11. Teoh WH, Lee K M et al. Comparison of LMA supreme vs the I – gel in paralysed patients undergoing gynaecological laparoscopic surgery with controlled ventilation. Anaesthesia.2010; 65:1173 – 1179.

12. Kim, Brull SJ. L. Comparion of I – gel and LMA supreme in anaesthetized and paralysed children anaesthetic implications.Anesth Analg.1993; 76:1120 – 1133.

13. Ragazzi R, et al LMA S upreme vs- I – gel – comparison of insertion success in novices.Anaesthesis 2012; 67:384-388.

14. Schmidbauer W, Berker S, Volk T, Bogusch G, Mager G, Kerner T. Oesophageal seal of the novel supralaryngeal airway device I-gel in comparison with the laryngeal mask airways classic and ProSeal using a cadaver model. Br J Anesth. 2008; 10:1093. [PubMed]

15. Levitan RM, Kinkle WC. Initial anatomic investigations of the I-gel airway: A novel supraglottic airway without inflatable cuff. Anaesthesia. 2005; 60:1022–6. [PubMed]

16. The laryngeal mask airway supreme TM. Intavent Orthofix; 2007

17. Hosten T, Ozdamar D, et al. The new supraglottic airway device; LMA supreme and LMA proseal, Anaethesiology scand, 2009; 53(7):852-857

18. Jayashree S. Laryngeal mask airway and its variants. Indian J Anaesth. 2005; 49:275–80.

19. Miller DM. A Proposed classification and scoring system for Supraglottic Sealing Airway: A brief review anesth Analg.2004Nov 1; 99(5):1553-9

20. The LMA supremeTM – a pilot study: A. Van Zundert, J.Brimacombe, Aneathesia 2008 Feb 63(2):209-10

21. Gal TJ. Airway management. In: Miller RD, editor. Textbook of anesthesia. 6th ed. Philadelphia: Elsevier; 2005. pp. 1617–52.

22. Peppard SB, Dickens JH. Laryngeal injury following short-term intubation. Ann Otol Rhinol Laryngol. 1983;92:327–30. [PubMed]

23. Singh I, Gupta M, Tandon M: comparison of clinical performance I – gel with LMA Supreme in elective surgeries. Indian J Anaesth 2009;53:302-05.

24. Theiler et al. Crossover comparison of LMA Supreme and the I – gel in simulated difficult airway scenario in anaesthesized patients. Anaesthesiology.2009;111:55-62.

25. Wharton NM, Gibbison B, Gabbott DA, Haslam GM, Cook TM. I-gel insertion by novices in manikins and patients. Anesthesia. 2008;63:991–5. [PubMed]

26. Shin WJ: the supraglottic airway I-Gel in comparison with LMA supreme and classic LMA in anaesthetized patients. Eur J Anaesthesiol 2010; 27:598-601

27. Helmy AM et al: comparative study between I-Gel, a new supraglottic airway device, and classical laryngeal mask airway in anaesthetized spontaneously ventilated patients, Saudi J Anaesth. 2010;4:131-36.

28. Sang Yoong Park, Jong Cheol Rim et al : comparison of I – gel and LMA supreme during laparoscopic cholecystectomy. Korean J Anaesthesiol 2015 Oct :68[5]: 455 – 461.

29. Eschertzhuber S, et al. Directly measured mucosal pressures produced by the I–gel and LMA supreme in paralysed anaesthesized patients. Anaesthesia.2012;67:407 – 410.

30. Weiler N, Latorre F, Eberle B, Goedecke R, Heinrichs W. Respiratory mechanics, gastric insufflation pressure, and air leakage of the laryngeal mask airway. Anesth Analg. 1997;84:1025–8. [PubMed]

31. Gatward JJ, Cook T, Seller C, Handel J. Evaluation of the size 4 i-gel airway in one hundred non-paralyzed patients. Anesthesia mask airway in adult patients. Br J Anaesth. 1999;82:286–7. [PubMed]

32. Uppal V, Gangaiah S, Fletcher G, Kinsella J. Randomized crossover comparison between the i-gel and the LMA-Unique in anaesthetized, paralysed adults. BJA. 2009;103:882–5. [PubMed]

