

Review Article

LARYNGEAL MASK

Lt Col Tariq Hayat Khan, MBBS, MCPS, FCPS

Classified Anaesthetist, CMH, Hyderabad.

LARYNGEAL MASK

Laryngeal mask is also called laryngeal mask airway (LMA). It was invented by Archibald I J Brain, a London anaesthesiologist in 1988, and has rapidly established itself as a reliable mode of maintenance of airway, in routine use as well as in difficult circumstances.

It was first introduced in the UK in 1988 and in the USA in 1992 as an alternative to face mask. Since 1988, the manufacturer estimates, it has been used in over 100 million patients worldwide. It is used in 20% of all surgical cases in the United States, as compared to 30-60% in the UK¹. Its use has steadily increased in day care cases and upto 30% of all day care surgery is being performed using LMA in the US²⁻³. The younger anaesthesiologists, working in less subspecialized fields are more eager to practise its use.

TYPES OF LMA:



The original, standard LMA consists of an oval inflatable head made of silicone rubber and attached with a wide bore rubber tube. A standard 15mm adapter is inserted in the proximal end of the tube to be attached to standard anaesthesia circuits or even Ambu bag. The head is inflated after inser-

tion into the hypopharynx blindly, through a narrow tube with a pilot balloon, and a valve.

During the previous few years a number of modified forms have been made available commercially. The important ones of these include a reinforced LMA, the LMA-Flexible™ in which the conducting tube is embedded with a nylon or steel



spiral spring to give extra rigidity and protection against inadvertent occlusion or sheering up by the teeth of a lightly anaesthetized patient⁴. An intubating LMA allows insertion of a suitable sized endotracheal tube through it and the LMA can be peeled off and removed afterwards. The difficulties encountered with this device during intubation forced the manufacturer to conduct extensive studies of upper airway anatomy, using MRI and other imaging techniques⁵. The research bore fruit and LMA-Fastrach™ was born. It is an advanced type of LMA designed to facilitate blind intubation. It has been used successfully in difficult airways and emergency resuscitation. It permits single-handed insertion from any position. It allows continuous ventilation during intubation attempt, lessening the likelihood of desaturation. A special, wire-reinforced endotracheal tube has been designed for use with LMA-Fastrach. This is available in three sizes, 7.0, 7.5, and 8.0 mm., and can be re-used upto ten times⁵. LMA Fastrach is available in three sizes 3,4, and 5⁴.

Table 1: LMA sizes & inflation volumes

LMA Size	Suitable for	Recommended Max Inflation
1	Neonatal upto 5kg	4ml
1 ½	5 – 10 kg	7ml
2	10-20 kg	10ml
2 ½	20-30 kg	14ml
3	30-50kg	20ml
4	Adults 50-70kg	30ml
5	Large Adults 70-100kg	40ml
6	Large Adults, over 100 kg	50ml

LMA – Fastrach incorporates a rigid stainless steel tube covered with silicon sheath and fitted with a standard 15mm connector, an integral tube handle, for maneuvering the LMA during insertion and removal, a 30° tube distal bevel to permit passage of LMA though narrow inter-incisor gap. A 'V' –Shaped TT guiding ramp and an exclusive epiglottic elevating bar instead of usual longitudinal bars. The steel tube is short enough to al-

Table 2 ILMA design features and functions

FEATURE	FUNCTION
Rigid stainless steel airway tube	<ul style="list-style-type: none"> *Permits mask to be guided/steadied during intubation. *Short enough to permit TT to pass of correct depth. *Good internal; external diameter ratio (13:15mm). *Autoclavable.
Integral 15 mm connector	<ul style="list-style-type: none"> *Permits use as standard LMA *Avoids danger of accidental disconnection *Permits passage of 8.0 mm cuffed TT
Anatomical curve of tube	<ul style="list-style-type: none"> *Permits insertion with mask following same path as with standard insertion technique *Avoids need for to insert finger because pressure against palate can be applied externally *Aligns TT to plane of glottic vestibule
Integral tube handle	<ul style="list-style-type: none"> *Permits use of straight TT reducing anterior tracheal wall trauma *Allows device manipulation and steadying during intubation-extubation
Bevel on proximal end of stainless steel tube	<ul style="list-style-type: none"> *Facilitates device insertion-removal
"V" shaped TT guiding ramp	<ul style="list-style-type: none"> *Permits mask aperture to be compressed to permit passage via narrow inter-dental gap
Epiglottic elevation bar (EEB)	<ul style="list-style-type: none"> *Tube centering function *Guides tube anteriorly to reduce risk of arytenoid trauma-oesophageal placement *Acts as epiglottic ramp during insertion. *Keeps epilottis from obstructing airway. *Protects and elevates epiglottis during tube passage

low removal of LMA after insertion of the tube. Table 2 shows ILMA design features and functions.⁵

