PROCEDURE

8 Laryngeal Mask Airway AP

Stephen Both

PURPOSE: Despite the wide adoption and use of the laryngeal mask airway (LMA) for routine surgery, this procedure focuses on this device's utility as an emergency airway device involving a lost or compromised airway in the unconscious patient when endotracheal intubation is not readily available or has failed (e.g., cardiac arrest, prehospital airway management, failed intubation/difficult airway, conduit for intubation). Although second-generation LMAs offer better protection against aspiration, it should be understood that the LMA is not a definitive airway.[1,2,4,7]

PREREQUISITE NURSING KNOWLEDGE

- The requirements for rapid airway management in an unconscious patient should be understood.
- The anatomy and physiology of the upper airway should be understood.
- The design of the LMA available should be understood (Figs. 8-1 and 8-2):
  - An airway tube connects the mask and the 15-mm male adapter.
  - The mask's cuff, when inflated, conforms to the contours of the hypopharynx, with the opening of the air tube positioned directly over the laryngeal opening.
  - A cuff inflation line with a valve and a pilot balloon leads to the mask's cuff.
- Benefits of second-generation LMAs over first generation LMAs should be understood (Table 8-1).
- The final placement of an LMA in the airway should be understood (Fig. 8-3).
- The ability to ventilate an unconscious patient adequately with a mouth-to-mask or bag-valve-mask device is necessary.
- The underlying risks of the LMA should be understood.
  - Due to the potential risk of regurgitation and aspiration, do not use the LMA as a "first-choice airway" in the following elective or difficult airway patients on a non-emergency pathway[9]:
    - Patients who have not fasted, including patients whose fasting cannot be confirmed.[5]
    - Patients who are morbidly obese, who are more than 14 weeks pregnant, who have multiple or massive injury or acute abdominal or thoracic injury, who have any condition associated with delayed gastric emptying, or who have used opiate medication before fasting. However, in all these clinical scenarios, the LMA Supreme (second-generation supraglottic device) is ideally suited to serve as an "airway rescue device" in preference to the LMA Classic or the LMA Unique (first-generation supraglottic device).[3,5]
  - LMA Supreme is contraindicated in the following:
    - Patients with fixed decreased pulmonary compliance, such as in pulmonary fibrosis due to inadequate seal around the larynx[5]
    - Adult patients who have had radiotherapy to the neck involving the hypopharynx (risk of trauma, failure to seal effectively)[5]
    - Patients with a mouth opening inadequate to permit insertion[8]
    - Patients with suspected acute intestinal obstruction or ileus or patients having been injured shortly after ingesting a substantial meal[8]
    - Patients who have ingested caustic substances[5]
  - LMA Supreme usage precautions include the following:
  - The LMA Supreme is a single use–only device.[5]
    - Due to oropharyngeal tissue being specifically prone to swelling and bleeding with mild to moderate traumatic forces (potentially resulting in dire consequences), excessive force should not be used at any time during insertion of the LMA Supreme or insertion of a gastric tube through the drain tube of the LMA Supreme.[5]
    - Never overinflate the cuff after insertion. An appropriate intracuff pressure is 60 cm H_2O. Excessive intracuff pressure can result in malposition and sore throat, dysphagia, or nerve injury.[5,6,8]
    - If airway problems persist or ventilation is inadequate, the LMA Supreme should be removed and an airway established by some other means.[9]
    - The LMA Supreme is made of medical grade polyvinyl chloride that can be torn or perforated. Avoid contact with sharp or pointed objects at all times. Do not insert the device unless the cuff is fully deflated as described in the instructions for insertion.[5]

AP This procedure should be performed only by physicians, advanced practice nurses, and other healthcare professionals (including critical care nurses) with additional knowledge, skills, and demonstrated competence per professional licensure or institutional standard.