33. Janakiraman C, Chethan DB, Wilkes AR, Stacey MR, Goodwin N. A randomised crossover trial comparing the i-gel supraglottic airway and classic laryngeal mask airway. Anaesthesia. 2009;64:674–8. [PubMed]

34. Keller C, Brimacombe JR, Morris R. Comparison of four methods for assessing airway sealing pressure with laryngeal mask airway in adult patients. Br J Anaesth. 1999;82:286–7. [PubMed]

35. Richez B, Saltel L, Banchereau F. A new single use supraglottic device with a noninflatable cuff and an esophageal vent: An

observational study of the I-gel. Anesth Analg. 2008;106:1137–9. [PubMed]

36. Brain A, Denman WT, Goudsouzian NG. Laryngeal Mask Airway Instruction Manual. San Diego, Calif: LMA North America Inc; 1999.

37. Fei Wang et al. application of LMA-SUPREME and I-gel during pelvic surgeries in adult patients . Asian Journal Of Surgery (2016) 39, 1e5.

ANNEXURE-1

PATIENT CONSENT FORM

STUDY TITLE

Comparison of haemodynamic stress response during insertion of LMA -SUPREME versus I-GEL in patients undergoing short surgeries under general anaesthesia.

Study centre:

Participant's name:

Age: sex:

Diagnosis:

Plan:

I confirm that I have understood the purpose of procedure for the above study. I have the opportunity to ask the question and all my questions and doubts have been answered to my satisfaction.

I have been explained about the pitfall in the procedure. I have been explained about the safety, advantage and disadvantage of the

technique. I understand that my participation in the study is voluntary and that I am free to withdraw at anytime without giving any reason.

I understand that investigator, regulatory authorities and the ethics committee will not need my permission to look at my health records both in respect to current study and any further research that may be conducted in relation to it, even if I withdraw from the study. I understand that my identity will not be revealed in any information released to third parties or published, unless as required under the law. I agree not to restrict the use of any data or results that arise from the study.

I have been explained that the anaesthetic technique is a standard and approved technique. This may help in future research in the field of anaesthesia. I consent to undergo this procedure.

Insurance No:

Date :

Signature/thumb impression of patient:

ANNEXURE-2

PATIENT PROFORMA

NAME **AGE** **WT** **GENDER**

BMI

DIAGNOSIS **IP NUMBER**

PROCEDURE **BLOOD GROUP**

PRE OPERATIVE DETAILS

ASA

REMARKS

INTRA OPERATIVE DETAILS
PREMEDICATION
PRE OXYGENATION
INDUCTION
SAD INSERTION NUMBER OF ATTEMPTS/FAILURE
MAINTENANCE
VENTILATION

PRE OP	PULSE RATE	NON INVASIVE BLOOD PRESSURE	MEAN ARTERIAL PRESSURE	SPO2	ETCO2

TIME	PRE INDUCTION	INSERTION	1 MIN	2 MIN	3 MIN
HEART RATE/MIN					
SYSTOLIC BLOOD PRESSURE mmHg					
DIASTOLIC BLOOD PRESSURE mmHg					
SPO2					
ETCO2					

NUMBER OF RESCUE DOSE OF PROPOFOL NEEDED:

PRESENCE OF BLOOD OVER SAD ON REMOVAL - YES/ NO

SORE THROAT IN RECOVERY ROOM AND

24 HOURS POSTOPERATIVELY - YES /NO

SIGNATURE OF INVESTIGATOR:

SIGNATURE OF PARTICIPANT:

MASTER CHART-IGEL

SNO	NAME	AGE	SEX	WEIGHT	NO OF ATTEMPTS	HR/MIN						BP mmHg						MAP mmHg						SPO_2 %						$ETCO_2$ %						POST OP COMPLICATIONS	
						BEFORE INDUCTION	AT INSERTION	1 MIN	3 MIN	5 MIN	AFTER REMOVAL	BEFORE INDUCTION	AT INSERTION	1 MIN	3 MIN	5 MIN	AFTER REMOVAL	BEFORE INDUCTION	AT INSERTION	1 MIN	3 MIN	5 MIN	AFTER REMOVAL	BEFORE INDUCTION	AT INSERTION	1 MIN	3 MIN	5 MIN	AFTER REMOVAL	BEFORE INDUCTION	AT INSERTION	1 MIN	3 MIN	5 MIN	AFTER REMOVAL	BLOOD STAINING	SORE THROAT
1	Raji	23	F	54	1	75	60	60	64	70	80	128/76	116/64	136/84	138/86	144/88	132/88	100	75	76	80	80	90	99	99	100	100	100	99	40	38	38	37	36	40	NO	NO
2	Ramalakshmi	25	F	58	1	72	64	64	67	64	85	134/82	124/76	142/94	144/96	148/98	128/86	97	72	76	79	82	90	100	99	100	100	100	99	41	38	35	38	36	42	NO	NO
3	Mahalakshmi	28	F	56	1	73	63	63	68	68	76	136/78	128/66	146/86	148/88	154/92	132/80	99	76	77	78	81	96	100	99	100	100	100	100	39	39	36	35	37	39	NO	NO
4	Seethalakshmi	27	F	58	1	79	69	69	62	65	79	138/82	130/76	152/92	154/94	158/98	132/78	103	75	78	82	79	94	100	99	100	100	100	99	39	39	37	35	38	40	NO	NO
5	Sandhyalakshmi	35	F	57	1	72	65	65	61	63	84	132/72	126/64	144/82	146/84	148/86	130/80	110	79	78	74	76	91	100	99	100	100	100	99	39	34	37	37	39	39	NO	NO
6	Priya	36	F	55	1	71	63	64	64	67	86	122/62	116/56	134/74	138/74	138/80	126/70	90	69	78	72	79	85	99	99	100	100	100	100	38	36	35	38	40	39	NO	NO
7	Kirubha	20	F	54	1	74	64	66	65	68	75	126/82	116/72	136/88	138/88	144/94	130/80	98	73	73	72	81	95	98	98	100	99	100	100	42	42	40	37	36	38	NO	NO
8	Kamala	21	F	55	1	73	66	64	68	68	76	132/72	124/62	146/84	148/86	152/88	128/80	101	70	76	79	81	89	100	98	100	100	100	100	41	38	37	38	37	42	NO	NO
9	Murugalakshmi	24	F	49	1	73	67	68	65	67	80	124/74	114/68	136/86	138/88	142/96	110/80	103	73	75	81	80	97	99	99	100	100	100	99	41	38	38	39	37	43	NO	NO
10	Aanandhi	26	F	43	1	70	64	65	64	65	74	128/78	116/68	136/86	138/90	144/92	130/84	110	76	77	75	74	91	99	98	100	100	100	98	40	37	39	41	36	41	NO	NO
11	Parimala	27	F	58	1	72	70	70	70	64	80	138/72	126/66	146/82	148/84	152/88	128/80	98	77	76	84	81	88	99	98	100	100	100	98	39	36	36	37	37	41	NO	YES
12	Ganga	28	F	60	1	72	65	66	65	67	82	134/76	126/66	146/82	148/86	154/86	136/80	89	72	80	77	82	86	99	99	99	100	100	99	37	36	40	37	39	41	NO	NO
13	Ravikumari	36	F	56	1	69	63	65	63	68	80	122/68	114/56	136/76	138/78	142/82	132/70	110	76	76	80	81	96	99	98	100	100	100	99	38	39	35	35	39	40	NO	NO
14	Devipriya	23	F	52	1	71	67	67	65	69	78	136/68	124/58	144/76	146/78	152/82	132/70	100	78	74	75	78	89	100	100	100	100	100	99	35	37	35	38	39	42	NO	NO
15	Kanagalakshmi	25	F	59	1	73	64	64	64	67	77	126/84	118/78	134/92	136/94	138/96	130/86	102	73	73	77	78	93	100	100	100	100	100	99	37	38	35	36	38	42	NO	NO
16	Shanthi	27	F	60	1	74	68	65	68	68	79	138/76	126/68	144/86	146/86	152/92	128/80	99	74	78	81	79	90	100	100	100	100	100	99	40	38	37	38	39	37	NO	NO
17	Ranilakshmi	28	F	58	1	76	67	67	67	67	88	128/84	114/74	138/92	140/92	144/98	130/74	94	75	79	79	81	93	100	100	98	100	100	100	36	38	38	39	39	38	NO	NO
18	Jayamala	24	F	56	1	75	65	68	65	66	79	132/64	126/56	142/72	144/74	148/78	128/70	89	77	74	82	79	94	100	100	100	100	100	100	42	37	37	36	38	38	NO	NO