The standard laryngeal mask airway (LMA) is not an ideal airway device because the low-pressure seal may be inadequate for positive pressure ventilation, and it does not protect the lungs from gastric contents regurgitated into pharynx. A new laryngeal mask device, the ProSeal LMA (PLMA; Laryngeal Mask Company, Henley-on Thames, UK), has been developed with a modified cuff to improve the seal and a drainage tube to provide a channel for regurgitated fluid and gastric tube placement.



The PLMA is made from medical grade silicone and has the following new or modified features (intended purpose); (A) a dorsal cuff (pushes the ventral cuff into the periglottic tissues to improve the seal); (B) a drainage tube that travels from the tip through the bowl and alongside the airway tube (for passage of a < 18- French gauge gastric tube, for venting regurgitated fluid and to provide information about device position); (C) a built-in bite block; (D) a locating strap on the anterior surface of tube.

The PLMA is capable of achieving a more effective seal than the standard LMA and facilitates gastric tube

placement, but it is more difficult to insert unless an introducer tool is used. When correctly positioned, the PLMA isolates the glottis from the upper esophagus with possible implications for airway protection.

Disposable, LMA-Unique is similar in design to the LMA-Classic, but is an one-time use, disposable LMA. The LMA-Unique is especially suited for use in those areas of the hospital where stocking a reusable device is not practical or economical. It has been used as a resuscitation device and in difficult or failed airway situations. It is ideal for use in centers with limited sterilization facilities and may be useful in the pre-hospital setting where intubation is not possible or with infectious patients.



Originally four sizes were made available. Size 1 for neonates /infants, size 2 for babies/children under 25 kg, size 3 for ladies / small male adults and size 4 for males. But variations in anatomy and the pharyngeal space size necessitated introduction of newer dimensions, and now a total of eight sizes are available. Table 1 illustrates the LMA size, the weight category for which it is suitable and the inflation values recommended for its head. It is important to choose the right size for a particular pressure. Smaller size will lead to incomplete seal of the laryngeal aperture or pushing into the oesophagus, whereas larger size will be difficult to insert,

and to seat it at the proper place. It may also cause damage to the epiglottis and other delicate laryngeal structures.

LMA AND FACE MASK

LMA is a superior device than conventional facemask in that it allows hands free maintenance of airway and thus can be conveniently used for long cases. It has an edge in difficult airway cases especially in large adults with big jaw, short receding jaw, or with a beard. It has low dead space as compared to face mask.⁹ and is convenient in use during ENT or Eye surgery. Change of position has minimum effect on the efficacy of maintenance of leak-free airway, and it also protects airway, from pharyngeal secretions etc.

On the contrary, LMA is more invasive, needs deeper level of anaesthesia at least in the start, may damage upper airway structures, and requires considerable skill for its insertion. N₂O can diffuse in its cuff and increase cuff pressure. Furthermore, it requires wide opening of mouth for its insertion, the condition that may not always be available e.g. TMJ immobility. Retropharyngeal vault may impede its way.

Although both masks can be safely used by a skilled anaesthesiologist in well-prepared, short to medium duration cases in a variety of indications, both can not prevent regurgitation and/or aspiration, and are less secure means of maintenance of airway in morbidly obese, or full stomach patient. Both offer an alternative means to ventilate a patient after unsuccessful attempts and intubation. LMA can be used to intubate such a patient using a small diameter tube. Intubating LMA-Fastrach has been developed especially for this purpose.

LMA AND COPA

Both LMA and Cuffed Oropharyngeal Airway (COPA) have been extensively studied. COPA is a modified Guedal airway⁷ with a large cuff at its distal end, which can be inflated just like endotracheal tube or LMA. It is designed to push the tongue forward and seal the pharynx so that a spontaneously breathing patient can be maintained on volatile anaesthetics in N₂O and oxygen by connecting it to the breathing circuit.

