INTUBATING LARYNGEAL MASK AIRWAY AS AN INDEPENDENT INTUBATING AND VENTILATING DEVICE DURING INTUBATION - A COMPARISON OF SUPINE, RIGHT LATERAL AND LEFT LATERAL POSITIONS

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This is to certify that this dissertation entitled **"INTUBATING LMA AS AN INDEPENDENT INTUBATING AND VENTILATING DEVICE DURING INTUBATION - A COMPARISON OF SUPINE RIGHT LATERAL AND LEFT LATERAL POSITIONS"** is a bonafide and genuine research work done by **Dr.U.RADHIGA** in partial fulfilment of the requirement for the degree of MD in ANAESTHESIOLOGY AND CRITICAL CARE.

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DECLARATION

I, **Dr.U.RADHIGA** solemnly declare that, this dissertation titled **"INTUBATING LMA AS AN INDEPENDENT INTUBATING AND VENTILATING DEVICE DURING INTUBATION-A COMPARISON OF SUPINE, RIGHT LATERAL AND LEFT LATERAL POSITIONS"** has been done by me. I also declare that this bonafide work or a part of this work was not submitted by me or any other for any award, degree or diploma to any other University or board either in India or abroad.

This is submitted to The Tamilnadu DR.M.G.R Medical University, Chennai in partial fulfillment of the rules and regulations for the award of Doctor of Medicine degree branch X (Anaesthesiology) to be held in May 2020.

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CONTENTS

INTRODUCTION

Airway management often acquires precedence over other treatment modalities in any emergency situation. The technique of endotracheal intubation has become the gold standard for airway management of patient who are unconscious. Intubation of the trachea not only provides an opportunity for controlled ventilation even for prolonged periods in any position, but also offers the opportunity for removal of tracheal secretions. Regularly, there are case reports regarding accidental extubation during general anesthesia, loss of airway under regional anesthesia, and also where block patients required general anesthesia, due to inadequate effect of block while they were laterally placed.

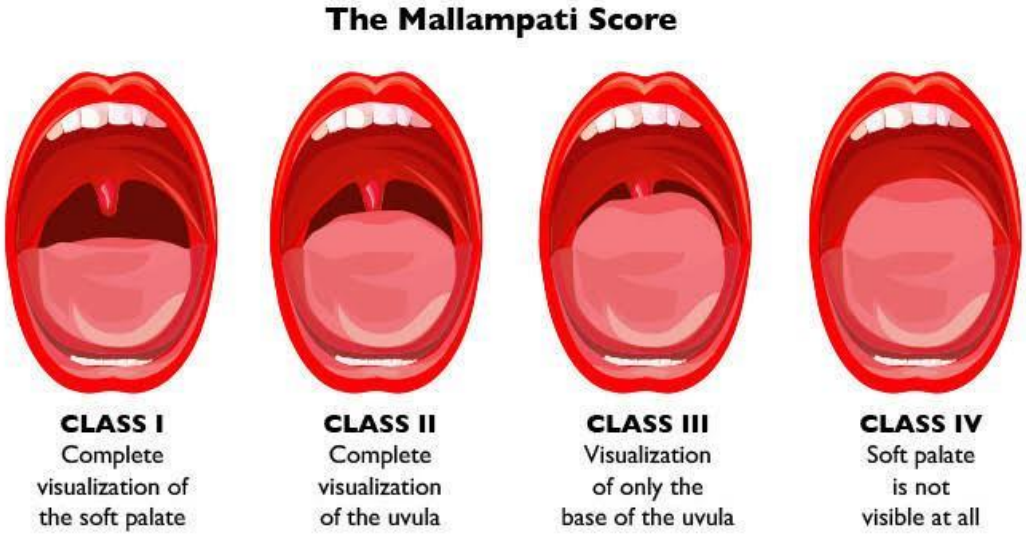
In these cases where patients were placed laterally, conventional laryngoscopy failed to intubate the trachea or took a longer time but light guided tracheal intubation via intubating laryngeal mask airway (ILMA) has been performed successfully. A comparative study on the feasibility of ILMA placement and blind intubation via the ILMA between patients placed in the supine and the lateral position has been performed. At the forefront of every anesthesiologist's mind is the concern about the patient's airway. Questions to address include whether there is potential for dificulty in maintaining a patent airway with a mask and a laryngeal

mask airway or in the ability to place an endotracheal tube when the patient is under general anesthesia. The ability to review previous anesthetic records is especially useful in uncovering an unsuspected “difficult airway” or to conirm previous uneventful intubations, noting whether the patient’s body habitus has changed in the interim. Patients should be questioned about their ability to breathe through their nose, whether there is suspected or diagnosed obstructive sleep apnea (OSA), and whether they have orthopnea. Evaluation of the airway involves examination of the oral cavity including dentition, determination of the thyromental distance, assessment of the size of the patient’s neck and scanning for tracheal deviation or masses, as well as evaluation of their ability to flex the base of the neck and extend the head. For trauma patients or patients with severe rheumatoid arthritis or Down syndrome, assessment of the cervical spine is critical. The presence of symptoms or signs of cervical cord compression should be assessed. In some instances, radiographic examination may also be required.

MALLAMPATI GRADING

The Mallampati classification has become the standard for assessing the relationship of the tongue size relative to the oral cavity, although by itself the Mallampati classification has a low positive predictive value in identifying patients who are difficult to intubate. Intubation involves

multiple steps: Flexion of the neck, extension of the head, opening the mouth to insert the laryngoscope, and displacing the tongue forward and down into the submandibular space to expose the glottis. Therefore, a multifactorial approach to predict intubation dificulty has proven more helpful. One must keep in mind that factors that predict a dificult intubation are not necessarily the same factors that predict a dificult mask airway. For example, the absence of teeth clearly makes laryngoscopy less difficult, but at the same timecan make maintaining a mask airway more challenging.



Supraglottic airway devices have become a standard fixture in airway management, filling a niche between the face mask and tracheal tube in terms of both anatomical position and degree of invasiveness. These devices sit outside the trachea but provide a handsfree means of

achieving a gas-tight airway. The first successful supraglottic airway device, the Laryngeal Mask Airway (LMA)-Classic, became available in 1989. As time went on, additional devices were added to the LMA family to satisfy specific needs, and a number of other devices were developed. There are a large number of supraglottic airway devices, some of which appear similar to the LMA family and others that work under a different concept.

LMA-Fastrach

The LMA-Fastrach (intubating LMA, ILMA, ILM, intubating laryngeal mask airway) was designed to overcome some of the limitations of the LMA-Classic during tracheal intubation. The LMA-Classic was too floppy to optimize alignment with the glottis, and the long narrow tube could not accommodate a standard tracheal tube. Another objective was to eliminate the need to distort the anterior pharyngeal anatomy in order to visualize the laryngeal inlet, making the device applicable to patients with a history of difficult intubation and a “high” or “anterior” larynx.

Description

The LMA-Fastrach has a short, curved stainless steel shaft with a standard 15-mm connector. The tube is of sufficient diameter that a cuffed 9-mm tracheal tube can be inserted and short enough to allow a

standard tracheal tube cuff to pass beyond the vocal cords. The metal handle is securely bonded to the shaft near the connector end to facilitate one-handed insertion, position adjustment, and maintain the device in a steady position during tracheal tube insertion and removal. There is a single, movable epiglottic elevator bar in place of the two vertical bars. A V-shaped guiding ramp is built into the floor of the mask aperture to direct the tracheal tube toward the glottis. The tip is slightly curved to permit atraumatic insertion. The LMA-Fastrach does not contain latex. It is available in sizes 3, 4, and 5. These fit the same size patients as the LMA-Classic. Both reusable and disposable versions are available. Insertion The LMA-Fastrach was designed for use with the patient in the neutral position. This includes LMA-Fastrach with tracheal tube. The tube on the LMA is shorter and wider than on the LMA-Classic and has a metal handle. Note that the tracheal tube connector has been removed using a head support, such as a pillow, but no head extension. The insertion technique consists of one-hand movements in the sagittal plane. It does not require placing fingers into the patient's mouth, thus minimizing the risk of injury or infection transmission as well as allowing insertion from almost any position. The LMA-Fastrach should be deflated and lubricated in a manner similar to the LMA-Classic. It is held by the handle, which should be approximately parallel to the patient's chest. The mask tip is positioned flat against the hard palate immediately posterior to

the upper incisors, then slid back and forth over the palate to distribute the lubricant. After the mask is flattened against the hard palate, it is inserted with a rotational movement along the hard palate and the posterior pharyngeal wall. The mouth opening may need to be increased momentarily to permit the widest part of the mask to enter the oral cavity.

The handle should not be used as a lever to force the mouth open. As the mask moves toward the pharynx, it should be firmly pressed to the soft palate and posterior pharyngeal wall to keep the tip from folding. The curved part of the metal tube should be advanced without rotation until it contacts the patient's chin, then kept in contact with the chin as the device is rotated inward. The handle should not be used to lever upward during insertion, because this will cause the mask to press into the tongue. When properly inserted, the tube should emerge from the mouth directed somewhat caudally. Aligning the internal LMA-Fastrach aperture and the glottic opening by finding the position that produces optimal ventilation and then applying a slight anterior lift with the

LMA-Fastrach handle facilitates correct positioning and blind intubation. The LMA-Fastrach can be inserted with a 180◦ rotation technique. Use Although the LMA-Fastrach has been designed to facilitate tracheal intubation, it can also be used as a primary airway device. It is especially useful for the anticipated or unexpected difficult

airway .Studies indicate that most insertion attempts with the LMA-Fastrach are successful, and a patent airway is secured in nearly all patients. It has been used successfully in children, morbidly obese patients, and acromegalic patients. The LMA-Fastrach can be inserted with the same or better success than the LMA-Classic . It is easier to place than the LMA-Classic when manual in-line stabilization is used. However, in patients with limited neck movement, intubation may be less likely to be successful and take longer than if a lighted intubation stylet is used. The LMA-Fastrach has been used successfully in the emergency department and prehospital care. It can be used with the patient in the lateral position. Tracheal Intubation Muscle relaxants are not necessary for intubation through the LMA-Fastrach but may increase the success rate. Cricoid pressure will decrease the likelihood of success and may need to be released to allow intubation .The tracheal tube recommended by the manufacturer for use with the LMA-Fastrach is a silicone, wire reinforced, cuffed tube with a tapered patient end and a blunt tip . This tube is flexible, which allows negotiation around the anatomical curves of the airway. It has a high-pressure, low-volume cuff that reduces resistance during intubation and makes cuff perforation as the tube passes through the LMA less likely. There is a stabiliizer that allows the LMA to be removed without extubating the patient.

When using the LMA-Fastrach, standard curved plastic tracheal tubes are associated with a greater likelihood of laryngeal trauma. Warming a plastic tube will result in success and complication rates similar to that of the tube from the LMA-Fastrach manufacturer.

A spiral embedded tube should not be used. If a curved plastic tracheal tube is used, it may be helpful to orient the curve opposite the LMA curve. Whatever tracheal tube is used, it is essential that it is possible to remove the connector. It is important to lubricate the tracheal tube well and pass it through the LMA several times before use.

Insertion

Standard Technique

The standard insertion technique uses a midline or slightly diagonal approach with the cuff fully deflated. The head should be extended and the neck flexed (sniffing position). This position is best maintained during insertion by using the noninserting hand to stabilize the occiput. The LMA can be inserted without placing the head in this position. The neutral position may cause a small decrease in successful placement compared with the sniffing position. The jaw may be pulled down by an assistant to more fully open the mouth. The tube portion is grasped as if it were a pen, with the index finger on the point where the tube joins the

mask. With the aperture facing forward (and the black line facing the patient's upper lip), the tip of the cuff is placed against the inner surface of the upper incisors or gums. At this point, the tube should be parallel to the floor. If the mouth is being held open, the jaw should be released during further insertion. In the patient with a restricted mouth opening an alternative method is to pass the LMA behind the molar teeth into the pharynx. The tubular part is then maneuvered toward the midline. As the LMA is advanced, the mask portion is pressed against the hard palate by using the index finger. This means that the direction of applied pressure is different from the direction in which the mask moves. If resistance is felt, the tip may have folded on itself or impacted on an irregularity or the posterior pharynx. In this case,a diagonal shift in direction is often helpful, or a gloved finger may be inserted behind the mask to lift it over the obstruction. If at any time during insertion the mask fails to stay flattened or starts to fold back, it should be withdrawn and reinserted. A change of direction can be sensed as the mask tip encounters the posterior pharyngeal wall and follows it downward. By withdrawing the other fingers as the index finger is advanced and slightly pronating the forearm, it is often possible to insert the mask fully into position with a single movement. If this maneuver is not successful, hand position must be changed for the next movement. The tube is grasped with the other hand, straightened slightly, and then pressed down with a single quick but

gentle movement until a definite resistance is felt. This may coincide with anterior laryngeal displacement. The longitudinal black line on the shaft should lie in the midline facing the upper lip. Any deviation may indicate that the cuff is misplaced. If the patient has a high, arched palate, a slightly lateral approach may be needed. The operator should check that the cuff tip is correctly flattened against the palate before proceeding. Difficulty encountered in negotiating the angle at the back of the tongue is most commonly the result of an incorrect angle of approach.

The inserting finger must press against the palate throughout insertion. The rate of successful placement may be reduced if cricoid pressure (especially one handed) is applied. If the first insertion attempt is unsuccessful, cricoid pressure should be transiently released while the mask is moving downward during a second attempt. When initial insertion is unsuccessful, a number of maneuvers alone or in combination may be helpful. These include inserting the LMA from the side of the mouth pulling the tongue forward; a jaw thrust; repositioning the head; insertion with the lumen facing backwards then rotating it 180◦ as it enters the pharynx applying continuous positive airway pressure(CPAP); slight lateral rotation; partial cuff inflation; inserting a finger behind the mask to act as a guide; using a laryngoscope; placing a stylet in the LMA; using a forceps; pressing the tip anteriorly toward the bowl while the cuff

is deflated; and using a thread to tilt the tip forward. When properly placed, the mask rests on the floor of the hypopharynx. The sides face the pyriform fossae, and the upper border of the cuff is behind the base of the tongue. The tip of the epiglottis may rest either within the bowl of the mask or under the proximal cuff at an angle determined by the extent to which the mask has deflected it downward.

180-degree Technique

Another technique is to insert the LMA with the laryngeal aperture pointing cephalad and rotate it 180 degrees as it enters the hypopharynx. A distinct pop may be felt by the introducing hand. This method may be as satisfactory as the standard technique, especially in pediatric patients. It has been postulated that rotation of the bulky LMA cuff in the close proximity of the hypopharynx could dislocate the arytenoid cartilages.

Partial Inflation Technique

Yet another technique is to partially or fully inflate the cuff before insertion. Although this technique may offer some advantages for an inexperienced user, the device may frequently be malpositioned. The incidence of sore throat may be reduced with the partial inflation method.

Thumb Insertion Technique

The thumb insertion technique is more suitable for patients where access to the head from behind is difficult or impossible. Insertion is similar to the standard technique except that the LMA is held with the thumb in the position occupied by the index finger in that technique. As the thumb nears the mouth, the fingers are stretched forward over the patient's face. The thumb is advanced to its fullest extent. Before removing the thumb, the tube is pushed into its final position by using the other hand.

Blind Intubation

The patient's head is maintained in the neutral position. The tracheal tube connector should be loosely fitted for easy removal. The tracheal tube should be lubricated with a water-soluble lubricant and passed into the metal shaft of the LMA-Fastrach until the tube tip is about to enter the mask aperture. With the silicone tracheal tube specially designed for the LMAFastrach, the longitudinal line should face the handle of the LMA, and the tracheal tube should not be passed beyond the point where the transverse line on the tube is level with the outer rim of the LMA-Fastrach airway tube. The LMA-Fastrach handle is grasped with one hand to steady it while the tracheal tube is being inserted, then lifted like a laryngoscope (not levered) to draw the larynx forward a few

millimeters. This increases the seal pressure and helps to align the axes of the trachea and the tracheal tube. It also corrects the tendency for the mask to flex. As it is advanced into the LMA-Fastrach, the tube should be rotated and moved up and down to distribute the lubricant. Ventilation and carbon dioxide monitoring can be performed during tracheal tube insertion by connecting the tracheal tube to the anesthesia breathing system.