19	Jaya	23	F	58	1	72	67	69	69	67	78	126/66	118/58	136/76	138/78	142/82	130/70	105	76	73	8578	80	84	100	99	100	100	100	100	40	33	35	35	38	38	NO	NO
20	Sendhurammal	35	F	56	1	71	67	63	67	68	84	136/72	128/64	146/82	148/84	154/88	138/80	100	75	74	80	74	90	100	98	100	100	100	100	38	35	36	38	35	40	NO	NO
21	Saraswathi	19	F	54	1	73	68	67	68	64	90	128/74	116/62	136/84	138/86	142/88	138/80	101	76	75	82	80	87	100	99	100	100	100	100	39	39	36	38	42	40	NO	NO
22	Madathi	20	F	60	1	69	70	68	70	65	98	122/66	114/58	134/72	136/74	140/78	130/72	100	69	72	83	81	93	100	98	99	100	100	100	38	38	36	36	40	41	NO	NO
23	Chandra	25	F	56	1	80	68	67	77	63	80	128/88	118/76	138/94	140/94	144/98	130/86	98	77	76	79	78	91	100	99	99	100	100	100	38	37	38	36	35	39	NO	NO
24	Begum	18	F	42	1	72	69	69	68	64	79	134/76	126/68	146/82	148/84	150/86	128/80	90	72	75	76	81	92	100	99	100	100	100	99	39	38	37	39	41	39	YES	NO
25	Mary	32	F	43	1	71	70	69	70	63	81	136/88	124/74	144/96	146/96	152/102	128/76	97	70	74	81	79	94	100	99	100	100	99	99	36	37	39	34	37	37	NO	YES
26	Marium	29	F	58	1	74	66	65	66	65	71	132/68	120/62	146/74	148/76	156/78	130/72	103	74	74	80	81	92	100	98	99	100	100	100	41	39	39	40	38	38	NO	YES
27	Parvathi	24	F	45	1	69	67	65	67	65	79	128/76	116/68	136/88	138/88	142/94	120/68	110	75	77	80	80	90	100	100	100	100	100	99	38	38	36	41	38	39	NO	NO
28	Chithra	20	F	40	1	73	64	66	60	60	80	138/86	126/80	148/94	150/96	154/98	126/66	90	70	72	79	81	94	99	100	100	100	100	100	40	36	35	35	39	39	NO	NO
29	Dhivya	21	F	54	1	71	64	66	64	66	89	130/74	122/62	142/82	144/84	146/88	128/78	89	77	79	80	89	95	100	100	100	100	100	99	40	37	36	34	36	37	NO	NO
30	Dhanam	23	F	40	1	73	70	72	70	64	89	140/84	132/78	148/92	148/94	156/98	134/80	110	75	79	78	79	90	98	98	98	100	100	100	37	40	37	37	36	40	NO	NO
31	Rajan	23	M	54	1	75	60	60	64	70	80	128/76	116/64	136/84	138/86	144/88	132/88	100	75	76	80	80	90	99	99	100	100	100	99	40	38	38	37	36	40	NO	NO
32	Ramalakshman	25	M	58	1	72	64	64	67	64	85	134/82	124/76	142/94	144/96	148/98	128/86	97	72	76	79	82	90	100	99	100	100	100	99	41	38	35	38	36	42	NO	NO
33	Balaji	28	M	56	1	73	63	63	68	68	76	136/78	128/66	146/86	148/88	154/92	132/80	99	76	77	78	81	96	100	99	100	100	100	100	39	39	36	35	37	39	NO	NO
34	Kumar	37	M	58	1	79	69	69	62	65	79	138/82	130/76	152/92	154/94	158/98	132/78	103	75	78	82	79	94	100	99	100	100	100	99	39	39	37	35	38	40	NO	NO
35	Sakthivel	45	M	57	1	72	65	65	61	63	84	132/72	126/64	144/82	146/84	148/86	130/80	110	79	78	74	76	91	100	99	100	100	100	99	39	34	37	37	39	39	NO	NO
36	Prabhu	36	M	55	1	71	63	64	64	67	86	122/62	116/56	134/74	138/74	138/80	126/70	90	69	78	72	79	85	99	99	100	100	100	100	38	36	35	38	40	39	NO	NO
37	Kirubha	50	M	54	1	74	64	66	65	68	75	126/82	116/72	136/88	138/88	144/94	130/80	98	73	73	72	81	95	98	98	100	99	100	100	42	42	40	37	36	38	NO	NO
38	Kamalakannan	21	M	55	1	73	66	64	68	68	76	132/72	124/62	146/84	148/86	152/88	128/80	101	70	76	79	81	89	100	98	100	100	100	100	41	38	37	38	37	42	NO	NO
39	Murugan	24	M	49	1	73	67	68	65	67	80	124/74	114/68	136/86	138/88	142/96	110/80	103	73	75	81	80	97	99	99	100	100	100	99	41	38	38	39	37	43	NO	NO
40	Aanandhakumar	26	M	43	1	70	64	65	64	65	74	128/78	116/68	136/86	138/90	144/92	130/84	110	76	77	75	74	91	99	98	100	100	100	98	40	37	39	41	36	41	NO	NO