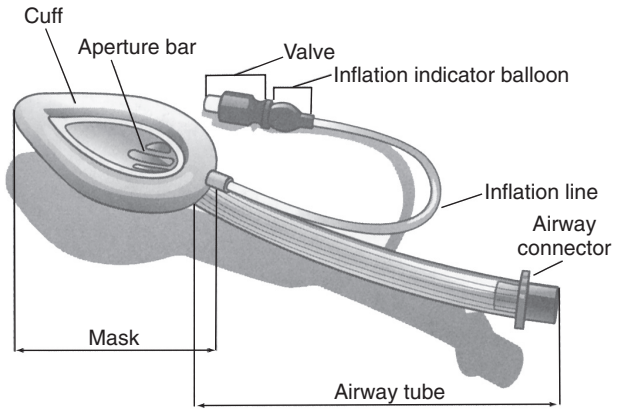

Figure 8-1 Components of the first-generation laryngeal mask airway (LMA; LMA Classic pictured). *(From the Laryngeal Mask Company Limited:* Instruction manual: LMA-Classic. *San Diego, 2005, Laryngeal Mask Company Limited.)*

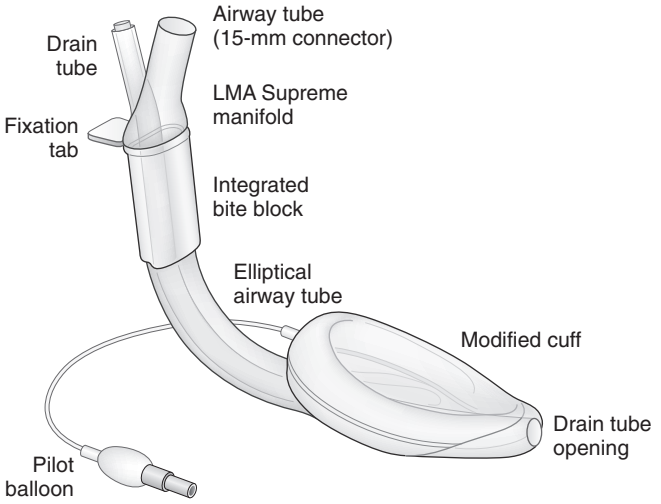

Figure 8-2 Components of a second-generation laryngeal mask airway (LMA; LMA Supreme pictured): Manifold with an integral bite block, an anatomically shaped airway tube enclosing a drain tube, a modified cuff through which a cuff inflation line with pilot tube. *(From Hagberg C:* Benumof and Hagberg's Airway Management, *ed 3, Philadelphia, 2013, Elsevier.)*

  - Gloves should be worn during preparation and insertion to minimize contamination of the airway.[5]
  - Store device in a dark, cool environment, avoiding direct sunlight or extremes of temperature.[5,9]
- The LMA may provide a more viable means of ventilation than a bag-valve-mask device in patients with a beard or without teeth.[3]
- Initial and ongoing training is necessary to maximize insertion success and minimize complications.[3–5,7]
- This procedure refers specifically to the LMA Supreme, a second-generation LMA. Other types of second-generation LMA devices are available and provide additional features, such as use as a conduit for endotracheal intubation through the LMA (e.g., LMA Fastrach).
- An understanding of the different models now available will aid in LMA selection (Table 8-2).
- Understand the advantages and disadvantages of LMAs compared with facemask ventilation and endotracheal tube intubation (Table 8-3).