The anaesthetic requirements for successful insertion for both devices have been compared. N. Nakata et al concluded that with 5% sevoflurane as an induction agent, the anaesthetic time required for successful COPA placement (mean 100 sec) was significantly

shorter than that for LMA (mean 160 sec). The Ed 50 and ED 95 (from statistical analyses for acceptable conditions associated with COPA or LMA placement) were 90 sec and 145 sec, and 164 sec and 261 sec, respectively.⁸ The dose of propofol in young patients required is significantly greater in case of LMA⁹ but with advancing age this difference becomes negligible. Dead space has been calculated to be greater in case of COPA, leading to higher mean ETCO₂. Similarly, airway manipulations required to assure patent airway were greater with COPA but the incidence of sore-throat was lower as compared to LMA (10% vs 20%).¹⁰

LMA VS ETT

LMA has been used in place of ETT in certain situations. LMA is especially suitable in spontaneously breathing patients for short to moderate duration surgery, but with more experience, its use is increasing in ventilated patients as well. It has been suggested that it provides less perfect laryngeal seal than ETT, so should not be used in full stomach patients. Probably it directs regurgitated material preferentially towards larynx. But the development of ProSeal LMA has allowed the practitioners to use it even in those patients who have increased risk to regurgitate. LMA has a definite edge on tracheal tube in that, it is less invasive, so produces less autonomic and haemodynamic changes¹¹⁻¹². Its insertion can be accomplished without the use of muscle relaxants e.g. succinylcholine, so no post anaesthetic myalgias, and no risk of hyperkalaemia. Its insertion is not associated with distortion of anatomy by direct laryngoscopy, as required for tracheal tube placement. It has been used almost in every situation, and for every type of surgery with complete satisfaction, even with less experienced operators.

It can be used in difficult airways due to any cause, and has proved life saving in cases of failed intubation as well as in emergency situations. It excludes the possibility of oesophageal or endobronchial intubation and is not associated with tooth or laryngeal trauma. It is particularly useful in patients in which smooth recovery is a must, e.g. cardiac patients, patients with open eye surgery.

However, LMA has its inherent limitations too. The risk of aspiration can not be ruled out with certainty, and some earlier reports of gastric inflation cost some doubts about its use in patients with increased intragastric pressure. Some of the operative positions also preclude its use e.g., jack-knife or prone position.

Although earlier investigators found it less suitable for IPPV, the current trend finds it useful even in those

patients who have to be relaxed and IPPV instituted for prolonged periods¹³⁻¹⁴. LMA has been suggested to be helpful in early recovery and shortening the total duration of anaesthesia.

The responsibility to assess the possible benefits or disadvantages of either device rests upon the operator and it should be undertaken judiciously¹⁵.

LMA AND GASTROESOPHAGEAL REFLUX:

Although LMA has been recommended to be used routinely only in fully prepared patients with empty stomachs, its use in emergency situations prompted various studies to investigate its efficacy in these situations; its effects on gastroesophageal reflux in well prepared cases and the means to prevent reflux.

Young-Pyo Cheong et al concluded in their study of esophageal motility that the pharyngeal reflex due to inserted LMA is blocked or minimal and does not affect esophageal motility. So pharyngeal reflex due to mass effect of inserted LMA is not a possible mechanism of gastroesophageal reflux¹⁶. In another study, same group of researchers pointed out that there is an increased incidence of reflux in patients who are allowed to awake fully before removal of LMA, as compared to those from whom LMA was removed on the first signs of arousal (bucking, straining, restlessness, swallowing or cough reflex)¹⁷. An increased incidence of reflux was also noted by Valentine J. and co-workers in paralyzed patients, ventilated though LMA by IPPV¹⁸⁻¹⁹. However in routine practice it is probably not of any clinical significance, as no case of aspiration was noted.

In full stomach patients, the risk of aspiration has been suggested to be increased, as LMA preferentially diversts regurgitated material towards glottis. This observation led to development of ProSeal LMA, which has a more blunt angle; a drainage tube to provide a channel for regurgitated fluid and gastric tube placement. This device is slightly more difficult to insert, takes longer than standard LMA to be effective. An introducer has been introduced for its facilitated insertion.²⁰

Another method to prevent gastroesophagal reflux during use of standard LMA has been described by Schwarzmann and co-workers²¹. They used a newly developed gastric balloon tube that occludes cardia. It is useful in pateints with risk of aspiration²².

LMA AND NASOGASTRIC TUBES

LMA can be successfully inserted with nasogastric tube in place, and nasogastric tubes have been pushed alongside the inserted LMA. Even if an endotracheal tube is judged to be inadvertently placed in esophagus, LMA may still be inserted safely to maintain oxygenation of the patient²³.