MASTER CHART - LMA SUPREME

SNO	NAME	AGE	SEX	WEIGHT	NO OF ATTEMPTS	HR/MIN						BP mmHg						MAP mmHg						SPO_2 %						$ETCO_2$ mmHg						POST OP COMPLICATIONS	
						BEFORE INDUCTION	AT INSERTION	1 MIN	3 MIN	5 MIN	AFTER REMOVAL	BEFORE INDUCTION	AT INSERTION	1 MIN	3 MIN	5 MIN	AFTER REMOVAL	BEFORE INDUCTION	AT INSERTION	1 MIN	3 MIN	5 MIN	AFTER REMOVAL	BEFORE INDUCTION	AT INSERTION	1 MIN	3 MIN	5 MIN	AFTER REMOVAL	BEFORE INDUCTION	AT INSERTION	1 MIN	3 MIN	5 MIN	AFTER REMOVAL	BLOOD STAINING	SORE THROAT
1	Madathi	18	F	43	1	70	67	65	66	65	80	134/88	124/78	142/92	146/96	150/98	130/78	100	75	76	80	80	90	100	100	100	100	100	99	38	40	37	36	38	40	NO	NO
2	Varshini	25	F	49	1	69	68	69	65	70	79	128/84	118/74	136/92	142/94	152/96	136/80	97	72	76	79	82	90	100	99	100	100	100	99	35	42	36	36	38	41	NO	NO
3	Sundarilakshmi	34	F	57	1	71	67	67	64	72	76	132/84	122/74	144/92	146/98	154/98	112/78	99	76	77	78	81	96	100	100	100	100	100	99	36	39	38	37	39	39	NO	YES
4	Jayakumar	35	M	60	1	75	60	68	69	71	77	122/76	110/74	134/88	138/88	146/90	132/76	103	75	78	82	79	94	99	100	100	100	100	100	37	40	39	38	39	39	NO	NO
5	Sangeetha	26	F	59	1	70	66	64	66	65	77	122/78	112/70	132/88	134/92	146/94	120/88	90	79	78	74	76	91	100	99	99	100	100	98	37	39	39	39	34	39	NO	NO
6	Mahesh	22	F	57	1	72	64	68	70	66	89	136/82	124/80	148/94	150/96	152/96	138/78	98	69	78	82	79	85	99	98	100	100	99	100	35	39	38	40	36	38	NO	NO
7	Meena	21	F	53	1	71	60	64	69	69	90	112/76	104/70	122/84	124/88	134/92	120/70	101	73	73	72	81	95	99	100	100	100	100	100	40	38	37	36	42	42	NO	NO
8	Vijayalakshmi	27	F	57	1	70	60	74	67	67	93	116/66	110/60	126/74	128/76	136/80	126/68	103	70	76	79	80	89	100	99	100	100	100	99	37	42	38	37	38	41	NO	NO
9	Veeralakshmi	28	F	59	1	71	60	65	68	67	80	98/72	88/62	112/82	114/84	130/90	100/80	110	73	75	81	74	98	100	100	100	100	100	100	38	43	39	37	38	41	NO	NO
10	Gowri	24	F	60	1	61	64	64	69	68	74	106/68	100/60	114/74	116/76	126/84	100/70	98	76	77	75	81	91	100	100	100	100	100	100	39	41	39	36	37	40	NO	NO
11	Kalaivani	23	f	58	1	60	69	65	69	67	80	104/72	98/62	112/84	114/88	124/90	122/80	99	77	76	84	82	88	99	99	100	100	100	100	36	41	38	37	36	39	NO	NO