The tracheal tube should be advanced gently. The LMA-Fastrach handle should not be pressed downward. If no resistance if felt, it is likely that the epiglottic elevating bar is lifting the epiglottis upward, allowing the tracheal tube to pass into the trachea. When the tracheal tube is thought to be in the trachea, the cuff should be inflated and its position in the trachea confirmed. If the tracheal tube fails to enter the trachea, a number of problems may have contributed to the lack of success. The epiglottis may have folded downward, or the tube may have impacted on the periglottic structures. The LMA-Fastrach may be too small or too large for the patient. The larynx may have been pushed downward during insertion. There may have been inadequate anesthesia or muscle relaxation so that the vocal cords were closed. During blind tracheal intubation, the operator relies on tactile perceptions, especially a feeling of resistance, while advancing the tracheal tube. If the mask is not aligned

with the glottic opening or the size of the LMA Fastrach is inappropriate, resistance will be encountered as the tracheal tube tip pushes against glottic or periglottic structures, such as the downfolded epiglottis, valleculae, arytenoids, or aryepiglottic folds.

If resistance is felt after the tracheal tube leaves the LMA-Fastrach, there are a number of maneuvers that can be taken to relieve the situation. If resistance is felt at 2 cm beyond the 15-cm mark on the tracheal tube, it is likely that the tube has impacted on the vestibular wall. Rotating the tracheal bevel may overcome the impaction. Another problem at this level may be a downfolded epiglottis. Without deflating the cuff, the device should be swung outward for 6 cm and reinserted. If resistance is encountered 3 cm beyond 15 cm, the epiglottis may be out of the reach of the elevating bar, and a larger LMA should be used. If resistance occurs immediately after the tracheal tube leaves the LMA-Fastrach, the LMA may be too large and should be replaced with a smaller one. If resistance is felt at 15 plus 4 cm, the LMA may be too large, and a smaller size should be used. Other maneuvers that can be tried include slightly rotating the LMA-Fastrach in the sagittal plane by using the metal handle until the least resistance to manual ventilation is achieved, removing the head support, pulling the metal handle toward the user (extension), or pushing it away from the user (flexion).The LMA-Fastrach can be used to

place an airway exchange catheter, which can then be used to direct a tracheal tube into the trachea. Blind intubation using the LMA-Fastrach is faster than fiberoptic-guided intubation or intubation using direct laryngoscopy. It can be performed awake. When compared with awake fiberoptic intubation for patients with known difficult airways, patient satisfaction was greater with the LMA-Fastrach. The success rate of blind intubation varies from 40% to 100%, depending on the number of attempts and the experience of the operator. The blind technique can be time consuming and may result in trauma or esophageal intubation. If difficulty is encountered, the use of an LMA-CTrach should be considered.

Blind Nasal Intubation. Blind nasal intubation can be accomplished. A flexible tracheal tube is inserted into the trachea through the LMA, which is then removed. A Foley catheter is introduced into the nose and withdrawn from the mouth. The Foley catheter is inserted into the end of the tracheal tube and inflated with saline to grip the inner walls. The Foley catheter is then withdrawn until the machine end of the tracheal tube exits through the nose.

Fiberscopic-guided Intubation

The LMA-Fastrach is useful for fiberoptic intubation in the difficult-to-intubate patient. The fiberscope is used to observe correct tracheal tube passage through the LMA. The epiglottic elevating bar is too stiff to be elevated by a fiberscope without risk of damaging the tip or directing it downward. It should be lifted by the distal end of the tracheal tube.

The tracheal tube is advanced approximately 1.5 cm past the mask aperture while the intubating metal handle of the LMA-Fastrach is held to stabilize it. The tip of the tracheal tube should now have lifted the fiberscope away from the bowl of the mask, exposing the glottic structures. The fiberoptic scope is inserted and advanced to, but not beyond, the distal end of the tracheal tube. The tracheal tube is advanced until the glottis is brought into view. The tracheal tube is then advanced into the trachea. If difficulties are encountered, the patient's head and neck may be maneuvered or the LMA-Fastrach position adjusted by using the metal handle .Fiberoptic intubation has a high success rate. It can be performed awake. It has been used in patients with unstable necks. It is easier than intubation with a rigid laryngoscope or using only a fiberscope in patients with manual in-line stabilization. It allows an examination of the lower airway. It can be performed easier and in less

time if the recommended tracheal tube is used. During fiberoptic intubation with a size 3 or 4 LMAFastrach, ventilation may be inadequate. With a size 5 LMA, ventilation is generally acceptable. The LMA-Fastrach can be used with an optical style.

Light-guided Intubation

An illuminated flexible fiber or a lighted intubation stylet inserted through the tracheal tube extending just beyond the tracheal tube tip can be used to guide a tracheal tube. A distinct central point of light without a halo in the midline indicates correct placement. Once correct position is achieved, the tracheal tube is advanced. If resistance is felt, correct transillumination is not observed or the light point is seen moving laterally, the tracheal tube should be withdrawn 1 cm beyond success. The epiglottis may have folded downward, or the tube may have impacted on the periglottic structures. The LMA-Fastrach may be too small or too large for the patient. The larynx may have been pushed downward during insertion. There may have been inadequate anesthesia or muscle relaxation so that the vocal cords were closed. During blind tracheal intubation, the operator relies on tactile perceptions, especially a feeling of resistance, while advancing the tracheal tube. If the mask is not aligned with the glottic opening or the size of the LMAFastrach is inappropriate, resistance will be encountered as the tracheal tube tip

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Removing the LMA-Fastrach after Intubation

After the trachea has been intubated, the decision needs to be made whether to remove the LMA-Fastrach or to leave it in place. It is usually recommended that the LMA Fastrach be removed. Alternately, the cuff can be deflated to 20 to 30 cm H2O and the LMA-Fastrach left in situ. The LMA-Fastrach may exert mucosal pressures in excess of capillary perfusion pressure. Patients in whom the LMA-Fastrach is retained have a higher incidence of hoarseness, sore throat, and dysphagia.

Removing the LMA is associated with a hemodynamic response. Delaying removal for a few minutes may slightly decrease the associated pressor response. The tracheal tube needs to be stabilized to prevent extubation during LMA-Fastrach removal. The tube connector needs to be removed. A stabilizer rod (extender) that is placed in the end of the tracheal tube is available from the manufacturer. Inserting the tip of To stabilize the tracheal tube and to prevent extubation during LMA-Fastrach removal, a stabilizer rod (extender) is placed in the end of the tracheal tube. a smaller tracheal tube into the end of the inserted tracheal tube will allow ventilation while the LMA-Fastrach is being removed.

The LMA-Fastrach cuff is deflated, and the LMA Fastrach is swung out of the pharynx into the oral cavity while applying counter pressure to the tracheal tube. The stabilizing rod is removed when the

LMA Fastrach cuff is clear of the mouth. The tracheal tube is then firmly grasped while unthreading the inflation tube and pilot balloon from the LMA-Fastrach. Finally, the tracheal tube connector is replaced.

Problems with Intubation

Pharyngeal pathology may make intubation through the LMA-Fastrach impossible. Currently, the smallest size available of the LMAFastrach is the number 3. This has been found to work well for intubation of patients over 30 kg, but for patients under this weight, successful intubation through this device is less certain. The LMA-Fastrach tracheal tube is expensive and should not remain in place for long periods of time because it has a high-pressure cuff. The LMA-Fastrach requires more time for intubation and results in more esophageal intubations and mucosal trauma than rigid laryngoscopy. Blind intubation through the LMA-Fastrach generates cardiovascular responses similar to tracheal intubation using direct laryngoscopy. When the LMA-Fastrach is removed, the tracheal tube may be displaced downward or dislodged. Problems The rigid LMA-Fastrach shaft cannot easily adapt to a change in the position of the patient’s neck. It is more likely to be dislodged than the LMA-Classic if head or neck manipulation is required. It should not be used in cases where the patient will be in the prone position.

The LMA-Fastrach is unsuitable for use in the MRI unit.A case of obstruction after the LMA-Fastrach was inserted has been reported. Fiberoscopy revealed that the epiglottic elevating bar was in the laryngeal aperture, and though it lifted the epiglottis, the arytenoid cartilage was pressed anteriorly by the LMA Fastrach cuff, partially obstructing the laryngeal aperture. Despite the obstruction, the trachea was intubated successfully. The large diameter of the LMA-Fastrach airway tube can cause difficulty during insertion in the patient with a limited mouth opening and may put dentition at risk. Compared with the LMA-Classic, the LMA Fastrach causes an increased incidence of sore throat, sore mouth, and difficulty swallowing. While LMA-Fastrach is easier to place than the LMA Classic and placement is more likely to be successful in patients with immobilized cervical spines, the LMA-Fastrach may exert pressure on the cervical spine. Intubation through the LMA-Fastrach may cause significant motion of the cervical spine. It may be difficult to insert in the patient with a cervical collar, especially if cricoid pressure is used. Anesthesia providers who have limited use of the left arm will find the LMA-Fastrach difficult to use. Using the LMA Family An LMA of the chosen size plus one size smaller and larger should always be immediately available. The syringe used to inflate the LMA should contain only air. Injecting organic substances such as propofol from a previously used syringe may damage the LMA.

Pre use Inspection

Visual Inspection The first step is to examine the tube. The airway tube should not be discolored, as this would prevent seeing fluids that may enter the tube. There should be no cuts or tears in the tube, and the spiral wires should not be kinked. The rest of the LMA's external surface should be examined for damage such as cuts, tears, scratches, or foreign particles. The interior should be free from obstruction or foreign particles. The LMA-Flexible should be examined to make certain that the reinforcing wire is wholly contained within the wall of the tube. The tube should be flexed up to, but not beyond, 180◦ .Kinking should not occur. Bending the tube beyond 180◦ could cause permanent damage. The next test is to examine the mask aperture. The bars should be gently probed to make certain that they are not damaged and the space between them is free from particulate matter. If the drain tube in the LMA ProSeal bowl is torn or perforated, the LMA should not be used.

The connector should fit tightly into the outer end of the airway tube. It should not be possible to remove it easily. The connector should not be twisted. If the connector has cracks or surface irregularities, it should not be used.

Deflation/ Inflation

The next step is to withdraw air from the cuff so that the walls are flattened against each other. Excessive force should be avoided. The cuff should not reinflate. The syringe should be removed from the inflation valve and the cuff checked to make certain that it remains deflated. If it reinflates, there is a faulty valve or leaking cuff. An LMA cuff with a hole may not reinflate after the air had been removed. The next step is to inflate the cuff with 50% more air than the recommended maximum inflation volume. The cuff should hold the pressure for at least 2 minutes. Any herniation, wall thinning, or asymmetry is an indication to discard the LMA. The balloon should be elliptical, not spherical or irregularly shaped. Excessive pilot balloon width indicates weakness and imminent rupture. Failure to perform this test may miss problems with the cuff.

Mask Preparation

The cuff should be fully deflated with a dry syringe to form a flat oval disc. This can be done by pressing the hollow side down against a clean, hard, flat surface. The deflated cuff should be wrinkle-free.

A cuff-deflating tool is available from the manufacturer. This device will provide a superior and more consistent shape than either hand manipulation or free deflation but does not offer any benefits in terms of

residual volume. The use of this device will lengthen the cuff life. Lubrication should be applied to the posterior cuff surface cuff just before insertion, taking care to avoid getting lubricant on the anterior (bowl) surface. The manufacturer recommends water-soluble jelly and does not recommend the use of analgesic-containing gels or sprays, because this may delay the return of protective reflexes and may provoke an allergic reaction. While some studies show that lubrication with lidocaine gel or spray will result in a lower incidence of retching and coughing on emergence, another study showed increased intra- and postoperative problem. The laryngeal mask ready for insertion. The cuff should be deflated as tightly as possible, with the rim facing away from the mask aperture. There should be no folds near the tip.Sprays that contain silicone may cause the mask to soften and swell.

Anesthetic Induction

Insertion of the LMA requires sufficient general or topical anesthesia to obtund the airway reflexes. A depth similar to that necessary for inserting an oropharyngeal airway but not as deep as is needed for tracheal intubation is required. Absence of a motor response to a jaw thrust is a reliable method for assessing the adequacy of anesthesia for LMA insertion. Greater depth is needed for inserting the LMA-ProSeal than for the LMA Classic.

Awake Placement

The laryngeal mask can be inserted in an awake patient following topical anesthesia of the upper airway and/or nerve blocks. Mask insertion should be coordinated with swallowing. It may be helpful to partially inflate the cuff to simulate a bolus of food.

Cuff Inflation and Assessing Position and Function

The cuff should be inflated to a pressure of approximately 60 cm H2O. A cuff pressure gauge is recommended for proper inflation pressure. Cuff pressure can be estimated by feeling the tension in the pilot balloon. A spherical pilot balloon is an indication that there is too much gas in the cuff. The cuff should be inflated over 3 to 5 seconds without holding the tube unless the position is obviously unstable (e.g., in edentulous patients with slack tissues).This usually causes slight upward movement of the airway tube, and a slight bulging at the front of the neck is commonly seen. There should be a smooth oval swelling in the neck and no cuff visible in the oral cavity.

In practice, it is rarely necessary to use the full volume Using greater than recommended volumes will not improve the seal against the larynx and may worsen it.A rational approach is to inflate the mask with half the maximum inflation volume and to determine the oropharyngeal

leak pressure, adding more air if necessary. Cuff size is probably more important than inflating volume in determining the seal, so upsizing the LMA may provide a better seal than adding more air to the cuff of a smaller LMA. If positive-pressure ventilation is to be used, the leak pressure should be greater than 20 cm H2O (30 cm H2O with the LMA-ProSeal). If spontaneous respiration is to be used, the leak pressure should be greater than 10 cm H2O. This is the approximate pressure of fluid at the posterior pharyngeal wall if the oral cavity is flooded. Until spontaneous respiration has resumed, it may be helpful to occlude the nose and seal the mouth around the tube to allow positive-pressure ventilation. The airway sealing pressure is determined by observing the pressure gauge in the breathing system as the bag is squeezed and the pressure increases. Several methods can be used to determine the leak pressure. A stethoscope can be placed just lateral to the thyroid cartilage. Another method is to listen over the mouth for a noise when the bag is squeezed. Carbon dioxide may be detected by placing the sample line in the oral cavity. Another method is determining a steady airway pressure after closing the adjustable pressure limiting (APL) valve in the circle system. It may be possible to improve the seal by adding more air to the cuff (if the maximum recommended volume has not been injected) or by flexing or rotating the head and neck slightly. The leak pressure will be higher if the head and neck are flexed or rotated. Higher pressures may be

achieved by applying pressure on the front and/or side of the neck,by applying continuous forward pressure on the LMA,or by lifting the handle of the LMA-Fastrach.

Indications of proper positioning

Indications that the LMA is properly positioned include normal breath sounds, chest movements, pressure-volume loops and volume monitoring not showing a leak, and carbon dioxide waveforms with positive-pressure ventilation. If the patient is breathing spontaneously, normal reservoir bag excursions and absence of signs of obstruction are indications of proper placement. A fiberscope or rigid endoscope can be inserted through the LMA to confirm its position and rule out airway obstruction. X-ray or MRI can also be used to confirm the position. An esophageal detector device can be used, although its utility has been questioned. If the airway is obstructed, the cause may be incorrect mask position, a downfolded epiglottis, a closed glottic sphincter, or an overinflated cuff. In most cases, removing and reinserting the mask will eliminate the obstruction. Another technique is to lift the anterior neck structures by using a gloved hand inserted into the mouth, deflate the cuff, and rotate the mask 360◦.In some cases, the epiglottis may be straightened digitally. Jaw manipulation or repositioning the head usually does not relieve airway obstruction. Removing air from the cuff may be

helpful. If despite these efforts satisfactory ventilation cannot be achieved, the device should be withdrawn and reinserted or a different size LMA or tracheal tube should be used.

Fixation of tube

A bite block or roll of gauze should be inserted into the mouth beside the tube to prevent the patient from biting the tube and to improve stability. Various other devices have been used. An oropharyngeal airway should not be used, because both it and the LMA are designed to be placed in the midline, and the airway tip might compromise the LMA cuff or cause tube compression. Also, an oropharyngeal airway may not prevent the tube from being bitten.The tube should be secured with tape, taking care that it does not become twisted. This can be accomplished by affixing the tape first to the maxilla, winding over the cephalad side of the tube, and down around the caudal side to fix the tube and bite block firmly to each other and to the opposite maxilla. Further security can be provided by taping from zygoma to zygoma under the mandible or around the neck. A tracheal tube holder may be used. Other fixation methods have been described. The fixation method should not obstruct the surgery. A suture around a tooth may be used if tape will be in the way. Bending the tube against its natural curvature may cause it to become dislodged or kink, unless the LMA Flexible is used. Traction

from the breathing system should be avoided, and several methods to achieve this have been suggested.