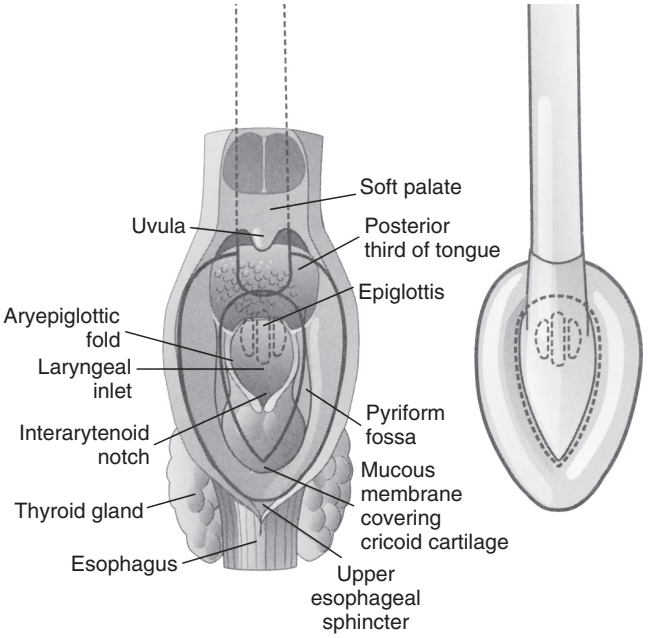

Figure 8-3 Dorsal view of the laryngeal mask airway (LMA) showing position in relation to pharyngeal anatomy(LMA Classic pictured.) *(From The Laryngeal Mask Company Limited:* Instruction manual: LMA-Classic. *San Diego, 2005, Laryngeal Mask Company Limited.)*

TABLE 8-1 Improvements to Second-Generation Supraglottic Airway Devices Compared With First Generation

Design Improvements	Rationale
Improved pharyngeal seal	Controlled ventilation at higher airway pressures (and hence in a wider range of patients and clinical situations)
Increased esophageal seal	Lessens the likelihood of regurgitant fluids entering the pharynx and leading to aspiration
Integrated bite block	Impedes patient's ability to bite and potentially occlude the airway, risking hypoxia and negative pressure pulmonary edema
Gastric port	May be used to confirm correct device positioning, enable access to the stomach, alert the user to the presence of regurgitation, and enable gastric contents to safely bypass the oropharynx and exit the patient (e.g., Laryngeal Mask Airway [LMA] Supreme and LMA Proseal)

From Cook T, Woodall N, Frerk C: Major complications of airway management in the UK: The Fourth National Audit Project of the Royal College of Anaesthetists, 2011, available at www.rcoa.ac.uk/nap4.

TABLE 8-2 Type of Laryngeal Mask Airway (LMA) With Corresponding Generation and Features

Type of Supraglottic Device (LMA)	Generation LMA	Features
LMA Classic	1st	Early prototype nondisposable LMA
LMA Unique	1st	Disposable standard LMA
LMA Proseal	2nd	Inflatable cuff with improved pharyngeal seal = ventilation tolerances, gastric port, and an integrated bite block
LMA Supreme	2nd	
I-Gel LMA	2nd	Noninflatable gel cuff rather than inflatable cuff for pharyngeal seal, gastric channel, and integrated bite block
Air-Q LMA	2nd	Designed to facilitate endotracheal intubation through the LMA device; no gastric port
AMBU Aura-I LMA	2nd	
LMA Fastrach	2nd	
LMA CTrach	2nd	Incorporates a camera to facilitate passage of an endotracheal tube; no gastric port

From Hagberg C: Benumof and Hagberg's Airway Management, *ed 3, Philadelphia, 2013, Elsevier; Butterworth J, Mackey DC, Wasnick J:* Morgan & Mikhail's Clinical Anesthesiology, *ed 5, New York, 2013, McGraw Hill; Nagelhout JJ, Plaus KL:* Nurse anesthesia, *ed 5, St. Louis, 2014, Elsevier.*

TABLE 8-3 Advantages and Disadvantages of the Laryngeal Mask Airway (LMA) Compared With Facemask Ventilation and Tracheal Intubation

	Advantages	Disadvantages
LMA compared with facemask	• Hands-free operation • Better seal in bearded patients • Often easier to maintain airway • Protects against airway secretions • Less facial nerve and eye trauma	• More invasive • More risk of airway trauma • Requires new skill • Multiple contraindications
LMA compared with tracheal intubation	• Less invasive • Very useful in difficult intubations • Less tooth and laryngeal trauma • Less laryngospasm and bronchospasm • Does not require neck mobility • No risk of esophageal or endobronchial intubation	• Increased risk of gastrointestinal aspiration • Limits maximum positive pressure ventilation • Less secure airway • Can cause gastric distention • Not designed for prolonged use; maximum time period of 10–24 hours has been studied without adverse effects[4]