12	Kumar	22	M	57	1	89	68	68	68	65	92	116/72	110/60	124/82	126/84	134/92	136/88	110	72	80	77	81	86	98	100	100	100	100	99	40	41	36	39	36	37	NO	NO
13	Marimuthu	30	M	54	1	90	70	68	69	64	89	114/66	106/58	124/76	126/78	134/88	126/74	100	76	76	80	78	96	99	100	100	100	100	99	35	40	36	39	39	38	NO	NO
14	Peratchi	18	F	45	1	80	69	67	65	67	70	106/74	100/68	118/82	122/82	140/92	110/76	102	78	74	75	79	89	99	98	100	100	100	99	35	42	38	39	37	35	NO	NO
15	Mariammal	21	F	54	1	81	68	64	69	68	72	118/82	110/72	126/94	128/96	136/90	132/88	99	73	73	77	81	93	100	98	100	100	100	98	35	42	39	38	38	37	NO	NO
16	Kaniammal	27	F	56	1	79	70	65	65	65	80	124/68	112/58	136/74	138/76	144/82	130/72	94	74	77	81	79	90	100	100	100	100	100	100	37	37	39	39	38	40	YES	NO
17	Rajkumar	36	M	59	1	75	69	68	65	67	88	132/66	122/58	144/78	146/78	150/86	126/70	89	75	79	79	80	93	100	99	100	100	100	100	38	38	38	39	38	36	NO	NO
18	Rajeshwari	24	F	60	1	75	69	67	71	68	80	98/68	88/58	112/76	114/78	136/88	100/80	105	77	74	82	74	94	100	100	100	100	100	100	37	38	37	38	37	42	NO	NO
19	Latha	21	F	56	2	74	69	68	66	67	78	102/66	96/58	114/76	118/78	130/82	110/76	100	76	73	85	80	84	100	97	100	100	100	100	35	38	37	38	33	40	NO	NO
20	Vairalakshmi	27	F	60	1	71	69	69	68	66	81	114/72	106/68	126/84	128/88	136/90	132/70	101	75	74	78	80	90	99	99	100	100	100	100	36	40	37	35	35	38	NO	NO
21	Vidhya	28	F	59	1	80	60	61	65	67	79	108/68	98/60	114/74	118/76	126/88	110/76	100	76	75	80	81	87	100	99	99	100	100	100	36	40	37	42	39	39	NO	NO
22	Vineetha	24	F	60	1	76	69	62	66	68	78	116/74	108/66	124/84	126/88	140/92	120/82	98	69	72	82	78	93	99	`100	100	100	100	99	36	41	37	40	38	38	NO	NO
23	Mangayarkarasi	21	F	56	1	76	65	60	66	64	80	122/82	112/72	134/94	136/98	142/92	132/76	90	77	76	83	81	91	98	100	100	100	100	99	38	39	37	35	37	38	NO	NO
24	Devi	27	F	59	1	76	69	63	65	65	79	134/62	124/56	142/74	144/76	150/84	132/72	97	72	75	79	79	92	99	99	99	100	100	99	37	39	38	41	38	39	NO	YES
25	Arivu	21	M	45	1	71	66	65	65	62	80	118/72	110/60	126/82	128/84	136/90	122/78	103	70	74	76	81	94	100	99	100	100	100	98	39	37	37	37	37	36	NO	NO
26	Venkateshwari	27	F	60	1	74	65	71	61	64	71	128/62	118/58	136/74	138/76	140/84	132/70	110	74	74	81	90	92	100	100	100	100	100	100	39	38	35	38	39	41	NO	NO