Intraoperative Management

During surgery, airway patency and correct LMA orientation should be verified at regular intervals. The patient's upper abdomen should be periodically observed for signs of distention and epigastric auscultation performed. A lighter level of anesthesia than would be required if a tracheal tube were used is usually possible. If laryngospasm, wheezing, swallowing, coughing, straining, or breath holding occurs, anesthesia should be deepened or muscle relaxants administered. An aerosol can be administered by using an LMA.

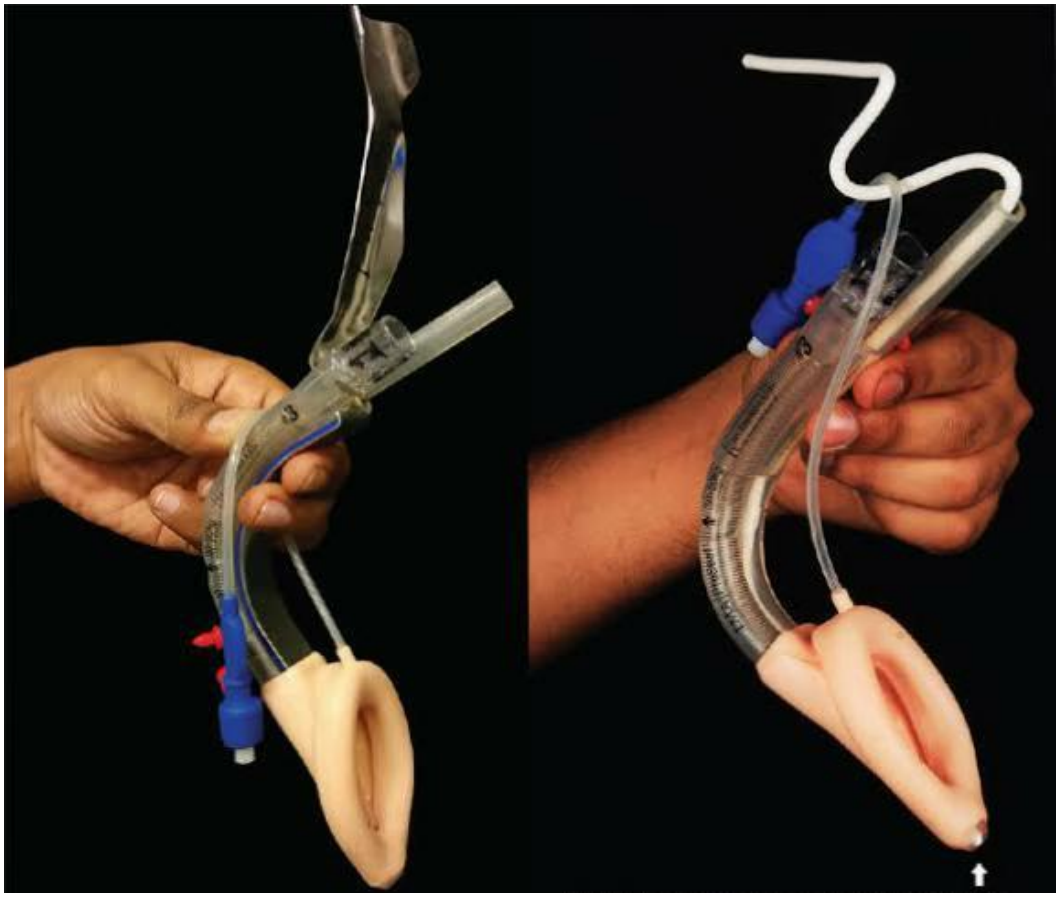
Nitrous oxide and carbon dioxide can diffuse into the cuff, increasing intracuff pressure and volume. Cuff volume increases less with the LMA-Unique than with the LMA-Classic. The increase in volume may cause airway obstruction. Inflating the cuff with nitrous oxide will avoid this increase. The manufacturer recommends that cuff pressure be checked periodically with a pressure gauge, transducer, or other device and adjusted to keep it at approximately 60 cm H2O. The pilot balloon should feel compliant. If the balloon feels stiff or olive shaped, the pressure may be excessive. Others have suggested that the logical method of controlling cuff pressures during nitrous oxide anesthesia may be to

take the “just seal” pressure as a control value and withdrawn volume to maintain values close to this pressure. The LMA can be used with controlled (including mechanical) or spontaneous ventilation. Patient outcome has been found to be similar in nonparalyzed patients with positive-pressure ventilation or spontaneous breathing. If controlled ventilation is used, the peak inspiratory pressure should be kept below 20 cm H2O (30 cm H2O with the ProSeal). Higher pressures may result in a leak around the mask, gastric distention, and operating room pollution. Changes in the ventilatory pattern to reduce tidal volume and using muscle relaxants may result in a lower peak pressure. If higher pressures are required, consideration should be given to exchanging the LMA for a tracheal tube. If cricoid pressure is applied, the airway pressures at which the patient is ventilated can often be increased to over 30 cm H2O without gastric insufflation occurring.

Pressure control ventilation, with or without PEEP, which is available on newer anesthesia ventilators, may be the mode of choice for controlled ventilation with the laryngeal mask because it allows a lower peak pressure for the same tidal volume with less leak around the LMA. For patients breathing spontaneously, pressure-support ventilation improves gas exchange and reduces the work of breathing. The work of breathing can also be reduced by using CPAP.A sudden increase in

leakage, snoring, or other sounds often signals the need for more muscle relaxation, although other causes such as LMA displacement, light anesthesia causing glottic closure, airway obstruction, a leaking cuff, and a decrease in lung compliance related to the surgical procedure are other possible causes Adding air to the cuff will not always correct a leak and may make it worse by increasing tension in the cuff and pushing it away from the larynx. Sometimes, removing some air from the cuff will help. If regurgitation occurs, the first sign may be the appearance of fluid traveling up the LMA tube. Breath holding or coughing may occur. The patient should be placed in the head-down position, the breathing circuit disconnected, and the airway tube suctioned. It may not be necessary to remove the LMA, although preparations for tracheal intubation should be made and the patient intubated, if indicated. Inserting a nasogastric tube behind a non-ProSeal LMA can be aided by using a nasal airway or a flexible endoscope to displace the LMA forward Adding air to the cuff will not always correct a leak and may make it worse by increasing tension in the cuff and pushing it away from the larynx. Sometimes, removing some air from the cuff will help. If regurgitation occurs, the first sign may be the appearance of fluid traveling up the LMA tube. Breath holding or coughing may occur. The patient should be placed in the head-down position, the breathing circuit disconnected, and the airway tube suctioned. It may not be necessary to remove the LMA,

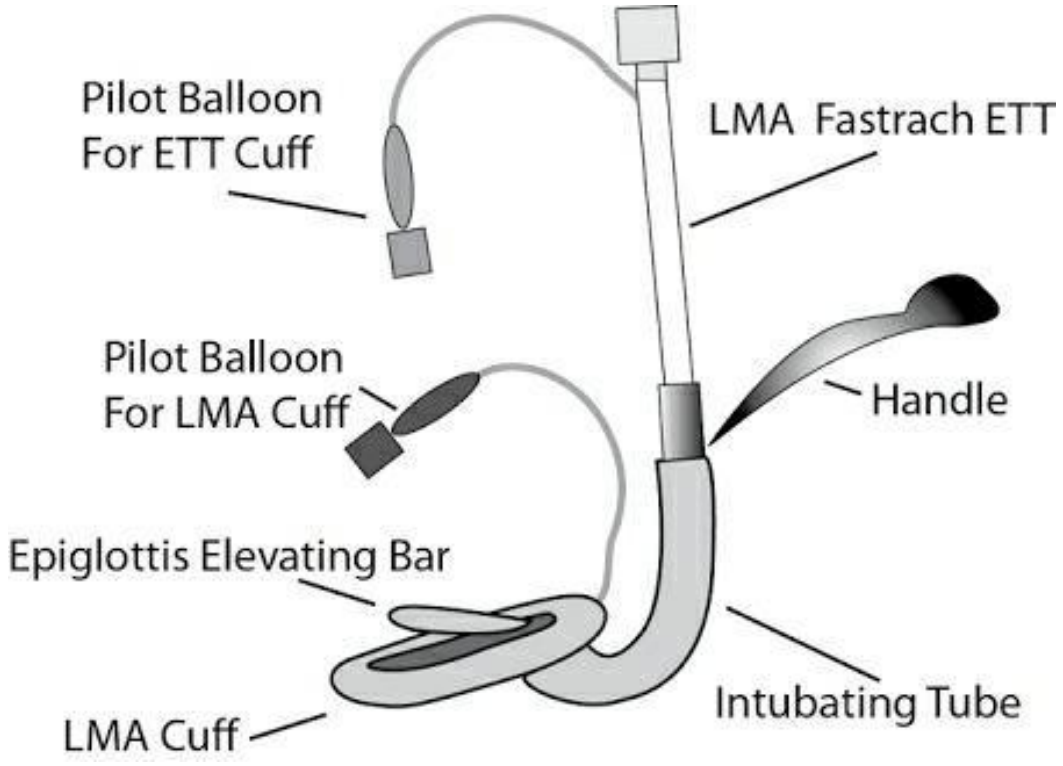
although preparations for tracheal intubation should be made and the patient intubated, if indicated. Inserting a nasogastric tube behind a non-ProSeal LMA can be aided by using a nasal airway or a flexible endoscope to displace the LMA forward will expand in the heat and may damage the cuff, valve, or pilot balloon. If desired, an LMA can be preformed into a more desirable shape by bending it when it is packed for autoclaving. A red plug is supplied with the LMA-ProSeal. Leaving the valve open lets air escape to the atmosphere.



LMA-Fastrach

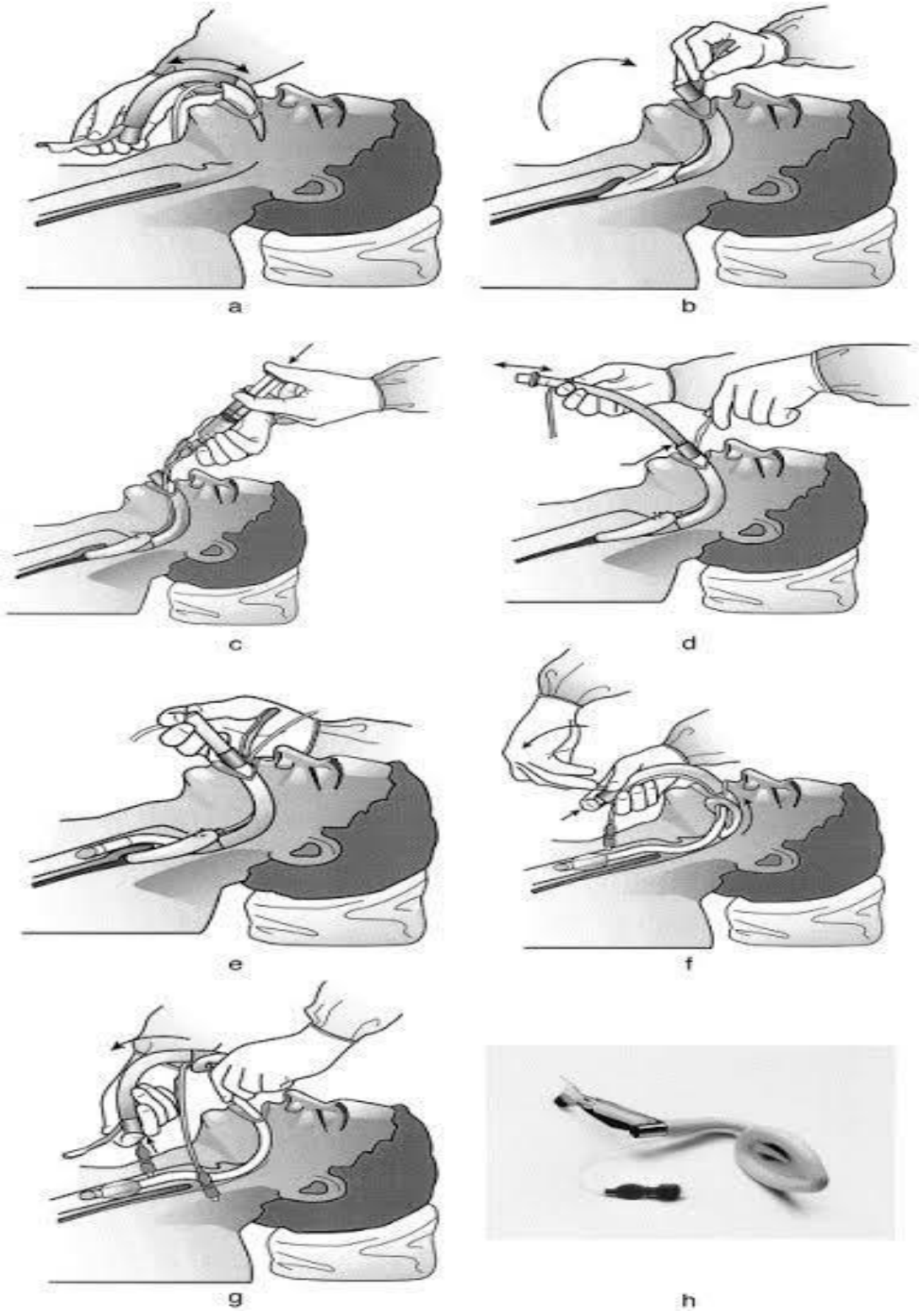
The LMA-Fastrach (intubating LMA, ILMA, ILM, intubating laryngeal mask airway) was designed to overcome some of the limitations of the LMA-Classic during tracheal intubation. The LMA-Classic was too floppy to optimize alignment with the glottis, and the long narrow tube could not accommodate a standard tracheal tube. Another objective was to eliminate the need to distort the anterior pharyngeal anatomy in order to visualize the laryngeal inlet, making the device applicable to patients with a history of difficult intubation and a "high" or "anterior" larynx.

Description



The LMA-Fastrach has a short, curved stainless steel shaft with a standard 15-mm connector. The tube is of sufficient diameter that a cuffed 9-mm tracheal tube can be inserted and short enough to allow a standard tracheal tube cuff to pass beyond the vocal cords. The metal handle is securely bonded to the shaft near the connector end to facilitate one-handed insertion, position adjustment, and maintain the device in a steady position during tracheal tube insertion and removal. There is a single, movable epiglottic elevator bar in place of the two vertical bars. A V-shaped guiding ramp is built into the floor of the mask aperture to direct the tracheal tube toward the glottis. The tip is slightly curved to permit atraumatic insertion. The LMA-Fastrach does not contain latex. It is available in sizes 3, 4, and 5. These fit the same size patients as the LMA-Classic. Both reusable and disposable versions are available.

Insertion



The LMA-Fastrach was designed for use with the patient in the neutral position. The tube on the LMA is shorter and wider than on the LMA-Classic and has a metal handle. using a head support, such as a pillow, but no head extension. The insertion technique consists of one-hand movements in the sagittal plane. It does not require placing fingers into the patient's mouth, thus minimizing the risk of injury or infection transmission as well as allowing insertion from almost any position. The LMA-Fastrach should be deflated and lubricated in a manner similar to the LMA-Classic. It is held by the handle, which should be approximately parallel to the patient's chest. The mask tip is positioned flat against the hard palate immediately posterior to the upper incisors, then slid back and forth over the palate to distribute the lubricant. After the mask is flattened against the hard palate, it is inserted with a rotational movement along the hard palate and the posterior pharyngeal wall. The mouth opening may need to be increased momentarily to permit the widest part of the mask to enter the oral cavity. The handle should not be used as a lever to force the mouth open. As the mask moves toward the pharynx, it should be firmly pressed to the soft palate and posterior pharyngeal wall to keep the tip from folding. The curved part of the metal tube should be advanced without rotation until it contacts the patient's chin, then kept in contact with the chin as the device is rotated inward. The handle should not be used to lever upward during insertion, because this will cause the mask to

press into the tongue. When properly inserted, the tube should emerge from the mouth directed somewhat caudally. Aligning the internal LMA-Fastrach aperture and the glottic opening by finding the position that produces optimal ventilation and then applying a slight anterior lift with the LMA-Fastrach handle facilitates correct positioning and blind intubation. The LMA-Fastrach can be inserted with a 180◦ rotation technique. Use Although the LMA-Fastrach has been designed to facilitate tracheal intubation, it can also be used as a primary airway device. It is especially useful for the anticipated or unexpected difficult airway. Studies indicate that most insertion attempts with the LMA-Fastrach are successful, and a patent airway is secured in nearly all patients. It has been used successfully in children, morbidly obese patients, and acromegalic patients. The LMA-Fastrach can be inserted with the same or better success than the LMA-Classic. It is easier to place than the LMA-Classic when manual in-line stabilization is used. However, in patients with limited neck movement, intubation may be less likely to be successful and take longer than if a lighted intubation stylet is used.