From Butterworth J, Mackey DC, Wasnick J: Morgan & Mikhail's Clinical Anesthesiology, *ed 5, New York, 2013, McGraw-Hill.*

TABLE 8-4 Laryngeal Mask Airways (LMA) Supreme Selection Guide

Airway Size	Patient Weight	Maximum Size Nasogastric Tube	Recommended Maximum Inflation Volume	Optimum Intra-Cuff Pressure (Do Not Exceed)
1	<5 kg	6 Fr	5 mL	60 cm H_2O
1.5	5–10 kg	6 Fr	8 mL	
2	10–20 kg	10 Fr	12 mL	
2.5	20–30 kg	10 Fr	20 mL	
3	30–50 kg	14 Fr	30 mL	
4	50–70 kg	14 Fr	45 mL	
5	70–100 kg	14 Fr	45 mL	

From Teleflex Medical Incorporated, Morrisville, NC.

EQUIPMENT

- LMA Supreme size selection (Table 8-4)
  - For normal adults, use the size 4 device as a first choice.[5]
- Water-soluble lubricant
- Gloves, mask, and eye protection
- Suction equipment (suction canister with control head, tracheal suction catheters, Yankauer suction tip)
- Mouth-to-mask or bag-valve-mask device attached to a high-flow oxygen source
- Tape
- 60-cm^3 syringe

Additional equipment, to have available as needed, includes the following:

- Nasogastric (NG) tube (for sizing see Table 8-4). The drain port of the LMA Supreme can facilitate the passage of an appropriately sized NG tube after correct positioning of an LMA Supreme.

PATIENT AND FAMILY EDUCATION

- If time allows, provide the family with information regarding the LMA and the reason for insertion. ***Rationale:*** This information assists the family in understanding why the procedure is necessary and decreases family anxiety.

PATIENT ASSESSMENT AND PREPARATION

Patient Assessment

- Assess the level of consciousness and responsiveness. ***Rationale:*** In an emergency situation, the LMA should be inserted only into a patient who is profoundly unconscious and unresponsive.[5] Laryngospasm and/or vomiting may result, causing the inability to ventilate if an LMA is introduced into a conscious or semiconscious patient.
- Assess history and patient information for the possibility of delayed gastric emptying (e.g., hiatal hernia, recent food ingestion, poorly controlled diabetes). ***Rationale:*** In a patient with delayed gastric emptying, the benefits of LMA insertion must be weighed against the possibility of regurgitation.[5]
- Assess history and patient information for possibility of decreased pulmonary compliance (i.e., pulmonary fibrosis, obesity). ***Rationale:*** The high pressures needed to ventilate a patient with decreased pulmonary compliance may override the occlusive pressure of the LMA.[5]
- Assess predictors of difficult LMA insertion.[10] Consider the mnemonic "RODS":
  - R = restricted mouth opening
  - O = obstruction/obesity
  - D = disrupted or distorted airway
  - S = stiff, as in asthma, pulmonary fibrosis, or pulmonary edema[10]

Patient Preparation

- If time permits, assess the patient's and family's level of understanding about the condition and rationale for use of the LMA. ***Rationale:*** This assessment identifies the patient's and family's knowledge deficits concerning the patient's condition.
- Ensure adequate ventilation and oxygenation with either a mouth-to-mask or bag-valve-mask device (see Procedure 31). ***Rationale:*** The patient is nonresponsive and apneic without assisted ventilation before the LMA insertion.[5]
- Ensure that the suction equipment is assembled and in working order. ***Rationale:*** The patient may regurgitate during the insertion or while the LMA is in place and may require oropharyngeal or tracheal suctioning.[5]
- Anything that is not permanently affixed in the patient's mouth (e.g., dentures, partials, jewelry) should be removed. ***Rationale:*** Inadvertent dislodgment and aspiration might occur with the placement of the LMA.[5] Significant time should not be wasted in removing such oral appliances if significant hypoxia is being experienced.
- Placement is most successful with the patient positioned supine with the head in the neutral or sniffing position.[5] ***Rationale:*** Proper head positioning facilitates successful placement of an LMA.