27	Papa	28	F	58	1	77	65	69	69	63	90	108/76	100/70	116/82	120/84	136/88	110/76	90	75	77	80	81	90	100	99	100	100	100	100	36	39	35	38	38	38	NO	NO
28	Meena	28	F	47	1	69	66	66	68	64	86	102/74	96/66	114/82	116/84	136/90	110/80	89	75	72	60	89	94	100	100	100	100	100	100	35	39	35	39	36	40	NO	NO
29	Lakshmanan	19	M	53	1	68	68	78	66	65	88	136/64	128/58	144/72	146/74	150/80	140/70	110	79	79	79	89	95	100	100	100	100	100	100	36	37	39	36	37	40	NO	NO
30	Ravi	48	M	60	1	90	65	64	68	63	89	132/76	126/70	144/84	146/88	1550/86	130/70	98	75	79	80	78	90	100	99	100	100	100	100	37	40	35	36	40	37	NO	NO
31	Madhavan	45	M	43	1	70	67	65	66	65	80	134/88	124/78	142/92	146/96	150/98	130/78	100	75	76	80	80	90	100	100	100	100	100	99	38	40	37	36	38	40	NO	NO
32	Vandhana	32	F	49	1	69	68	69	65	70	79	128/84	118/74	136/92	142/94	152/96	136/80	97	72	76	79	82	90	100	99	100	100	100	99	35	42	36	36	38	41	NO	NO
33	Sudharshan	34	M	57	1	71	67	67	64	72	76	132/84	122/74	144/92	146/98	154/98	112/78	99	76	77	78	81	96	100	100	100	100	100	99	36	39	38	37	39	39	NO	YES
34	Prasad	35	M	60	1	75	60	68	69	71	77	122/76	110/74	134/88	138/88	146/90	132/76	103	75	78	82	79	94	99	100	100	100	100	100	37	40	39	38	39	39	NO	NO
35	Krishnan	26	M	59	1	70	66	64	66	65	77	122/78	112/70	132/88	134/92	146/94	120/88	90	79	78	74	76	91	100	99	99	100	100	98	37	39	39	39	34	39	NO	NO
36	Mohan	22	M	57	1	72	64	68	70	66	89	136/82	124/80	148/94	150/96	152/96	138/78	98	69	78	82	79	85	99	98	100	100	99	100	35	39	38	40	36	38	NO	NO
37	Kanagaraj	42	M	53	1	71	60	64	69	69	90	112/76	104/70	122/84	124/88	134/92	120/70	101	73	73	72	81	95	99	100	100	100	100	100	40	38	37	36	42	42	NO	NO
38	Vijayakumar	27	M	57	1	70	60	74	67	67	93	116/66	110/60	126/74	128/76	136/80	126/68	103	70	76	79	80	89	100	99	100	100	100	99	37	42	38	37	38	41	YES	NO
39	Veerabadran	28	M	59	1	71	60	65	68	67	80	98/72	88/62	112/82	114/84	130/90	100/80	110	73	75	81	74	98	100	100	100	100	100	100	38	43	39	37	38	41	NO	NO
40	Gowrishankar	34	M	60	1	61	64	64	69	68	74	106/68	100/60	114/74	116/76	126/84	100/70	98	76	77	75	81	91	100	100	100	100	100	100	39	41	39	36	37	40	NO	NO