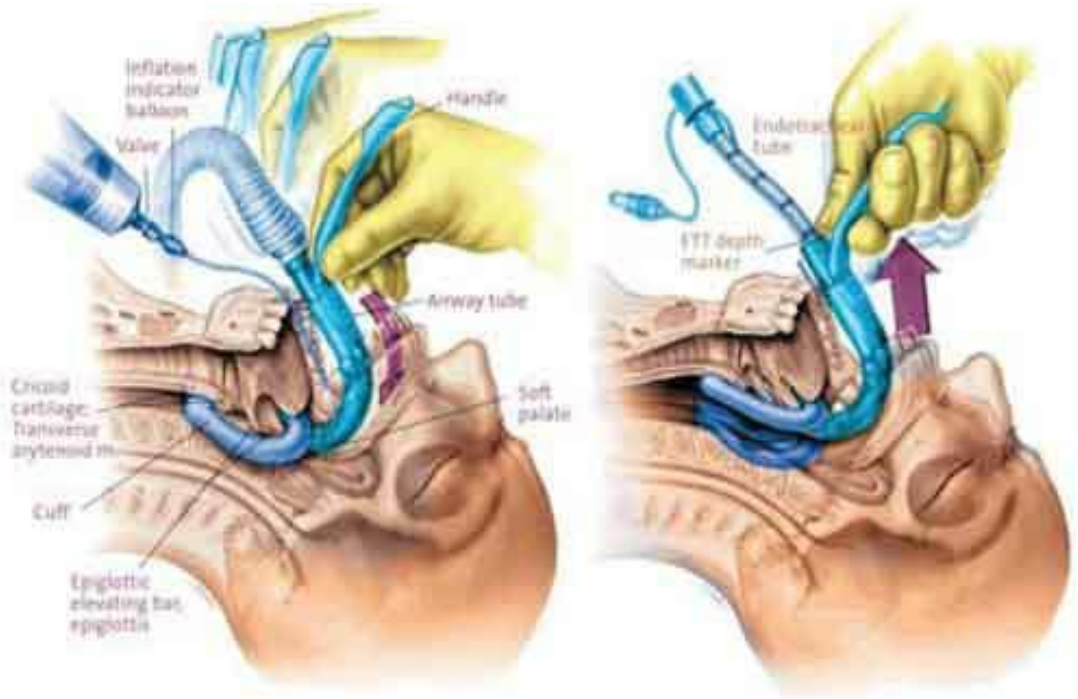
The LMA-Fastrach has been used successfully in the emergency department and prehospital care. It can be used with the patient in the lateral position. Tracheal Intubation Muscle relaxants are not necessary

for intubation through the LMA-Fastrach but may increase the success rate. Cricoid pressure will decrease the likelihood of success and may need to be released to allow intubation. The tracheal tube recommended by the manufacturer for use with the LMA-Fastrach is a silicone, wire reinforced, cuffed tube with a tapered patient end and a blunt tip. This tube is flexible, which allows negotiation around the anatomical curves of the airway. It has a high-pressure, low-volume cuff that reduces resistance during intubation and makes cuff perforation as the tube passes through the LMA less likely. There is a stabiliizer that allows the LMA to be removed without extubating the patient. When using the LMA-Fastrach, standard curved plastic tracheal tubes are associated with a greater likelihood of laryngeal trauma. Warming a plastic tube will result in success and complication rates similar to that of the tube from the LMA-Fastrach manufacturer. A spiral-embedded tube should not be used. If a curved plastic tracheal tube is used, it may be helpful to orient the curve opposite the LMA curve. Whatever tracheal tube is used, it is essential that it is possible to remove the connector. It is important to lubricate the tracheal tube well and pass it through the LMA several times before use.

Blind Intubation

The patient's head is maintained in the neutral position. The tracheal tube connector should be loosely fitted for easy removal. The tracheal tube should be lubricated with a water-soluble lubricant and passed into the metal shaft of the LMA-Fastrach until the tube tip is about to enter the mask aperture. With the silicone tracheal tube specially designed for the LMA Fastrach, the longitudinal line should face the handle of the LMA, and the tracheal tube should not be passed beyond the point where the transverse line on the tube is level with the outer rim of the LMA-Fastrach airway tube. The LMA-Fastrach handle is grasped with one hand to steady it while the tracheal tube is being inserted, then lifted like a laryngoscope (not levered) to draw the larynx forward a few millimeters. This increases the seal pressure and helps to align the axes of the trachea and the tracheal tube. It also corrects the tendency for the mask to flex.As it is advanced into the LMA-Fastrach, the tube should be rotated and moved up and down to distribute the lubricant. Ventilation and carbon dioxide monitoring can be performed during tracheal tube insertion by connecting the tracheal tube to the anesthesia breathing system. The tracheal tube should be advanced gently. The LMA-Fastrach handle should not be pressed downward. If no resistance if felt, it is likely that the epiglottic elevating bar is lifting the epiglottis upward, allowing

the tracheal tube to pass into the trachea. When the tracheal tube is thought to be in the trachea, the cuff should be inflated and its position in the trachea confirmed. If the tracheal tube fails to enter the trachea, a number of problems may have contributed to the lack of success. The epiglottis may have folded downward, or the tube may have impacted on the periglottic structures. The LMA-Fastrach may be too small or too large for the patient. The larynx may have been pushed downward during insertion. There may have been inadequate anesthesia or muscle relaxation so that the vocal cords were closed.



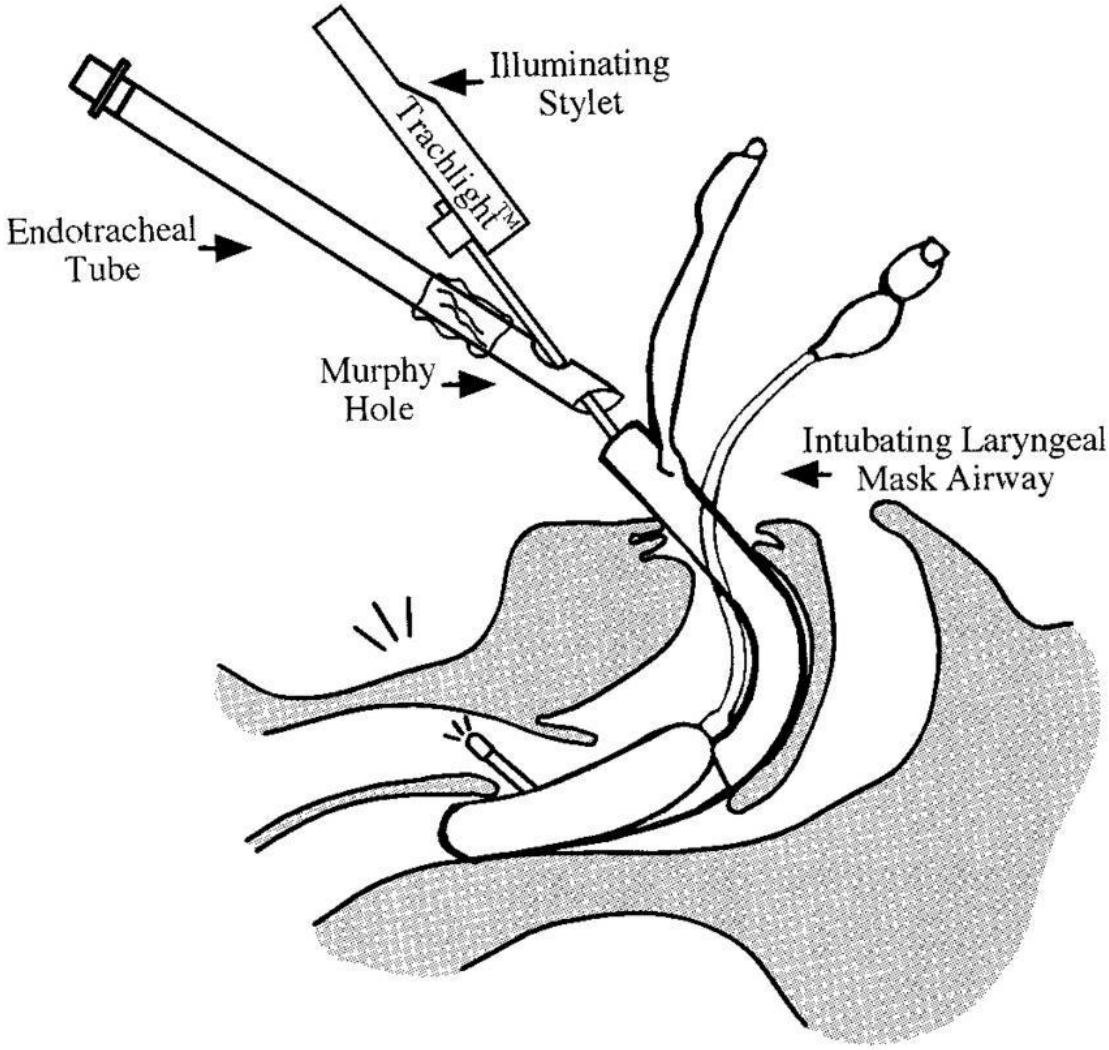
During blind tracheal intubation, the operator relies on tactile perceptions, especially a feeling of resistance, while advancing the tracheal tube. If the mask is not aligned with the glottic opening or the

size of the LMA Fastrach is inappropriate, resistance will be encountered as the tracheal tube tip pushes against glottic or periglottic structures, such as the downfolded epiglottis, valleculae, arytenoids, or aryepiglottic folds.If resistance is felt after the tracheal tube leaves the LMA-Fastrach, there are a number of maneuvers that can be taken to relieve the situation. If resistance is felt at 2 cm beyond the 15-cm mark on the tracheal tube, it is likely that the tube has impacted on the vestibular wall. Rotating the tracheal bevel may overcome the impaction. Another problem at this level may be a down folded epiglottis. Without deflating the cuff, the device should be swung outward for 6 cm and reinserted. If resistance is encountered 3 cm beyond 15 cm, the epiglottis may be out of the reach of the elevating bar, and a larger LMA should be used. If resistance occurs immediately after the tracheal tube leaves the LMA-Fastrach, the LMA may be too large and should be replaced with a smaller one. If resistance is felt at 15 plus 4 cm, the LMA may be too large, and a smaller size should be used. Other maneuvers that can be tried include slightly rotating the LMA-Fastrach in the sagittal plane by using the metal handle until the least resistance to manual ventilation is achieved, removing the head support, pulling the metal handle toward the user (extension), or pushing it away from the user (flexion).The LMA-Fastrach can be used to place an airway exchange catheter, which can then be used to direct a tracheal tube into the trachea. Blind intubation using the LMA-Fastrach is

faster than fiberoptic-guided intubation or intubation using direct laryngoscopy. It can be performed awake. When compared with awake fiberoptic intubation for patients with known difficult airways, patient satisfaction was greater with the LMA-Fastrach. The success rate of blind intubation varies from 40% to 100%, depending on the number of attempts and the experience of the operator. The blind technique can be time consuming and may result in trauma or esophageal intubation. If difficulty is encountered, the use of an LMA-CTrach should be considered.

Blind Nasal Intubation

Blind nasal intubation can be accomplished. A flexible tracheal tube is inserted into the trachea through the LMA, which is then removed. A Foley catheter is introduced into the nose and withdrawn from the mouth. The Foley catheter is inserted into the end of the tracheal tube and inflated with saline to grip the inner walls. The Foley catheter is then withdrawn until the machine end of the tracheal tube exits through the nose.



Fiberscopic-guided Intubation

The LMA-Fastrach is useful for fiberoptic intubation in the difficult-to-intubate patient. The fiberscope is used to observe correct tracheal tube passage through the LMA. The epiglottic elevating bar is too stiff to be elevated by a fiberscope without risk of damaging the tip or directing it downward. It should be lifted by the distal end of the tracheal tube.The tracheal tube is advanced approximately 1.5 cm past the mask

aperture while the intubating metal handle of the LMA-Fastrach is held to stabilize it. The tip of the tracheal tube should now have lifted the fiberscope away from the bowl of the mask, exposing the glottic structures. The fiberoptic scope is inserted and advanced to, but not beyond, the distal end of the tracheal tube. The tracheal tube is advanced until the glottis is brought into view. The tracheal tube is then advanced into the trachea. If difficulties are encountered, the patient's head and neck may be maneuvered or the LMA-Fastrach position adjusted by using the metal handle.

Autoclaving

The ILMA can be autoclaved at temperatures up to 135◦C (275◦ F). Higher temperature can cause the tube to become brittle and fragment. The ILMA should be allowed to cool to room temperature after sterilization. Autoclaving impairs the bond between the connector and the tube but not its air tightness. The World Health Organization guidelines and published literature indicate that the ILMA cleaning and sterilization procedures discussed previously are sufficient for inactivation of conventional pathogens such as bacteria, fungi, and viruses. In patients known or suspected to have a transmissible spongiform encephalopathy, it is recommended that the ILMA be destroyed after use. An ILMA-Unique should be used in these cases. Liquid chemical agents such as

glutaraldehyde, phenol-based cleaners, iodine-containing cleaners, or quaternary ammonium compounds or ethylene oxide should not be used to clean or sterilize the ILMA. They are adsorbed onto the silicone and can cause pharyngitis and laryngitis as well as shorten the ILMA life.

Life Span

With careful use and strict adherence to cleaning and sterilization procedures, a laryngeal mask airway will last for a long time. The recommended maximum number of uses by the manufacturer for the ILMA is 40, but up to 200 uses have been reported. With repeated use, there is a decrease in elastance, an increase in cuff permeability, and a loss in strength of the airway tube. It may be possible to exchange a malfunctioning inflation valve on an ILMA.

Dead Space

The dead space associated with the ILMA is less than with a face mask but is greater than with a tracheal tube. The correlation between end-tidal and arterial carbon dioxide is better with the laryngeal mask than with the face mask and as accurate as with a tracheal tube. The preferred site for measuring end tidal carbon dioxide in children is the laryngeal end of the shaft.

Flow Resistance and Work of Breathing

Resistance to breathing is an important consideration with the ILMA because it is frequently used with spontaneous breathing. While the ILMA itself offers less resistance than a tracheal tube, total respiratory resistance and work of breathing have been found to be similar because the larynx is not bypassed. The work of breathing through the ILMA is similar to that with a face mask unless there is difficulty in maintaining a patent airway. The LMA-Flexible has a smaller ID and imposes significantly greater resistance than other ILMAs.

Useful Situations

The ILMA has been used for a wide variety of procedures, but it is probably best suited to short cases, making it especially useful for outpatient surgery. It has proved useful for patients who need multiple anesthetics over a short period of time. The maximum duration for which the ILMA can be safely used is not known. It has been used for surgical procedures lasting up to 8 hours. The laryngeal mask has been used with low-flow and closed system anesthesia.

Out of hospital Use

The LMA has been used in out-of-hospital situations, including air transfers. It has proven useful in patients with cervical spine injury and in those trapped in positions that do not lend themselves to tracheal intubation. Its ease of insertion may make it useful in the scenario of a toxic mass casualty event. Paramedics and respiratory therapists can acquire skills more rapidly and have a higher rate of successful placement with the LMA than with a tracheal tube. However, while LMA placement by paramedics is usually successful, blind tracheal intubation through it is not associated with a high success rate.