PREPARATION

LMA is a reusable product and must be sterilised before use. It can be autoclaved but the manufacturer does not recommend sterilization with glutaraldehyde, formaldehyde or ethylene oxide (EO). In our set-ups where it may not be possible to autoclave it before every use, it is essential to clean and wash it with mild detergent and air-dried. Care must be taken to clean the tube from inside with a brush. Repeated autoclaving has been shown to loosen the adhesive that binds the head with the tube so that the head may rotate on the tube, but it does not effect inflation or the sealing pressures.

PRE-USE TESTS

The following pre-use performance tests should be carried out prior to each use of the device. Failure of any one test indicates that the device has passed its useful life and should not be used.

Test 1: Visual Inspection

Step 1: Discoloration

It is important that the airway tube is transparent in order to permit the detection of fluids/secretions.

Step 2: Kinking

Flex the tube up to, but not beyond 180°, pressing at different points. If the tube kinks, discard the LMA. This test is not applicable to the LMA-Flexible or LMA-Fastrach.

Step 3: Cuts or Scratches

Examine the surface of the LMA for any damage, including cuts, tears or scratches, Discard any mask with cuts or scratches as these accelerate fractures. Do not use if the LMA airway tube is damaged in any way.

Step 4 Breakage

Examine the aperture in the mask. Gently probe the two aperture bars (or epiglottic elevating bar on the LMA-Fastrach) to ensure they are not broken or otherwise damaged. If the aperture bars are not intact, the epiglottis may obstruct the airway.

Step 5: kinking

Inadequate protection with a bite block can result in the weakening of the airway tube. The LMA Flexible airway tube resists kinking when it is flexed or compressed against a rigid mouth gag; however, the tube does not offer resistance to occlusion by biting.

Step 6, Chemical Change

Residual chemical contamination from non-recommended cleaning or sterilization agents can have adverse clinical effects during use. Silicone-based lubricants or other non-aqueous lubricants can accelerate degradation of the LMA causing enlargement of the cuff and eventual breakdown of the adhesive.

Step 7: Connector

Examine the fit of the connector in the airway tube. Make sure the connector cannot be pulled off the airway tube by hand, using reasonable force.

Step 8: Crazing

Non-recommended cleaning solutions can cause sever damage. Extreme crazing caused by chemical degradation can cause weakening of the connector. An LMA with a damaged connector should not be used.

Step 9 Rupture

Take care to remove air or moisture in the cuff prior to autoclaving. Autoclaving a mask with air or moisture in the cuff can lead to rupture, herniation or adhesive failure.

Test 2: Inflation and Deflation

Deflate the cuff so that the cuff walls are tightly flattened against each other. Do not use the LMA if the cuff walls reinflate immediately and spontaneously, even if only slightly. Inflate the cuff with air from complete vacuum as shown in the table 3 below.

Table 3: Test Cuff Inflation Volumes

LMA Size	Air Volume *
1	6ml
1 ½	10 ml
2	5ml
2½	11
3	30ml
4	45ml
5	60ml
6	75ml

* Inflate the cuff with these volumes for testing only.

Any tendency of the cuff to deflate indicates the presence of a leak and should be evident within two minutes. Do not use the LMA if cuff leakage is present or if there is uneven bulging of the cuff. Also, do not

use the LMA if the inflation indicator balloon is spherical or irregularly shaped.

If the LMA fails any Pre-Use Test, It must be removed from service .

LMA AND INDUCTION OF ANAESTHESIA

Almost all induction methods and agents have been successfully used before insertion of LMA. Propofol is preferred as an intravenous agent as compared to thiopentone, as it reliably suppresses pharyngolaryngeal reflexes as compared to the later drug²⁴. A small dose of midazolam or narcotic agents has been shown to decrease the requirements of propofol / thiopentone for adequate depth of anaesthesia. The patients given thiopentone should receive high concentration of volatile agents to increase the depth of anaesthesia and effectively suppress the reflexes.

In children any volatile agent may be useful but sevoflurane has been found more pleasant, and rapid acting so is especially recommended for induction in this group²⁵.

Martlew et al calculated the following doses for successful insertion of LMA in children. ED50 in case of propofol alone is 3.8 mg/kg body weight, whereas ED90 in this group is 5.4 mg / kg body weight. The doses were 2.6 mg / kg and 3.6 mg / kg in premedicated children with midazolam.²⁶ A small (upto 0.25 mg / kg) dose of succinylcholine may facilitate insertion of LMA. Increasing the dose will result in post-op myalgias.