Procedures for Laryngeal Mask Airway (LMA Supreme) Insertion

Steps	Rationale	Special Considerations
1. HH		
2. PE		
3. Ensure that a spare LMA of the same type is immediately available. **(Level M*)**	Provides for a "backup" device should the initial device fail.	
4. Remove the LMA from the package and inspect. **(Level M)**	Ensures that the device is not defective and will work as indicated.	
A. Inspect the exterior of the mask for any cuts, tears, or scratches.	Ensures that the exterior surface of the device has not been damaged in any way.	
B. Inspect the interior of the airway tube for any particles	Particles in the airway tube may be inhaled when the device is used.	Discard the device if any evidence of damage is found and open the backup device
C. Examine the 15-mm male connector at the end of the airway tube and ensure that it fits tightly into the tube.	The 15-mm male connector is essential for ventilation with a bag-valve device or ventilator.	Discard the device if any particles cannot be removed from the tube and open the backup device

*Level M: Manufacturer's recommendations only.

Procedures for Laryngeal Mask Airway (LMA Supreme) Insertion—*Continued*

Steps	Rationale	Special Considerations
5. Perform the deflation and inflation tests. **(Level M*)**		
A. Expel the air from the 60-mL syringe and connect it to the pilot balloon valve.	Ensures that the device is not defective and will work as indicated.	
B. Pull back the syringe plunger to deflate the cuff fully.	The appropriate-size syringe is needed to inflate the cuff to the proper test level.	Discard the device if the connector does not fit tightly into the airway tube and open the backup device.[5]
C. Examine the cuff to ensure that it remains fully deflated (Fig. 8-4).	Full deflation of the cuff helps ensure its patency.	Discard the device if the cuff does not remain fully deflated and open the backup device.[5]
D. Obtain a 60-ml syringe and pull back on the syringe to the volume required for each LMA size, reattach to the valve, and inflate the cuff with the appropriate volume for the size (see Table 8-4).	Ensures that the device is not defective and will work as indicated.	Discard the device if the cuff does not remain fully deflated and open the backup device.[5]
E. Examine the inflated cuff to ensure that it is symmetrical without bulges.	Ensure that the device is not defective and will work as indicated.	Discard the device if the cuff bulges asymmetrically and open the backup device.[5]
F. Examine the pilot balloon to ensure that its inflated shape is elliptical.	Ensures that the device is not defective and will work as indicated.	Discard the device if the pilot balloon is spherical or bulges and open the backup device.[5]
Insertion Technique		
(If possible, preoxygenate patients with 100% oxygen for several minutes before the insertion of any advanced airway adjunct intervention) **(Level E*)**.[4,6,7]	Facilitates replacing nitrogen with oxygen in the lungs. Increases the duration of apnea without desaturation, which facilitates more time to place airway adjunct and improves patient safety	Conditions that increase oxygen demand (e.g., sepsis, pregnancy) and decrease functional residual capacity (e.g., morbid obesity, pregnancy) reduce the apnea period before desaturation ensues.[6]