REVIEW OF LITERATURE

1. Minerva Anestesiol. 2018 Apr;84(4):455-462. doi: 10.23736/S0375-9393.17.11702-5. Epub 2017 Oct 4.Airway management with Fastrach laryngeal mask versus Spritztube: a prospectiverandomized manikin-based study.DE Rosa S(1)(2), Ferrari F(3), Carboni Checcacci S(3), Rigobello A(3), GennaroP(3), DE Luca D(4)(5), Primadei M(3), Politi F(3), Pellizzari A(3), Bonato R(3).Author information: (1)Department of Anesthesiology and Intensive Care, San Bortolo Hospital, Vicenza, Italy - derosa.silvia@ymail.com.(2) Department of Anesthesiology and Intensive Care, Sacro Cuore CatholicUniversity, Rome, Italy - derosa.silvia@ymail.com. (3)Department of Anesthesiology and Intensive Care, San Bortolo Hospital, Vicenza, Italy.4)Department of Anesthesiology and Intensive Care, Sacro Cuore Catholic University, Rome, Italy.(5)Division of Pediatrics and Neonatal Critical Care, Paris-Sud UniversityHospitals, A. Beclere Medical Center, Paris, Italy.BACKGROUND: A new promising device, the Spritztube (ST), was developed combining the ability to perform both supraglottic ventilation and orotracheal fibreoptic intubation using the same device, allowing an easy passage from supraglottic ventilation to tracheal ventilation avoiding apnea. The present study aims to compare the speed and the subjective ease of insertion of the novel tracheal tube

(Spritztube®) compared to the intubating laryngeal mask airway Fastrach™ (FT-LMA) in a simulation environment. METHODS: Each participant received verbal instruction and practical demonstration concerning "technique of insertion" for both devices on manikin and, in arandomized order, used both devices. Time of placement (T1), time of inflation(T2), the elapsed procedural time (T3), ease of insertion, time of exchange maneuver for intubation

2. J Clin Anesth. 2017 Feb;37:31-37. doi: 10.1016/j.jclinane. 2016.10.040. Epub 2016 Dec 22.Awake tracheal intubation in anticipated difficult airways: LMA Fastrach vs flexible bronchoscope: A pilot study. Hanna SF(1), Mikat-Stevens M(2), Loo J(2), Uppal R(3), Jellish WS(2), Adams M(4).STUDY OBJECTIVE: To compare the use of LMA Fastrach intubating laryngeal mask airway (ILMA) to flexible bronchoscopy (FB) for awake intubation in patients with difficult airways. DESIGN: Randomized prospective study. SETTING: Large academic medical center. PATIENTS: Forty adult patients, American Society of Anesthesiologists I-IV, meeting the criteria for awake intubation based on history and physical examination. INTERVENTIONS: After sedation and airway topicalization, patients were randomized to either FB group, n=19, or ILMA group, n=21. All intubations were performed by or under the supervision of an attending

anesthesiologists, with variable participation of residents or certified registered nurse anesthetists. A maximum of three attempts were permitted with the assigned technique, to be followed bythe alternative method in case of failure. MEASUREMENTS: Times to carbon dioxide (end-tidal carbon dioxide) detection, endotracheal tube placement, number of attempts, training level of operator, and adverse events were recorded. Blood pressure, oxygen saturation, and heart rate were measured. Patients were interviewed the following day regarding their experience and satisfaction. MAIN RESULTS: Overall intubation success rate within three attempts was 95% forboth groups. However, successful intubation on the first attempt occurred at a significantly higher rate with ILMA vs FB (95% vs 58%; P=.0028). Total mean time to endotracheal tube placement was also significantly shorter in the ILMA group vs FB (92 vs 246 seconds; P=.0001). There were no adverse events in either group,and patient satisfaction was not significantly different.

3.Am J Emerg Med. 2016 Jul;34(7):1193-7. doi: 10.1016/j.ajem. 2016.02.076. Epub 2016Apr 2.Effect of head position on the success rate of blind intubation using intubating supraglottic airway devices. Yamada R(1), Maruyama K(2), Hirabayashi G(1), Koyama Y(3), Andoh T(1).BACKGROUND: To evaluate the effect of head position on the performance of intubating supraglottic airway devices, we compared the

success rate of blind intubation in the head-elevated and the pillowless head positions with the LMA Fastrach and the air-Q, and the change of glottic visualization through the air-Q.METHODS: We assigned 193 patients to two groups according to the device used and subgrouped by head position used for intubation: Fastrach/pillowless, Fastrach/head-elevated, air-Q/pillowless, and air-Q/head-elevated. Blind intubation through the Fastrach or the air-Q was attempted up to twice after induction of general anesthesia. Before the attempt at blind intubation with the air-Q, the percentage of glottic opening (POGO) score was also fiberscopically evaluated at the outlet of the device in both head positions in a cross-over fashion. RESULTS: The Fastrach significantly facilitated blind intubation compared with the air-Q in both the pillowless and head-elevated positions: 87.2% in Fastrach/pillowless vs 65.9% in air-Q/pillowless (P=.048), 90% in Fastrach/head-elevated vs 53.7% in air-Q/head-elevated (P<.001). The head-elevated position did not significantly affect the success rate of blind intubation for either device (P=.97 in Fastrach, P=.37 in air-Q). Although the head-elevated position significantly improved the POGO score from the median(10-90 percentile) 60% (0-100%) in the pillowless position to 80% (0-100%) (P=.008), it did not contribute to successful blind intubation with the air-Q.CONCLUSION: Although the head-elevated position improved glottic

visualization in the air-Q, the head position had minimal influence on the success rate of blind intubation with either the Fastrach or the air-Q.

4. Endotracheal intubation through the intubating laryngeal mask airway (LMA-Fastrach™): A randomized study of LMA- Fastrach™ wire-reinforced silicon endotracheal tube versus conventional polyvinyl chloride tracheal tube.AIM: To evaluate the success of tracheal intubation using the LMA-Fastrach™ tracheal tube versus conventional PVC tracheal tube through ILMA.SETTINGS AND DESIGN: Two hundred adult ASA physical status I/II patients, scheduled to undergo elective surgery under general anaesthesia requiring intubation, were randomly allocated into two groups. METHODS: The number of attempts, time taken, and manoeuvres employed to accomplish tracheal intubation were compared using conventional PVC tubes (group I) and LMA-Fastrach™ wire-reinforced silicone tubes (group II). Intraoperative haemodynamic changes and evidence of trauma and postoperative incidence of sore throat and hoarseness, were compared between the groups. STATISTICAL ANALYSIS: The data was analyzed using two Student's t test and Chi-square test for demographics and haemodynamic parameters. Mann Whitney U test was used for comparison of time taken for endotracheal tube insertion. Fisher's exact test was used to compare postoperative complications. RESULTS: Rate of successful tracheal

intubation and haemodynamic variables were comparable between the groups. Time taken for tracheal intubation and manoeuvres required to accomplish successful endotracheal intubation, however, were significantly greater in group I than group II (14.71±6.21 s and 10.04±4.49 s, respectively ($P<0.001$), and 28% in group I and 3% in group II, respectively($P<0.05$)).CONCLUSION: Conventional PVC tube can be safely used for tracheal intubation through the ILMA.CONCLUSION: Awake intubation can be performed successfully and expeditiously with the use of LMA Fastrach in patients with a difficult airway and no contraindication to a blind technique. It compared favorably to the use of the fiberoptic bronchoscope in the patient cohort presented in this study.

AIM OF THE STUDY

Sudden loss of airway in patients in the lateral position has always been proven to be difficult to manage with conventional laryngoscopy. We performed a randomized controlled trial to prove the success rate of ventilation and intubation in the lateral position via intubating laryngeal mask airway (ILMA).

MATERIALS AND METHODS

With permission from the authorities of GOVERNMENT RAJAJI HOSPITAL MADURAI with written consent of patients, 90 adult patients scheduled.

Inclusion criteria

- Age 18-55 years
- ASA grade I and II
- Both sexes
- General surgery cases

Exclusion criteria

- History of cardiorespiratory disease (e.g. hypertension, chronic obstructive pulmonary disease, ischemic heart disease)
- H/O Cerebrovascular disease
- Reflux oesophagitis
- Symptomatic hiatus hernia
- Peptic ulceration or non- fasting
- Predicted difficult airways
- Inadequate mouth opening

Along with other parameters, Mallampati scoring, mouth opening, with head extension in the upright and sitting position were recorded.

Perioperative monitoring included electrocardiogram, heart rate, non invasive blood pressure, capnography and pulse oximetry. Before induction of anesthesia, patients were randomly divided into 3 groups. Each group comprised of 30 patients were positioned right lateral, left lateral and supine. The feasibility of ventilation was assessed by means of bag and mask ventilation before placing them right or left lateral under supervision of a senior anesthesiologist. The head was supported on a pad 8 cm thick (with added padding, if needed) in the neutral position and oxygen was administered via a face-mask for 3 minutes before giving anesthesia.

Anaesthetic technique

Patients were pre-medicated with glycopyrolate 0.2 mg intra-veneous (IV) and fentanyl in a dose of 1 μg/kg IV and pre oxygenated using 100% O_2. Patients were induced with intravenous propofol 3 mg/kg IV injected over 30 seconds and maintained with sevoflurane in oxygen. ILMA was inserted when eyelash reflex was lost and the jaw was relaxed. Additional bolus of propofol 10-20 mg IV was allowed until an adequate level of anesthesia was achieved. Standing above patients head, ILMA was inserted into the hypopharynx, with the insertion technique consisting of a one handed rotational movement in the saggital plane, with head supported by a pillow to achieve a neutral position as described

by Brain et al. Size 4 ILMA was used for both sexes; after insertion, the cuff was inflated with 30 ml of air. Successful placement was confirmed by positive capnography along with ease of ventilation and adequate chest wall expansion. The time required to insert the ILMA was measured from the time of introduction of ILMA between the incisors, till the successful restoration of ventilation. If ventilation through the ILMA produced resistance, leakage and/or unsatisfactory ventilation, optimization of ventilation was performed using adjusting maneuvers in the following order (I) Chandy's maneuver-consisting of rotating the device in the saggital plane followed by slightly lifting the handle of the ILMA away from the posterior pharyngeal wall (II) extension maneuver pulling the handle back towards the intubator (III) flexion maneuver pushing the handle of ILMA away from the intubator. In case of a failed insertion, three attempts were allowed. Meanwhile, in between attempts, patients were oxygenated by face mask. After 3 attempts, as well as in the case of desaturation (SpO_2 < 92%) with hemodynamic instability, patients were moved to the supine position and intubated by conventional laryngoscopy. The Cormack & Lehane laryngoscopy score was noted in these cases. The number of attempts for successful placement of ILMA, number/type of adjusting maneuvers used, and time needed for final attempt to the ILMA insertion were noted. After confirming satisfactory ventilation with positive capnography rocuronium 0.6 mg/kg IV was

administered. Once adequate muscle relaxation (after 120 sec) is achieved, lubricated silicone tracheal tube size 7.5 was advanced relying on tactile sensation through ILMA. If no obstruction was observed, the tube was inserted 7 cm beyond the transverse mark. In case of resistance adjusting up-down maneuvers, extension & optimization were used. The intubation time (time taken for insertion of the tip of tracheal tube into the metallic end of ILMA till the restoration of ventilation) along with number of attempts, number of adjusting maneuvers used, and success rate were recorded. Data on patient demographics, number of attempts, number of adjusting maneuvers, success rate and vital signs were recorded, tabulated and analyzed using analysis of variance (ANOVA) and multiple t test for descriptive data between the two groups and chi square for quantitative data considered $P < 0.05$ was statistically significant. Statistical analysis was performed using statistical software SPSS 11.0 version.

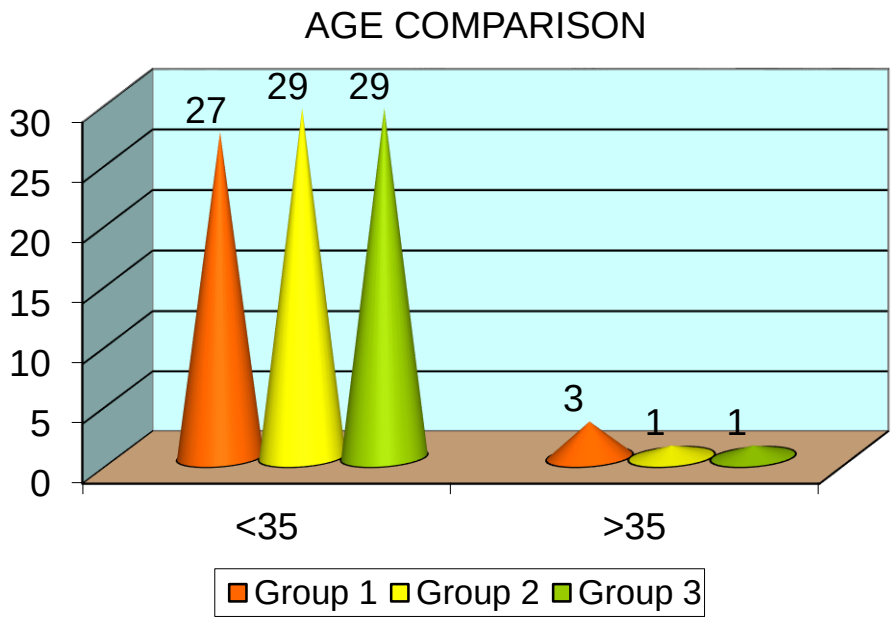
Group 1 - Supine

Group 2 - Right Lateral

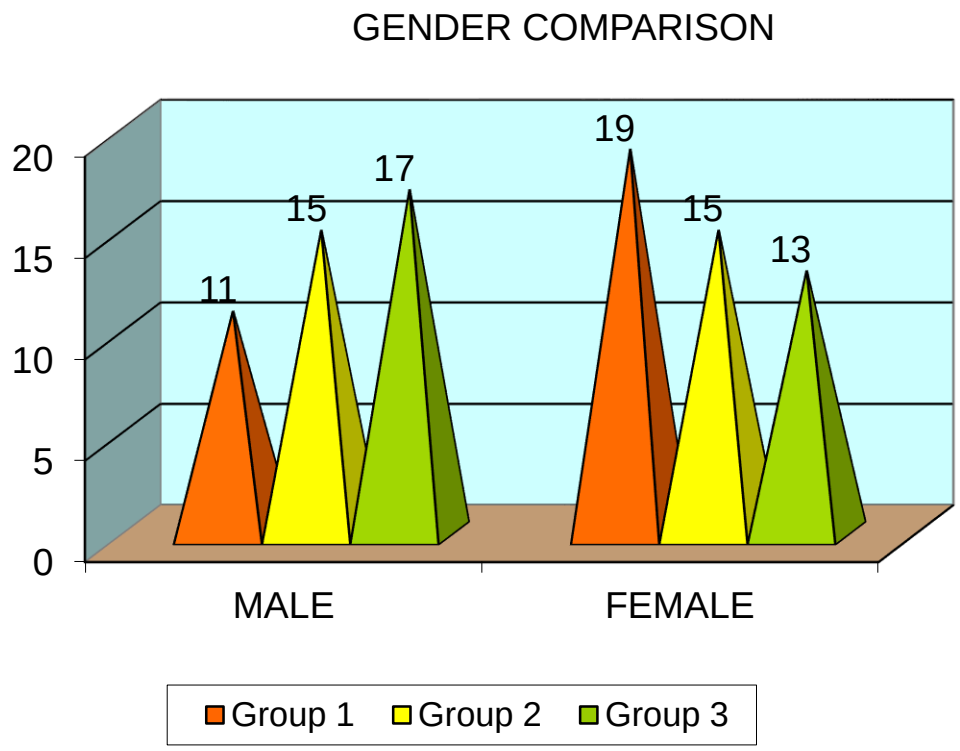
Group 3 - Left Lateral

OBSERVATION AND RESULTS

	NO.OF CASES		
AGE (in years)	**Group 1**	**Group 2**	**Group 3**
<35	27	29	29
>35	3	1	1
Total	30	30	30
	MEAN	SD	
Group 1	31.2	7.827	
Group 2	25.467	3.794	
Group 3	25.467	3.794	
p value	<0.206 Not Significant		