INSERTION AIDS

Several factors associated with LMA insertion difficulty have been identified, many of which are related to the technique used²⁷⁻²⁸. Paul G. Laoubser of Houston, Texas has described a prototype device, which he constructed after viewing several MRI slices of the pharyngeal area anatomy from healthy volunteers. The device consists of 2 sections – proximal section (3 inches) with handle (3-4 inches), a distal section (3 inches) connected by an angle of 80 degrees. Trans oral placement of the device is accomplished using one hand – the distal section is passed posteriorly and rotated so that the tip approximates the region of the vallecula, followed by forward and upward displacement of the tongue. This device has been claimed to be effective without the need for transoral digital manipulation²⁹.

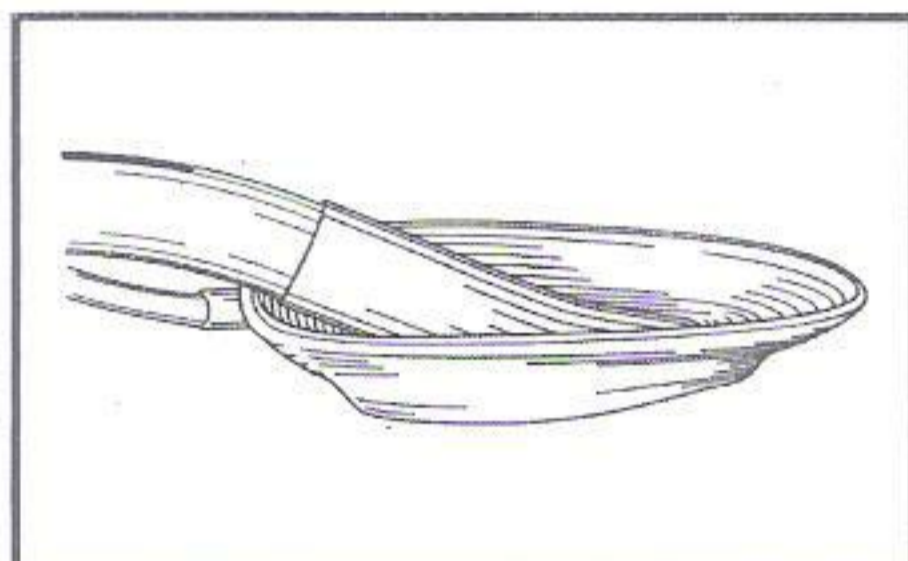
Other insertion aids, which have been described in literature are an F-forceps³⁰ and Dingley palate plate.³¹

USING THE LARYNGEAL MASK AIRWAY (LMA)

Preparation:

1. Reflate the cuff after sterilisation. Then deflate completely so that the cuff folds back away from the aperture. It is important to ensure the cuff tip is tightly deflated to form a smooth flat wedge shape. The cuff should be wrinkle free.

2. Lubricate the back of the cuff thoroughly just before insertion. Do not lubricate the front as this may result in aspiration of lubricant.

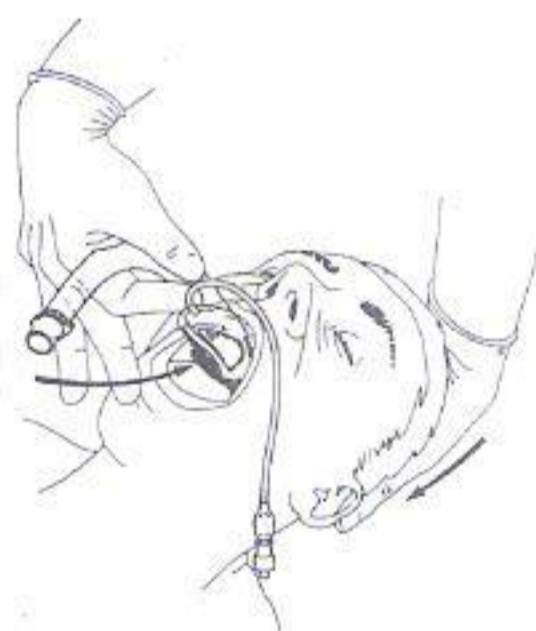


Insertion: (Note that gloves must be worn)