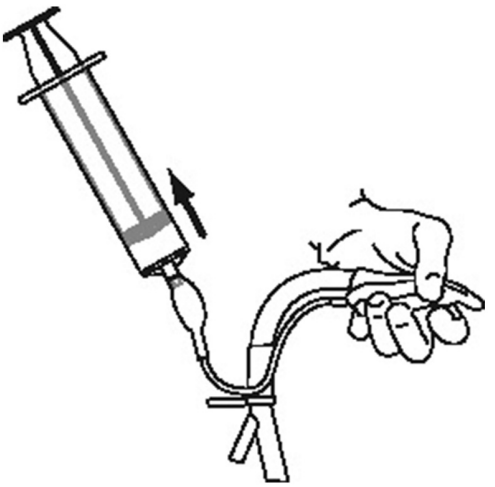

Figure 8-4 Laryngeal Mask Airway (LMA) Supreme deflation technique. After firmly connecting a syringe of at least 50 mL to the inflation port, hold the syringe and the LMA Supreme exactly as shown. Compress the distal end of the device in between the index finger and thumb while withdrawing air until a vacuum has been obtained. While deflating, hold the device so that the distal end is curled slightly anteriorly. Deflate the device until the tension in the syringe indicates that a vacuum has been created in the mask. Keep the syringe under tension while rapidly disconnecting it from the inflation port. *(From Teleflex Medical Incorporated, Morrisville, NC.)*

*Level E: Multiple case reports, theory-based evidence from expert opinions, or peer-reviewed professional organizational standards without clinical studies to support recommendations.
*Level M: Manufacturer's recommendations only.

Procedure continues on following page

Procedures for Laryngeal Mask Airway (LMA Supreme) Insertion—*Continued*

Steps	Rationale	Special Considerations
6. Fully deflate the cuff by holding the device so that the distal end is curled slightly anteriorly, as shown in Fig. 8-4. Attach a syringe. Compress the distal tip of the mask with thumb and index finger. **(Level M*)**	Facilitates smooth insertion and avoids deflection of the epiglottis.	
7. Lubricate the posterior surface of the cuff and airway tube with a small amount of water-soluble lubricant (Fig. 8-5, Step 2). **(Level M)**	Facilitates smooth insertion.	Avoid excessive lubrication on the anterior portion (aperture side) of the cuff because it may be aspirated or occlude lumen. Do not use lidocaine lubricants because they may delay the return of protective reflects and may cause an allergic reaction.[9]
8. Stand behind or besides the patient's head. Place the patient's head in the neutral or sniffing position (see Fig. 8-5, Step 3). **(Level E*)**	Facilitates proper body position for the person inserting the device and the patient's head during insertion.	The patient's head may be left in a neutral position if cervical spine injury is possible.[5] If cervical instability is suspected, manual stabilization should be maintained by the assistant during the placement procedure.
9. Hold the device exactly as shown in Fig. 8-5. Press the distal tip against the inner aspect of the upper teeth or gums (see Fig. 8-5, Step 3).	Facilitates smooth insertion.	
10. Slide inwards using a slightly diagonal approach (direct the tip away from the midline). Continue to slide inwards, rotating the hand in a circular motion so that the device follows the curvature behind the tongue (see Fig. 8-5, Step 4).	Assists in maneuvering the LMA into the proper position	Do not use force. If the LMA does not advance, remove, reventilate, and reinsert.[9] The mask must be pressed up against the hard palate to be inserted correctly.[9] If the cuff becomes obstructed by the tonsils, a diagonal maneuver is often successful.[5,9]
11. Resistance should be felt when the distal end of the device meets the upper esophageal sphincter. The device is now fully inserted (see Fig. 8-5, Step 5).	Continues moving the LMA into the proper final position.	
12. Inflate with the minimal amount of air needed to achieve an effective seal. For further details on a successful insertion, see Box 8-1.	The recommended intracuff pressure should not exceed 60 cm H_2O.	
Securing the LMA (Fixation)[5]		
13. Use a piece of adhesive tape 30–40 cm long, holding it horizontally by both ends	Facilitates the approximate length necessary to secure the LMA.	
14. Press the adhesive tape transversely across the fixation tab (if present) or an area 2–3 cm above the lips on the LMA airway tube.	The fixation tab is located above the bite block on LMA Supreme. Other first- and second-generation devices *do not* possess fixation tabs.	Fixation tab should be located 1–2 cm above the lips if placement and sizing is appropriate. Fixation tab should not be applied with downward pressure to lips/teeth nor be located >3 cm above the lips (may indicate improper sizing or improper placement of LMA).