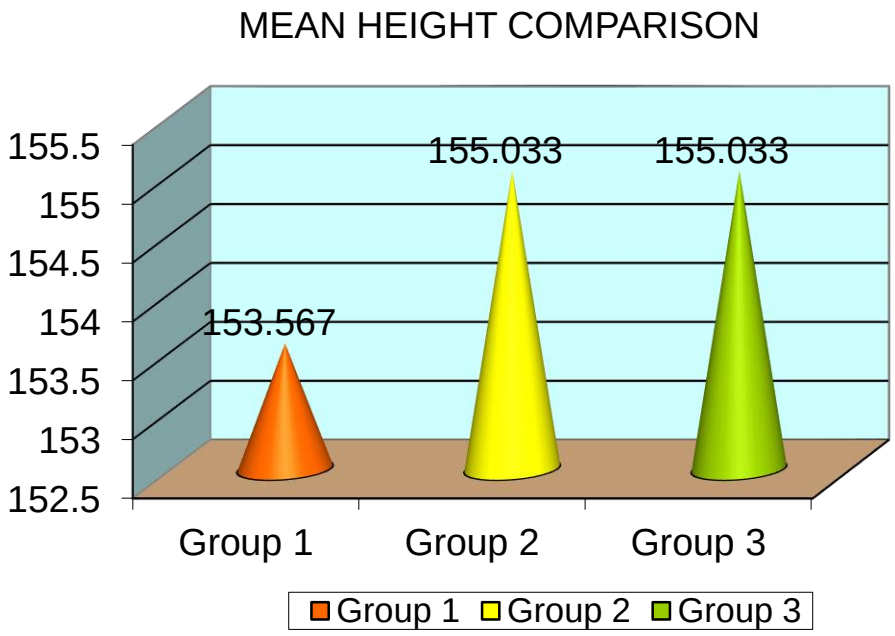


	NO.OF CASES		
SEX	Group 1	Group 2	Group 3
MALE	11	15	17
FEAMLE	19	15	13
p value	0.287 Not significant		

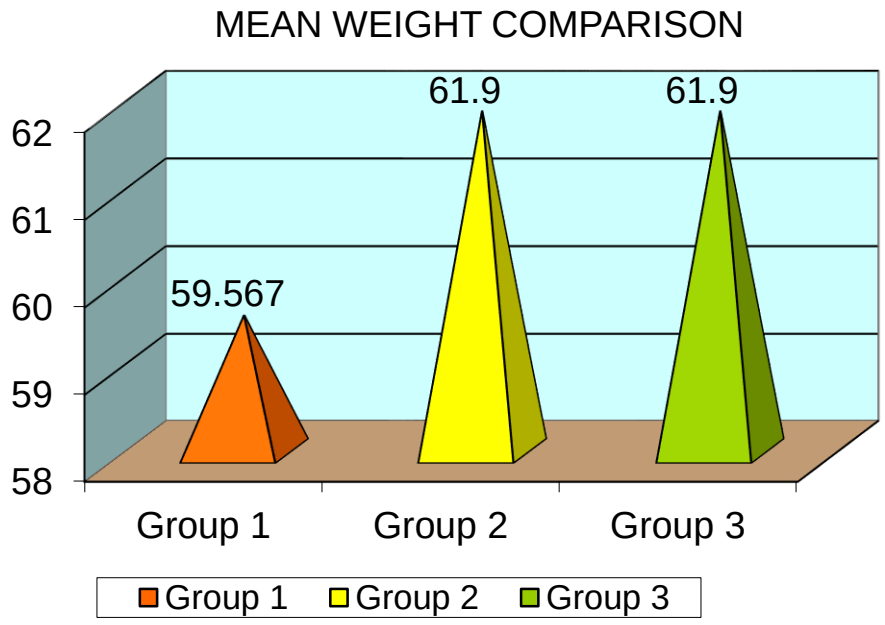


	NO.OF CASES		
HEIGHT	**Group 1**	**Group 2**	**Group 3**
<155	21	18	18
>155	9	12	12

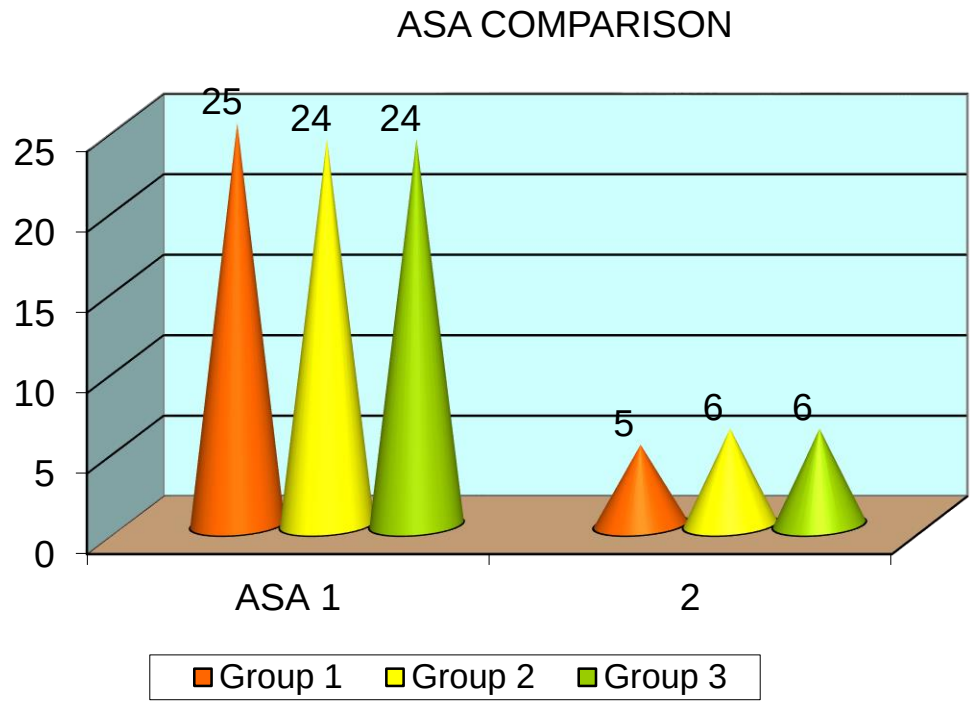
HEIGHT	MEAN	SD
Group 1	153.567	4.462
Group 2	155.033	3.211
Group 3	155.033	3.211
P	0.209 Not significant	



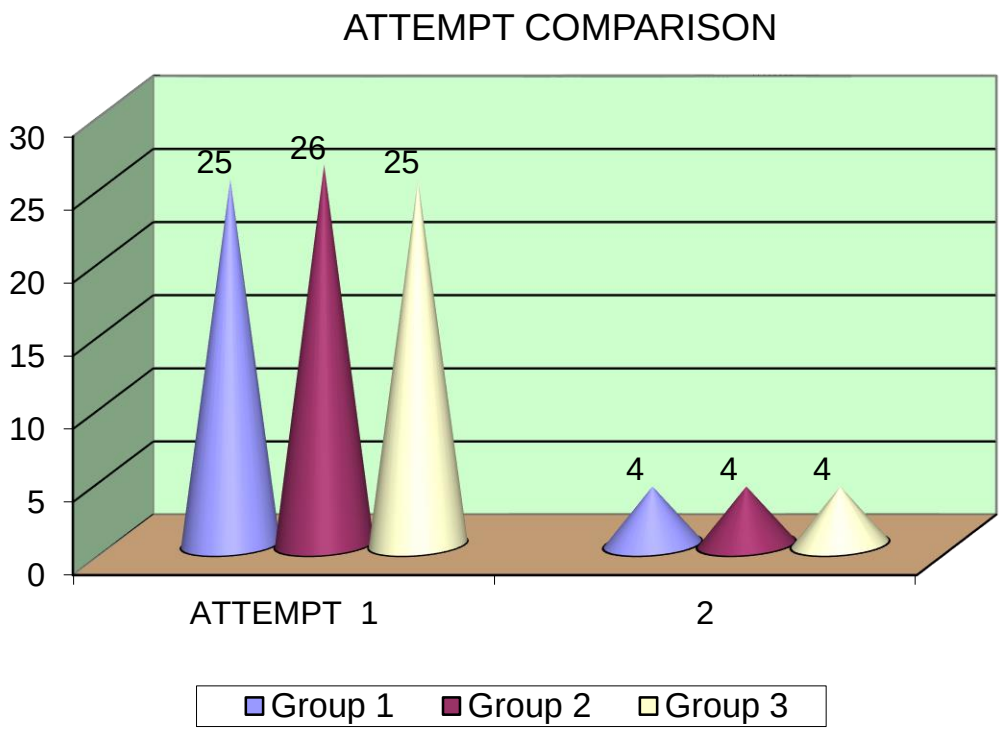
NO.OF CASES			
WEIGHT	**Group 1**	**Group 2**	**Group 3**
<55	30	6	6
>55	0	24	24
Weight	MEAN	SD	
Group 1	59.567	3.491	
Group 2	61.9	7.976	
Group 3	61.9	7.976	
P	0.208 Not Significant		



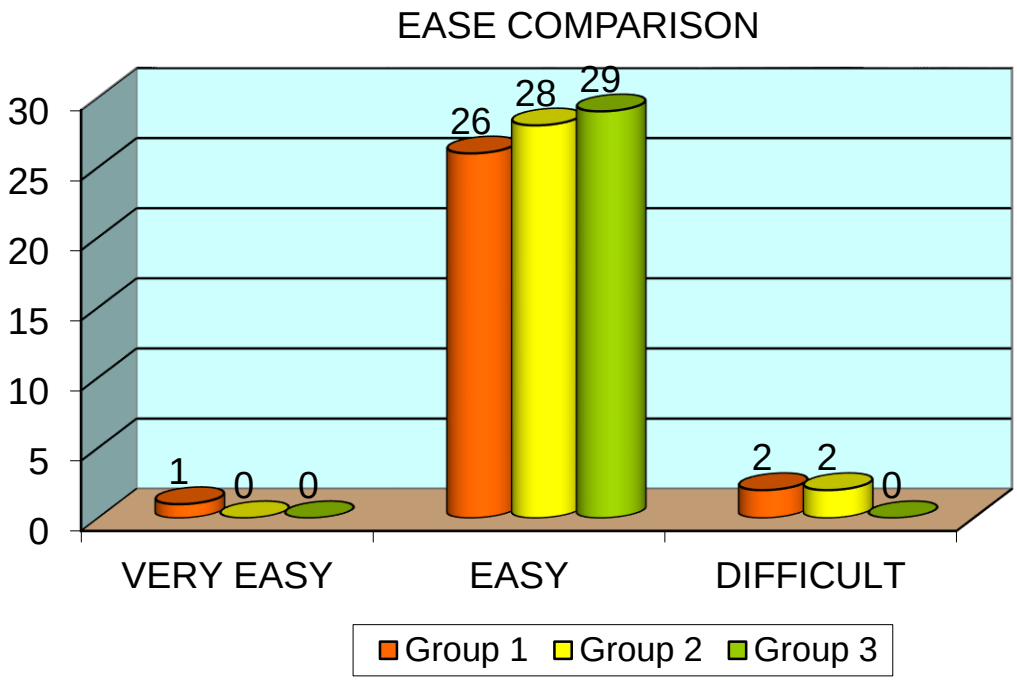
	NO.OF CASES		
ASA	**Group 1**	**Group 2**	**Group 3**
ASA 1	25	24	24
2	5	6	6
p value	0.930 Not significant		



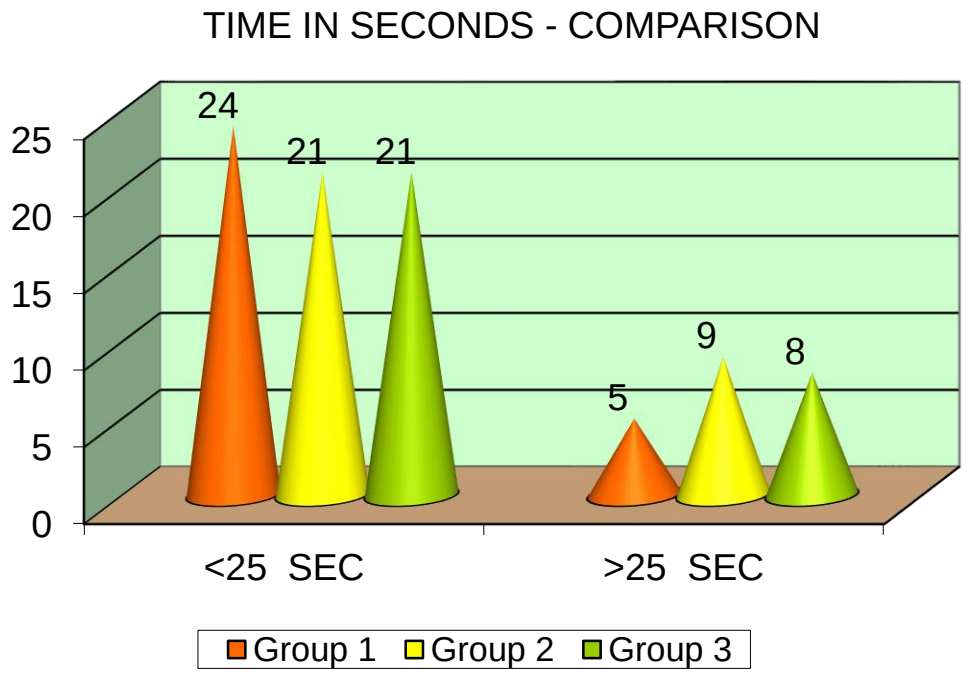
	NO.OF CASES		
ATTEMPT	**Group 1**	**Group 2**	**Group 3**
ATTEMPT 1	25	26	25
2	4	4	4
p value	1.0 Not significant		



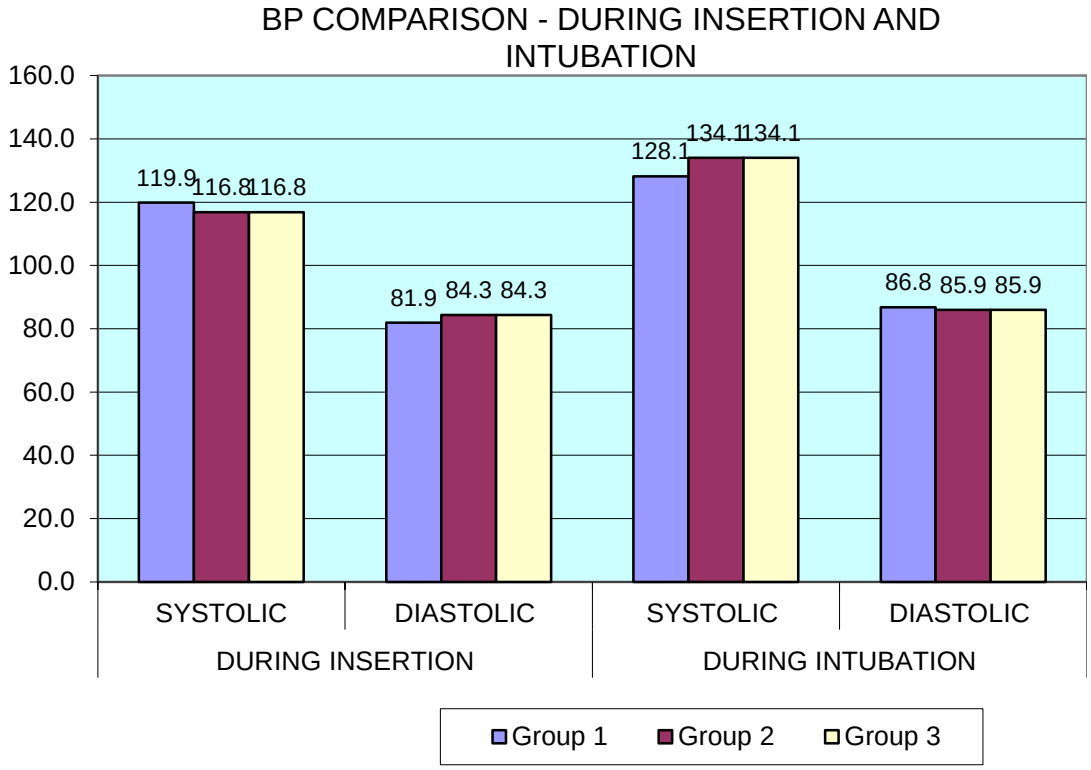
	NO.OF CASES		
EASE	**Group 1**	**Group 2**	**Group 3**
VERY EASY	1	0	0
EASY	26	28	29
DIFFICULT	2	2	0
Total	30	30	30
p value	0.384 Not significant		