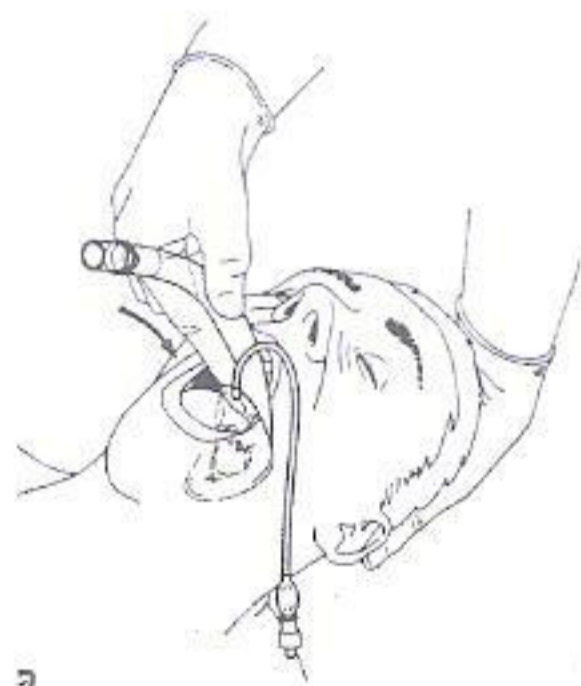
1. Anaesthesia must be deep enough to permit insertion. Do not try to insert immediately following Thiopentone induction, unless a relaxant drug has been given. A volatile agent or propofol provides suitable insertion conditions.

2. Position the head and neck as for normal intubation. Keep the neck flexed and the head extended by pushing on the occiput with one hand while inserting the mask into the mouth with the other hand.

3. When inserting the mask, hold it like a pen, with the index finger placed at the junction of the cuff and tube (Fig.6). Press the tip up against the hard palate and verify it lies flat against the palate and that the tip is not folded over, before pushing further into the pharynx.



4. Using the index finger, push the mask downwards, still maintaining pressure against the palate (fig.7).



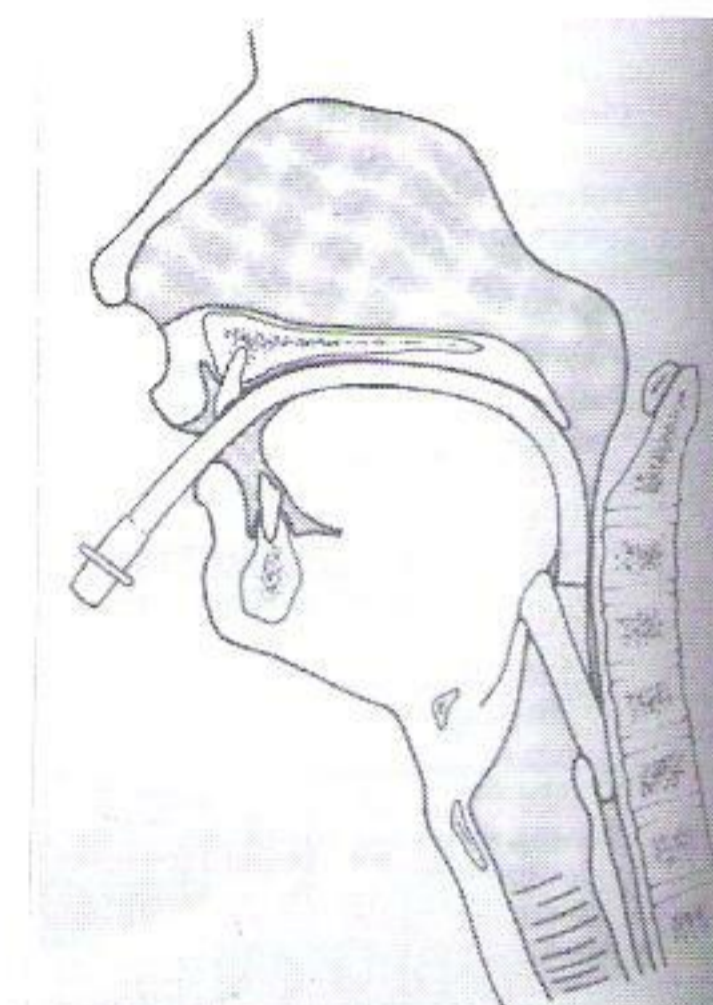
5. As the mask moves downwards the index finger keeps pressing the mask backwards against the posterior pharyngeal wall, to avoid collision with the epiglottis. Insert the index finger fully into the mouth to complete insertion. Keep other fingers out of the mouth.