*Level E: Multiple case reports, theory-based evidence from expert opinions, or peer-reviewed professional organizational standards without clinical studies to support recommendations.
*Level M: Manufacturer's recommendations only.

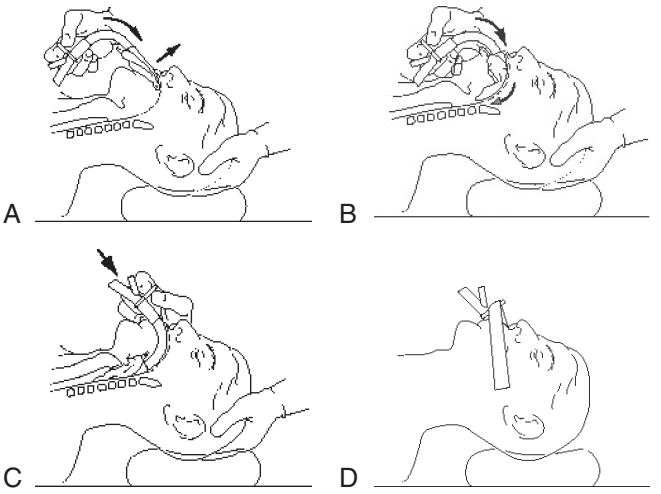

Figure 8-5 Insertion of second-generation Laryngeal Mask Airway (LMA) Supreme. *(From Teleflex Medical Incorporated, Morrisville, NC.)*

BOX 8-1 Successful Insertion of a Laryngeal Mask Airway Depends Upon Attention to Several Details

1. Choose the appropriate size (see Table 8-4) and check for leaks before insertion.
2. The leading edge of the deflated cuff should be wrinkle free and face away from the aperture.
3. Lubricate the back side of the cuff.
4. The patient must be vastly unresponsive and relaxed before attempting insertion.
5. Place the patient's head in sniffing position (see Fig. 8-5).
6. Correct positioning can be aided by using your index finger to guide the cuff along the hard palate and down into the hypopharynx until an increased resistance is felt.
7. Inflate with the correct amount of air (see Table 8-4).
8. Obstruction after insertion is usually due to a down-folded epiglottis or transient laryngospasm.
9. Avoid pharyngeal suction, cuff deflation, or laryngeal mask removal until the patient is awake (e.g., opening mouth on command) unless removing to facilitate a more secure airway.

From Butterworth J, Mackey DC, Wasnick J: Morgan & Mikhail's Clinical Anesthesiology, *ed 5, New York, 2013, McGraw-Hill.*

Procedures for Laryngeal Mask Airway (LMA Supreme) Insertion—*Continued*

Steps	Rationale	Special Considerations
15. Continue to press downward so that the ends of the tape adhere to each of the patient's cheeks and the device itself is gently pressed inwards by the tape.	Secures the LMA with slight inward pressure. This assists in maintaining LMA seal.	Without securing the LMA in place, displacement or migration of device from airway is probable.
16. Bite block may be considered if utilizing a first-generation LMA.	The patient may bite down on a first-generation LMA airway, collapsing the tube and thus compromising airway.	Second-generation LMAs incorporate bite blocks within the device.
17. Dispose of supplies.		
18. HH		

Procedures for Laryngeal Mask Airway (LMA Supreme) Correct Position

Steps	Rationale	Special Considerations
1. Correct placement should produce a leak-free seal against the glottis, with the mask tip at the upper esophageal sphincter	Maintenance of low ventilator pressures prevents overriding the pressure in the cuff, creating a leak, or forcing air into the stomach.	If sounds are heard in the epigastrium on auscultation, remove the device and manually ventilate the patient with a bag-valve mask.
2. The bite-block portion of the LMA Supreme should lie between the teeth.	Helps confirm correct depth with primary assessment.	Limit tidal volumes to <8 mL/kg.
3. A drop of water-soluble lubricant (1–2 mL) can be placed on the proximal end of the gastric drainage tube port.	Confirms proper placement with tip of LMA sealed in esophagus.	Observe a slight up-down meniscus movement of the lubricant following the application and release of gentle pressure on the suprasternal notch,[5] aka "suprasternal notch test."[5] This is more important if the rescuer plans to pass an NG tube of appropriate size down the LMA for gastric decompression purposes. Increased risk of laryngospasm and airway occlusion can result if the LMA is mal-positioned, resulting in NG placement down the bronchi.
4. Observe a slight up-down meniscus movement of the lubricant following the application and release of gentle pressure on the suprasternal notch	Indicates that the distal end of the drain tube is correctly placed so that it seals around the upper esophageal sphincter	