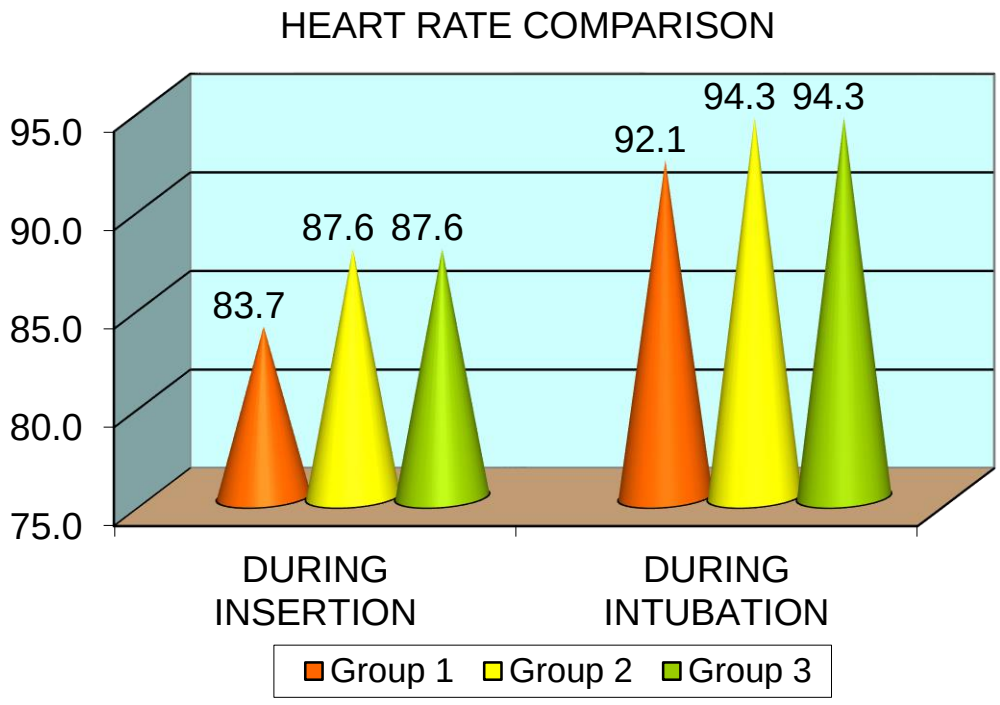
	NO.OF CASES		
TIME	**Group 1**	**Group 2**	**Group 3**
<25 SEC	24	21	21
>25 SEC	5	9	8
Total	30	30	30
	MEAN	SD	
Group 1	24.567	6.912	
Group 2	25	6.803	
Group 3	25	6.803	
P	0.961 Not significant		



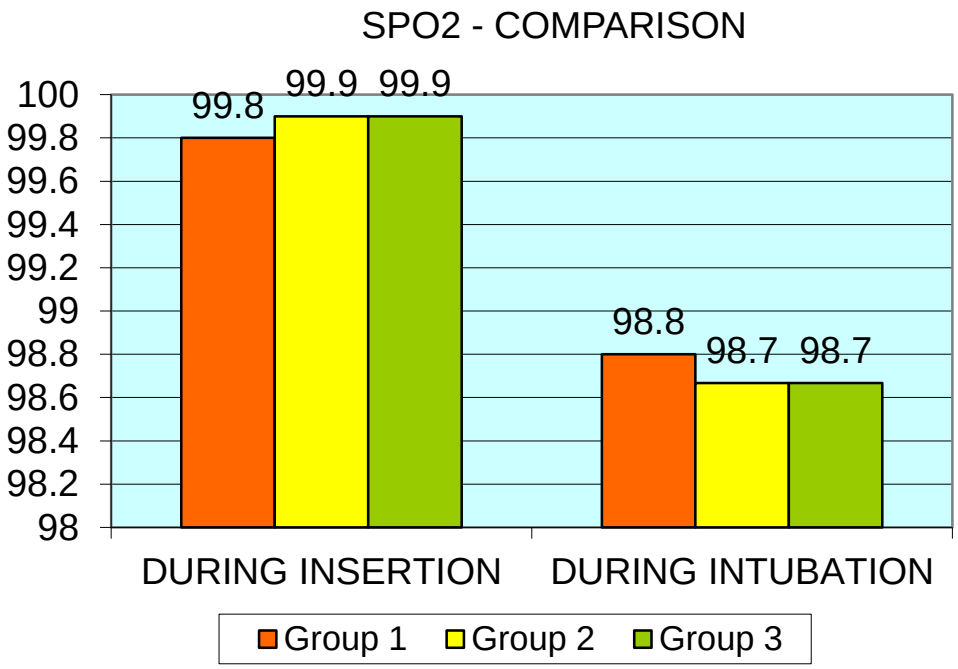
BP (in mmHg)		Group 1		Group 2		Group 3		p value
		MEAN	SD	MEAN	SD	MEAN	SD	
During Insertion	Systolic	119.867	4.607	116.833	3.573	116.833	3.573	0.004
	Diastolic	81.933	4.085	84.333	2.412	84.333	2.412	0.003
During Intubation	Systolic	128.133	3.821	134.067	2.05	134.067	2.05	<0.001
	Diastolic	86.8	2.325	85.933	3.503	85.933	3.503	0.474



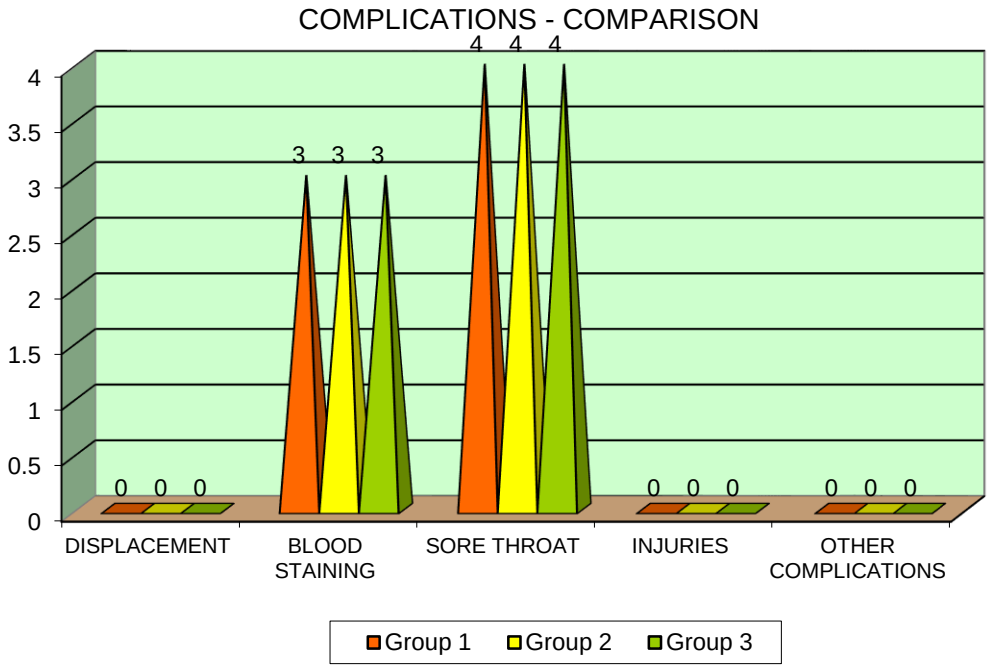
HEART RATE	Group 1		Group 2		Group 3		p value
	MEAN	SD	MEAN	SD	MEAN	SD	
During Insertion	83.667	3.916	87.6	4.507	87.6	4.507	<0.001
During Intubation	92.1	5.821	94.267	2.406	94.267	2.406	0.05



SPO2	Group 1		Group 2		Group 3		p value
	MEAN	SD	MEAN	SD	MEAN	SD	
During Insertion	99.8	0.407	99.9	0.305	99.9	0.305	0.43
During Intubation	98.8	0.847	98.667	0.959	98.667	0.959	0.812



	NO.OF CASES		
COMPLICATIONS	**Group 1**	**Group 2**	**Group 3**
DISPLACEMENT	0	0	0
BLOOD STAINING	3	3	3
SORE THROAT	4	4	4
INJURIES	0	0	0
OTHER COMPLICATIONS	0	0	0



DISCUSSION

This randomized prospective controlled study was designed to evaluate the feasibility of the use of ILMA in a simulated emergency situation of sudden accidental loss of airway during the middle of surgery in patients lying in the lateral position. Such a scenario can be extrapolated to disaster conditions where the victims may be trapped in a lateral position under the rubble following an earthquake. Conventional laryngoscopy has limitations in right lateral patients due to blade design. Also, lateral positioning results in deterioration of the laryngoscopic view which can be disastrous in case of failed intubation skills. Our study was extrapolated to review the importance of ILMA in laterally placed patients with respect to success rate and intubation time. We concluded that the success rate of insertion and adequate ventilation through ILMA was almost equal in the supine as well as right and left lateral groups. We successfully inserted ILMA in all but one patient among 89/90 (i.e. 98.99%) patients, with ease of insertion in 79 and a little bit of adjustment in the remaining 10 patients, besides the gravity-dependent descent of the paralyzed lower jaw in the lateral position. The success rate of ventilation via ILMA in the lateral position was similar to that of standard LMA.

The success rate of intubation in the first attempt was higher in the supine group (96.55%), but comparable with the right lateral (86.20%) and left lateral groups (93.10%). Despite all the maneuvers we could not intubate trachea in two patients, one from each group (supine and left lateral). The patient in the supine group whose trachea could not be intubated was the one with unsatisfactory ventilation, and suggests improper placement of ILMA leading to failure in achieving intubation through it. The overall success rate of blind intubation in the lateral position at 96.6% did not differ from similar studies. Additionally our results for supine patients are quite comparable with light-wand guided intubation via ILMA in supine patients. Fibreoptic guidance definitely improves success rates as reported by Joo and Rose, where he compared blind versus fibreoptic intubation via ILMA and by Weiss et al who used fibre-optic guidance in pediatric patients after a failed blind intubation. However, as we were simulating situations where intubation was required as emergency rescue measures in patients in the lateral position, our technique proves to be blind but technically rapid and easy.

The majority of patients in all 3 groups were intubated within 11-20 sec which is quite comparable with previous studies. In patients where few maneuvers were used to perform successful intubation, it also held true that a few more seconds were required for intubation .The time required for intubation was quite similar in all the three groups (~20 sec). Definitely among the 3 groups, we took the least time in the supine group, but this was due to more familiarity with performing procedures in supine patients. We observed that Chandy's maneuver is useful in increasing the success of proper placement of ILMA as well as for intubation through it. While removing ILMA over the tracheal tube, accidental extubation occurred in one patient due to slippage of an over-lubricated silicone tracheal tube. Time taken for removal of ILMA in all the three groups was almost equal.

The ILMA's insertion, intubation and removal resulted in increase in heart rate as well as systolic blood pressure for a transient period, which was well tolerated by patients of ASA grade I and II. The ILMA is fairly suitable as a ventilatory device in the lateral position on apneic patients in the hands of inexperienced personnel. The blind intubation through ILMA is feasible in a high percentage of patients.

Esophageal intubation occurred irrespective of lateral position due to slippage of the over lubricated tracheal tube at the time of removal of ILMA in one case, comparable to that of Caponas where he observed that esophageal intubation occurs in 5% of cases. As reported by Komatsu et al., we also expected difficulties for a right handed investigator to insert ILMA in the lateral position. But we observed that the position of the patient did not affect the success rate of ILMA insertion and intubation through it. Instead, we used a little thrust on the lower jaw to facilitate insertion of ILMA. Among our patients, three had sore throats postoperatively, which were the cases where we took more than one attempt at intubation.

CONCLUSION

To conclude, the ILMA has proven to be an effective ventilatory device and a suitable conduit for blind tracheal intubation even in patients lying in the lateral position in terms of ease, success rate and time taken. As per the record, most of our patients weighed between 41-70 kg, showing that size 4 is suitable for emergency rescue airway management in an average adult Indian population. The ILMA has an important role to play in the emergency management of airways in patients in the lateral position where other conventional methods of airway management may be difficult or have failed.

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PROFORMA

NAME: I.P.NO:

AGE & SEX: ASA:

WEGHT:

DATE AND TIME OF ADMISSION:

DATE AND TIME OF DISCHARGE:

DIAGNOSIS:

PROCEDURE:

HISTORY: allergy to drugs, heart diseases, DM, hypertention, bronchialasthma, thyroiddisease, epilepsy, Complications in previous surgeries, treatment history.

CLINICAL EXAMINATION: PR, BP, SPO2, general examinations**,** dental examination, airway assessment, CVS, RS.

BASIC EXAMINATION

1) Complete blood count
2) Blood grouping and typing
3) BT, CT
4) Urineroutine
5) Blood urea, serum creatinine

6) RBS

7) CXR-PA view

8) ecg, echo

9) serum electrolytes

ANAESTHTIC TECHNIQUE GROUP A/GROUP R/GROUP L

PATIENT CHARACTERISTICS

	SUPINE	**RIGHT LATERAL**	**LEFTLATERAL**
AGE			
HEIGHT(cm)			
WEIGHT(KG)			
SEX(M/F)			

PRIMARY OUTOME

COMPARISION IN 3 GROUPS

	SUPINE	RIGHT LATERAL	LEFTLATERAL
INSERTION ATTEMPTS 1/2/failed			
EASEOF INTUBATION Very easy/easy/difficult			
TIMEFOR INSERTION			
AIRWAY SEALING CAPNOGRAPHY			

SCORING SYSTEM

INTUBATION ATTEMPTS

NO.OFATTEMPTS	SCORE
ONE	2
TWO	1
>TWO	0

EASE OF INTUBATION

TIME FOR INSERTION	SCORE	EASE OF INTUBATION
<30SECONDS	2	VERYEASY
30-50SECONDS	1	MEDIUM
>50SECONDS	0	DIFFICULT

MONITORING VITALS

	SUPINE	RIGHT LATERAL	LEFT LATERAL
NIBP(SBP/DBP)			
DURING INSERTION			
DURING INTUBATION			
HEART RATE			
DURING INSERTION			
DURING INTUBATION			
SPO2			
DURING INSERTION			
DURING INTUBATION			

COMPLICATIONS

	SUPINE	**RIGHT LATERAL**	**LEFT LATERAL**
1. DISPLACEMENT			
2. BLOOD STAINING (on removal)			
3. SORE THROAT			
4. HOARSENESS OF VOICE			
5. ANY INJURIES			
6. OTHER COMPLICATIONS			

ABBREVIATIONS

ASA	-	American Society of Anaesthesiologists
ILMA	-	Intubating laryngeal mask airway
cm H_2O	-	Centimeters of Water
DBP	-	Diastolic Blood Pressure
HR	-	Heart rate
GA	-	General anaesthesia
kg	-	Kilogram
LMA	-	Laryngeal mask airway
MAP	-	Mean Arterial Pressure
mg	-	milligrams
mins	-	minutes
mmHg	-	millimeter of mercury
PLMA	-	Proseal laryngeal mask airway
SAD	-	Supraglottic airway device
SBP	-	Systolic Blood Pressure
%	-	Percentage

ஆராய்ச்சி தகவல் அறிக்கை

மதுரை அரசு இராசாசி மருத்துவமனையில் வரும் நோயாளிக்கு ஒரு ஆராய்ச்சி இங்கு நடை பெற்று வருகிறது. நீங்களும் இந்த ஆராய்ச்சியில் பங்கேற்க விரும்பிகிறோம் .

உங்களை சில சிறப்பு பரிசோதனைக்கு உட்படுத்தி அதன் தகவல்களை ஆராய்வோம். அதனால் தங்களது நோயின் ஆய்வரிகையோ அல்லது சிகிச்சையோ பாதிப்பு ஏற்படாது என்பதைதெரிவித்து கொள்கிறேன் .

முடிவுகளை வெளியிடும் போது அல்லது ஆராய்ச்சியின் போதோ தங்களது பெயரோ அல்லது அடையாளங்களோ வெளியிடமாட்டோம் என்பதை தெரிவித்துகொள்கிறோம்.

இந்த ஆராய்ச்சியில் பங்கேற்பது தங்களுடைய விருப்பத்தின் பேரில் தான் நடக்கும். மேலும் நீங்கள் எந்நேரமும் இந்த ஆராய்ச்சியில் இருந்து பின் வாங்கலாம் என்பதையும் தெரிவித்து கொள்கிறோம்.