When resistance is felt the finger should be fully

inserted into the mouth. Use the other hand to hold the tube while withdrawing the finger from the mouth.

6. Check that the black line on the tube faces the upper lip. Now immediately inflate the cuff without holding the tube. Do this before connection to the gas supply. This will permit the LMA to position itself correctly. Inflate sufficient air to obtain a low pressure seal. Never overinflate the cuff. A volume 10-20% less than that recommended is better tolerated.

7. Successful placement / ventilatory ability is judged by chest wall movement and capnography (maintain PetCO₂ within normal range) during manually assisted ventilation.



INSERTION OF ILMA:

The insertion technique consists of a one-handed rotational movement in the sagittal plane with the head supported by a pillow to achieve a neutral position. Specifically, the mask is fully deflated with the rim facing posteriorly, a bolus of a water soluble lubricant applied posteriorly to the distal saucer-shaped tip, which is then flattened against the palate with no attempt made to push the device inwards until the saucer-shaped depression has been seen to be inverted against the palatal surface, drawing back slightly to ensure complete flattening of the rim into the dome of the palate. The ILMA is then rotated inwards, following the arc of the palate and posterior pharyngeal wall so that the curved tube remains closely applied to the inner aspect of the upper incisors throughout the insertion maneuver. After insertion, using a hand-held cuff inflator-manometer, the device is inflated to an intracuff pressure of 60 cm H₂O without holding it in place and ventilation is attempted by squeezing the reservoir bag. Successful placement - ventilatory ability is judged by chest wall movement and capnography (maintain PetCO₂ within normal range) during manually assisted ventilation. If adequate ventilation is not possible the ILMA is manipulated in situ before removal and reinsertion.

USES OF LMA

Traditionally, the LMA has been used for short to medium duration cases, breathing spontaneously, but with increasing experience the anaesthetists found it suitable even in long cases, lasting many hours. Even the use of IPPV with LMA is on an increase. The initial desaturation¹⁵ observed with its use led many investigators to use CPAP, which improved oxygenation. Later

on It was shown that PSV (pressure support ventilation) is more potent in this regard³²

The uses of LMA in routine cases of all fields of surgery are endless. The more you use it, the more you like it. A list of different procedures, in which it has been used successfully, is given below:

Basic / Routine use of LMA

When first gaining experience with the LMA, its use is recommended in the following.

- Short (<1 hours), elective procedures
- ASA I-II patients
- Spontaneously breathing
- Supine position or

Lithotomy position without Trendelenburg for brief procedure (<30 min.)

Examples of basic/routine uses include:

Urology:

- Circumcision
- Cystoscopy
- Hypospadias repair
- Orchiectomy
- Orchidopexy
- Penile plastics
- TURP
- Urethral meatotomy
- Vasectomy

Gynecology

- Cone biopsy
- Condylomata therapy
- D & C
- Examination under anaesthesia
- Hysteroscopy
- Hysterectomy (vaginal)

Orthopedics:

- Arthroplasty
- Arthroscopy
- Carpal tunnel release
- Closed / open reductions
- Hand and foot procedures
- Hardware removal
- Tendon repair

Ophthalmology

- Cryotherapy
- Electroretinography
- Examination under anaesthesia
- Eyelid repair
- Foreign body removal
- Intraocular pressure measurement
- Nasolacrimal duct exploration
- Strabismus repair

Other plastic procedures:

- Breast augmentation/reduction
- Burn dressings
- Laser Therapy of cutaneous lesions
- Skin grafts.
- Varicose vein procedures
- Wound debridement

General Surgery:

- (Breast biopsy
- Central line placement/removal
- Cutaneous/Subcutaneous Lesions
- Inguinal or femoral herniorrhaphy
- Rectal surgery (lithotomy)
- Vascular shunt revisions

Other head and neck procedures:

- Cranioplasty, Facial Plastics
- Mastoid Surgery
- Myringotomy
- Scalp procedures
- Tube placement

Advanced use of LMA

Examples of advanced uses include:

Eye/Ear/Nose/Throat

- Adenotonsillectomy
- Antral washouts
- Cataract surgery with or without lens implant
- Intraocular surgery
- Myrinoplasty
- Nasal polypectomy
- Reduction of nasal Fractures
- Rhinoplasty
- Septoplasty
- Submucosal resection
- Tympanoplasty

Dental and oral

- Cleft palate repair
- Laser pharyngoplasty
- Removal of tongue tumor or cyst
- Tooth extraction
- Tooth implant

Abdominal

- Gynecologic laparoscopy

Diagnostic tests

- Bone marrow biopsy
- Bronchoscopy
- Colonoscopy
- CT scan
- MRI (LMA-Classic & LMA Unique Only)

Other clinical situations

Obesity

Prolonged surgery

Non-supine position (Jack-knife, lateral, prone, Trendelenburg)

Remote anaesthesia for radiotherapy

As pointed out elsewhere in this article, LMA can be used to intubate patients with difficult airway. ILMA has been specifically designed for this purpose and is a superior device for single handed insertion.