இந்த சிறப்பு பரிசோதனை முடிவுகளை ஆராய்ச்சியின் போது அல்லது ஆராய்ச்சியின் முடிவின் போது தங்களுக்கு அறிவிப்போம் என்பதையும் தெரிவித்துகொள்கிறோம்.

பங்கேற்பாளர் கையொப்பம்

MASTER CHART

S.NO	NAME	AGE	SEX	WEIGHT	HEIGHT	ASA	ATTEMPTS	EASE	TIME(SEC)	BLOOD PRESSURE				HEART RATE		SPO2		COMPLICATIONS				
										DURING INSERTION		DURING INTUBATION		INSERTION	INTUBATION	INSERTION	INTUBATION	DISPLACEMENT	BLOOD STAINING	SORE THROAT	INJURIES	OTHER COMPLICATIONS
										SYSTOLIC	DIASTOLIC	SYSTOLIC	DIASTOLIC									
1	NAVANEETHAN	25	M	47	160	1	1	EASY	20	114	80	120	80	88	92	99	99	0	0	yes	0	0
2	SIVA	22	M	51	158	1	1	EASY	22	116	82	124	88	90	94	100	99	0	0	0	0	0
3	LALITHA	26	F	48	152	1	1	EASY	24	118	84	130	90	86	88	100	100	0	0	0	0	0
4	KAVYA	46	F	54	152	2	2	EASY	20	114	78	128	86	84	82	100	99	0	yes	0	0	0
5	MEENA	26	F	54	153	1	1	EASY	22	118	88	130	86	86	88	100	99	0	0	0	0	0
6	DEVI	45	F	47	144	1	1	EASY	23	114	86	128	88	88	94	100	99	0	0	0	0	0
7	ANDISAMY	33	M	52	154	1	1	VERY EASY	15	118	88	130	90	84	92	99	99	0	0	0	0	0
8	SAMIDURAI	30	M	53	155	1	1	EASY	22	120	78	128	88	85	92	100	100	0	0	0	0	0
9	NATARAJAN	23	M	48	153	1	1	EASY	24	128	68	126	86	84	88	99	98	0	0	yes	0	0
10	KAVITHA	23	F	43	154	2	1	EASY	26	116	78	124	84	82	90	100	99	0	0	0	0	0
11	UMA	44	F	49	152	1	1	EASY	27	126	82	122	86	88	94	100	98	0	0	0	0	0
12	VIJAYA	29	F	48	150	1	1	EASY	22	128	88	120	88	86	96	100	98	0	0	0	0	0
13	KARTHIK	31	M	55	158	1	1	DIFFICULT	48	126	84	138	90	84	102	100	97	0	0	0	0	0
14	MATHIVANAN	35	M	50	159	1	2	EASY	21	124	82	124	84	85	93	100	99	0	yes	0	0	0

15	SUBHA	27	F	48	152	1	1	EASY	24	126	84	132	86	74	88	100	98	0	0	0	0	0
16	ARUN	42	M	54	158	2	1	EASY	23	118	84	132	88	76	92	100	99	0	0	0	0	0
17	ANITHA	48	F	49	150	1	1	EASY	22	114	84	128	90	82	94	100	99	0	0	0	0	0
18	PALPANDI	30	M	42	158	1	1	EASY	22	118	82	130	84	80	92	99	98	0	0	0	0	0
19	DEEPA	34	F	50	159	1	1	EASY	26	112	78	128	84	78	94	100	100	0	0	0	0	0
20	VANITHA	26	F	47	152	1	1	EASY	25	124	82	128	86	88	98	100	99	0	0	0	0	0
21	SABITHA	43	F	50	152	1	2	EASY	23	126	86	128	88	83	95	100	100	0	0	yes	0	0
22	RASU	31	M	53	154	2	1	EASY	22	120	82	128	86	86	94	99	99	0	0	0	0	0
23	MANICKAM	35	M	55	160	1	1	EASY	22	118	78	128	88	85	82	100	98	0	0	0	0	0
24	LOGANAYAGI	23	F	44	150	1	1	EASY	21	122	84	128	90	78	80	99	99	0	yes	0	0	0
25	MALAR	27	F	49	150	1	1	EASY	22	124	82	130	88	83	92	100	100	0	0	0	0	0
26	MAHESWARI	22	F	48	155	1	1	EASY	25	118	78	128	84	77	85	100	99	0	0	0	0	0
27	PATTUROSA	24	F	53	155	1	1	EASY	25	120	84	128	88	83	94	100	98	0	0	0	0	0
28	ROHINI	31	F	49	156	1	1	DIFFICULT	49	122	84	130	86	88	110	100	97	0	0	0	0	0
29	JEYA	30	F	52	140	1	1	EASY	26	118	82	132	88	84	94	100	100	0	0	yes	0	0
30	KARPAGAM	25	F	45	152	2	2	EASY	24	116	78	134	86	85	94	100	98	0	0	0	0	0

S.NO	NAME	AGE	SEX	WEIGHT	HEIGHT	ASA	ATTEMPTS	EASE	TIME(SEC)	BLOOD PRESSURE				HEART RATE		SPO2		COMPLICATIONS				
										DURING INSERTION		DURING INTUBATION		INSERTION	INTUBATION	INSERTION	INTUBATION	DISPLACEMENT	BLOOD STAINING	SORE THROAT	INJURIES	OTHER COMPLICATIONS
										SYSTOLIC	DIASTOLIC	SYSTOLIC	DIASTOLIC									
1	SUMITHRA	24	F	65	154	1	1	EASY	22	114	82	132	88	84	88	100	99	0	0	yes	0	0
2	NAGARATHINAM	28	F	59	157	1	2	DIFFICULT	48	118	84	138	96	86	99	99	97	0	0	0	0	0
3	RANJANI	34	F	63	158	1	1	EASY	23	113	82	132	90	83	94	99	100	0	0	0	0	0
4	KRISHNAMOORTRHY	36	M	60	160	2	1	EASY	22	120	88	134	88	87	96	100	99	0	yes	0	0	0
5	SUGANTHI	28	F	48	156	1	1	EASY	26	118	86	132	78	84	92	100	99	0	0	0	0	0
6	PRABHADEVI	28	F	52	152	1	1	EASY	21	113	81	134	84	92	94	100	99	0	0	0	0	0
7	MANGALESWARI	19	F	70	151	1	1	EASY	27	116	82	136	86	96	96	100	99	0	0	0	0	0
8	PANDI	26	M	63	154	1	1	EASY	22	115	84	135	88	92	94	100	100	0	0	0	0	0
9	JOTHILAKSHMI	22	F	58	152	1	1	EASY	21	123	86	132	88	93	92	100	98	0	0	yes	0	0
10	MEENAKSHI	27	F	60	148	1	1	EASY	27	119	88	135	82	92	93	100	99	0	0	0	0	0
11	NAJIMA	28	F	59	153	2	1	EASY	22	120	82	136	84	94	95	100	98	0	0	0	0	0
12	PERUMAL	22	M	62	155	1	1	EASY	21	112	84	132	86	92	97	100	98	0	0	0	0	0
13	MUNIYANDI	24	M	45	160	1	1	EASY	26	110	85	134	88	94	97	100	97	0	0	0	0	0
14	PUSHPAM	25	F	63	154	1	2	DIFFICULT	49	116	86	140	92	92	99	99	97	0	yes	0	0	0
15	PARABADEVI	21	F	73	157	1	1	EASY	22	115	88	134	84	92	92	100	98	0	0	0	0	0

16	VASU DEVAN	26	M	60	153	1	1	EASY	21	114	82	132	86	92	94	100	99	0	0	0	0	0
17	KALYANI	28	F	55	154	2	1	EASY	28	116	84	136	88	90	96	100	99	0	0	0	0	0
18	BALUISAMY	21	M	49	156	1	1	EASY	23	116	82	132	82	83	92	100	98	0	0	0	0	0
19	RAMALIN GAM	26	M	63	153	1	1	EASY	22	122	86	134	84	85	94	100	100	0	0	0	0	0
20	AARTHY	23	F	62	158	1	1	EASY	21	124	88	136	86	88	92	100	99	0	0	0	0	0
21	THIYAGARA JAN	26	M	56	152	2	1	EASY	26	124	82	132	88	82	95	100	100	0	0	yes	0	0
22	SUMATHI	23	M	70	160	1	1	EASY	23	120	84	134	82	84	92	100	99	0	0	0	0	0
23	RAJA	20	M	69	154	1	2	EASY	22	118	88	136	84	82	97	100	98	0	0	0	0	0
24	SUDHAKAR	24	M	74	155	2	1	EASY	24	116	81	132	86	84	96	100	99	0	yes	0	0	0
25	MANI MARAN	26	M	68	152	1	1	EASY	25	116	82	134	88	83	92	100	100	0	0	0	0	0
26	JEYANTHI	25	F	52	156	1	2	EASY	23	119	83	132	82	82	93	100	99	0	0	0	0	0
27	SELVARAJ	21	M	70	152	1	1	EASY	21	112	82	134	84	88	95	100	98	0	0	0	0	0
28	RAMACHAN DRAN	27	M	69	163	1	1	EASY	29	114	84	136	86	84	92	100	97	0	0	0	0	0
29	SIVAGAMI	26	F	62	155	1	1	EASY	21	116	86	132	88	82	94	100	100	0	0	yes	0	0
30	BASKAR	30	M	78	157	2	1	EASY	22	116	88	134	82	86	96	100	98	0	0	0	0	0

S.NO	NAME	AGE	SEX	WEIGHT	HEIGHT	ASA	ATTEMPTS	EASE	TIME (SEC)	BLOOD PRESSURE				HEART RATE		SPO2		COMPLICATIONS				
										DURING INSERTION		DURING INTUBATION		INSERTION	INTUBATION	INSERTION	INTUBATION	DISPLACEMENT	BLOOD STAINING	SORE THROAT	INJURIES	OTHER COMPLICATIONS
										SYSTOLIC	DIASTOLIC	SYSTOLIC	DIASTOLIC									
1	RAJA	24	M	65	154	1	1	EASY	22	114	82	132	88	84	88	100	99	0	0	yes	0	0
2	MALAR	28	F	59	157	1	2	DIFFICULT	48	118	84	138	96	86	99	99	97	0	0	0	0	0
3	RAMA	34	M	63	158	1	1	EASY	23	113	82	132	90	83	94	99	100	0	0	0	0	0
4	UMA	36	F	60	160	2	1	EASY	22	120	88	134	88	87	96	100	99	0	yes	0	0	0
5	ARUN	28	M	48	156	1	1	EASY	26	118	86	132	78	84	92	100	99	0	0	0	0	0
6	MUTHU	28	M	52	152	1	1	EASY	21	113	81	134	84	92	94	100	99	0	0	0	0	0
7	SUBRAMANI	19	M	70	151	1	1	EASY	27	116	82	136	86	96	96	100	99	0	0	0	0	0
8	RAMANI	26	F	63	154	1	1	EASY	22	115	84	135	88	92	94	100	100	0	0	0	0	0
9	VIGNESH	22	M	58	152	1	1	EASY	21	123	86	132	88	93	92	100	98	0	0	yes	0	0
10	TAMILSELVI	27	F	60	148	1	1	EASY	27	119	88	135	82	92	93	100	99	0	0	0	0	0
11	KANNAN	28	M	59	153	2	1	EASY	22	120	82	136	84	94	95	100	98	0	0	0	0	0
12	KARTHIK	22	M	62	155	1	1	EASY	21	112	84	132	86	92	97	100	98	0	0	0	0	0
13	RAMYA	24	F	45	160	1	1	EASY	26	110	85	134	88	94	97	100	97	0	0	0	0	0
14	DHIVYA	25	F	63	154	1	2	DIFFICULT	49	116	86	140	92	92	99	99	97	0	yes	0	0	0
15	MANIKANDAN	21	M	73	157	1	1	EASY	22	115	88	134	84	92	92	100	98	0	0	0	0	0

16	ANNAMALAI	26	M	60	153	1	1	EASY	21	114	82	132	86	92	94	100	99	0	0	0	0	0
17	MANICKAM	28	M	55	154	2	1	EASY	28	116	84	136	88	90	96	100	99	0	0	0	0	0
18	SIVAGAMI	21	F	49	156	1	1	EASY	23	116	82	132	82	83	92	100	98	0	0	0	0	0
19	LAKSHMI	26	F	63	153	1	1	EASY	22	122	86	134	84	85	94	100	100	0	0	0	0	0
20	SANTHOSH KUMAR	23	M	62	158	1	1	EASY	21	124	88	136	86	88	92	100	99	0	0	0	0	0
21	VEERAIYA	26	M	56	152	2	1	EASY	26	124	82	132	88	82	95	100	100	0	0	yes	0	0
22	RAGU	23	M	70	160	1	1	EASY	23	120	84	134	82	84	92	100	99	0	0	0	0	0
23	MUTHUSAMY	20	M	69	154	1	2	EASY	22	118	88	136	84	82	97	100	98	0	0	0	0	0
24	KANAMMAL	24	F	74	155	2	1	EASY	24	116	81	132	86	84	96	100	99	0	yes	0	0	0
25	REVATHI	26	F	68	152	1	1	EASY	25	116	82	134	88	83	92	100	100	0	0	0	0	0
26	SHANKAR	25	M	52	156	1	2	EASY	23	119	83	132	82	82	93	100	99	0	0	0	0	0
27	PUNITHA	21	F	70	152	1	1	EASY	21	112	82	134	84	88	95	100	98	0	0	0	0	0
28	MARIYAMMAL	27	F	69	163	1	1	EASY	29	114	84	136	86	84	92	100	97	0	0	0	0	0
29	MURUGAN	26	M	62	155	1	1	EASY	21	116	86	132	88	82	94	100	100	0	0	yes	0	0
30	LEELAVATHY	30	F	78	157	2	1	EASY	22	116	88	134	82	86	96	100	98	0	0	0	0	0

ETHICAL COMMITTEE APPROVAL LETTER

MADURAI MEDICAL COLLEGE
MADURAI, TAMILNADU, INDIA -625 020
(Affiliated to The Tamilnadu Dr.MGR Medical University, Chennai, Tamil Nadu)

Prof Dr V Nagaraajan MD MNAMS DM (Neuro) DSc.,(Neurosciences) DSc (Hons)
Professor Emeritus in Neurosciences, Tamil Nadu Govt Dr MGR Medical University
Chairman, IEC

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Member Secretary,
Asso.Professor of Pharmacology, Madurai Medical College, Madurai.

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7.Thiru.Pala.Ramasamy, B.A.,B.L., Advocate, Palam Station Road, Sellur.

8.Thiru.P.K.M.Chelliah, B.A., Businessman,21, Jawahar Street, Gandhi Nagar, Madurai.

ETHICS COMMITTEE CERTIFICATE

Name of the Candidate	:	Dr.U.Radhiga
Designation	:	PG in MD., Anaesthesia
Course of Study	:	2017- 2020
College	:	MADURAI MEDICAL COLLEGE
Research Topic	:	Intubating Laryngeal mask airway as an independent ventilating and intubation device. A comparison of supine, right lateral and left lateral positions
Ethical Committee as on	:	17.05.2019

The Ethics Committee, Madurai Medical College has decided to inform that your Research proposal is accepted.

Member Secretary | Chairman | Dean / Convenor

Prof Dr V Nagaraajan
MD., MNAMS, D.M., Dsc.,(Neuro), Dsc (Hon)
CHAIRMAN
IEC - Madurai Medical College
Madurai

DEAN
Madurai Medical College
Madurai-20

21 MAY 2019

PLAGIARISM CERTIFICATE

URKUND

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Instances where selected sources appear:

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CERTIFICATE II

This is to certify that this dissertation work titled, entitled **“INTUBATING LMA AS AN INDEPENDENT INTUBATING AND VENTILATING DEVICE DURING INTUBATION - A COMPARISON OF SUPINE RIGHT LATERAL AND LEFT LATERAL POSITIONS”** submitted by **Dr.U.RADHIGA** with registration number 201620104 for the award of MASTER DEGREE in the branch of ANAESTHESIOLOGY AND CRITICAL CARE has been personally verified by me in urkund.com website for the purpose of plagiarism check. I found that the uploaded thesis file contains from introduction to conclusion pages and result shows **18** percentage of plagiarism in the dissertation.

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