In emergency situations, LMA provides a tool to maintain airway in less experienced hands or under less ideal conditions for intubation, and thus may help sustain life. A supply of disposable LMA-Unique's should thus be part of all emergency CPR kits.

USE OF LMA FOR EXCHANGE OF OROTRACHEAL TUBES

Endotracheal tubes can be exchanged by passing a tube exchanger or a long boogie through the existing ETT into the trachea, removing the tube and then passing a new tube over that exchanger or boogie, into the trachea³³⁻³⁷. However it may often be very difficult to advance an ETT over an exchanger, because the tubes progress may be impeded by the epiglottis, the arytenoids or the pyriform fossa³⁸⁻³⁹. For example, when a fiberoptic bronchoscope is used as an exchanger, there may be difficulties in tracheal intubation in 50-90% of the patients^{38,40}. Takashi Asai of Osaka has described that the placement of an ETT does not prevent the placement of the laryngeal mask because the tube passes through the larynx, whereas the distal part of the laryngeal mask is inserted into the hypopharynx⁴⁴. When the ETT is affixed to the jaw, and the laryngeal mask is inserted using the index finger to slide the mask against the hard palate, it is possible to place the mask while barely touching the endotracheal tube and the tongue. Similarly, the endotracheal tube can also be removed without dislodging the laryngeal mask³⁸⁻⁴³. Thus it is possible to remove the old ETT after placing a laryngeal mask; after which, new ETT is gently glided down laryngeal mask and through the glottis. Fiberoptic bronchoscope greatly facilitates this process.

LMA AND LASER

LMA cuff can be inflated using water or saline in place of air, in laser surgery. It does not effect intracuff pressure and fiberoptic position. The cuff can be emptied and dried if sufficient time is allowed⁴⁵.

PROBLEMS AND COMPLICATIONS:

As with any other device used to maintain airway, LMA is not absolutely safe and without complications. Its insertion is a new technique and requires some practice. The standard LMA necessitates mouth opening some TMJ movement and head flexion, which may not be possible in every patient. The newer ILMA has better profile in this regard. Further, the depth of anaesthesia required for its insertion is greater as compared to COPA or the use of face mask, still a small percentage of patients may exhibit laryngospasm, bronchospasm or cough. Voyagis GS et al reported a total of 13(4.7%) critical respiratory incidents in the spontaneously breathing patients, and 7 (2.6%) in the IPPV group, out of a total patient population of 541⁴⁶.

Brinkschmidt and co-workers found that the incidence of coughing was significantly lower with LMA as compared to tracheal tube during emergency (1.7% versus 19%). They reported that incidence of SaO₂<90% was higher with LMA (10.9% vs 3.2%) during induction, but it was lower during recovery as compared to tracheal tube (6.8% vs 9.5%)¹⁵.

Bleeding from uvula, tonsils or pharyngeal mucosa is a low possibility, as is the damage to the laryngeal structures. During my four years experience with LMA one patient bled profusely from uvula and about six percent patients had blood stained secretions on the removed LMA.

2.5 – 4 % incidence has been reported for failure to insert in the first attempt. A similar number of patients may require readjustment of the device to get perfect seal. This number drops sharply with more experience, and some workers report 100% success rate with standard LMA and even with ILMA (Fastrach)⁴⁷. The failure to correctly place LMA may be due to a palatopharyngeal web, down folding of the epiglottis or a size too small or too large. Pharyngolaryngeal abnormalities may also impede attaining a leak-proof seal. The movement of reservoir bag in a spontaneously breathing patient or an ability to manually ventilate him will indicate correct placement.

Sore-throat is a least common complication, as is a painful jaw. Some anaesthetists may feel need to insert fingers in the mouth of the patient as un-aesthetic. A remote chance of injury to fingers or transmission of infection has also been described, and it can be minimised by compulsory use of gloves during its use. LMA-Fastrach eliminates these problems by a single handed insertion through manipulation of the tube handle.

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