Procedure continues on following page

Procedures for Laryngeal Mask Airway (LMA Supreme) Removal

Steps	Rationale	Special Considerations
1. HH 2. PE 3. Remove the LMA as follows: A. Gently assist with ventilations when the patient begins spontaneously breathing. B. Observe for signs of swallowing. When the patient can open his or her mouth on command, deflate the cuff and remove the LMA.[5] C. Continue to assess for airway and breathing effectiveness: i. Establishment of an effective airway in an emergency situation ii. Maintenance of adequate ventilation iii. Recovery of spontaneous ventilation 4. Dispose of supplies. 5. HH	Removal may prevent agitation, regurgitation, and laryngeal spasm. Prevents excess ventilator pressures. Indicates a return of some protective reflexes. If the LMA is removed before effective swallowing and coughing, secretions may enter the larynx, causing bronchospasm. Maintains monitoring of the airway and the patient's ability to breathe on his or her own.	Removal of the LMA is often to facilitate the placement of a more secure and definitive airway such as an endotracheal tube. This is usually accomplished by personnel specifically trained in airway emergencies (e.g., anesthesiologists and certified registered nurse anesthetists). Tape or tube-securing device may be removed at this time. Unless overt secretions are noted after LMA removal, avoid suctioning because it may cause laryngeal spasm. The cuff should remove excess secretions when removed and prevent aspiration.[5] Potential complications related to the use of the LMA appear inversely proportional to the experience and skill level of the operator and patient-related factors (e.g., placement in semiconscious individual, patients with full stomachs, etc.).[4,8] • Regurgitation • Aspiration • Laryngospasm • Gagging • Retching • Trauma to tissues • Damage to various nerves • Sore or dry mouth • Hoarseness, stridor

Expected Outcome

- Placement of patent artificial Airway
- Properly positioned and secured airway
- Improved oxygenation and ventilation

Unexpected Outcomes

- Aspiration of gastric contents
- Trauma to oral and pharyngeal tissue potentially leading to worsening ventilation, nerve damage, and aspiration of blood
- Inability to ventilate lungs effectively secondary to:
  1. Improper sizing or position of LMA
  2. High airway and thoracic pressures (e.g.: Obese and Asthmatic patients)
  3. Obstruction: secretion or foreign body
  4. Pt semi-conscious
  5. Poor seal of LMA cuff (over or under inflated)
  6. Anatomical mismatch of patient and device (uncommon anatomical airway variants can result in a poor seal and fit of the LMA)[4,6,7]

Patient Monitoring and Care

Steps	Rationale	Reportable Conditions
		These conditions should be reported if they persist despite nursing interventions.
1. Monitor the patient and LMA during ventilation for potential problems. A. Attach a pulse oximeter and monitor for trends. B. Watch for air leaks around the cuff that may be caused by malposition. If suspected, assess for normal smooth oval swelling around cricothyroid membrane. If absent, in conjunction with prolonged expiratory phase, remove the LMA, reventilate, and reinsert.[9] C. If regurgitation occurs, as indicated by fluid in the airway tube, immediately tilt the patient's head down and turn the patient's body to one side, remove bag-valve device, and suction through the airway tube.	Ensures proper ventilation and airway management. Pressure-controlled and volume-controlled ventilation may be used but should be minimized or avoided because LMAs are not designed for long-term airway management. Pressure-controlled ventilation may require lower peak airway pressures.[4,5,9] Efforts should be made to secure a definitive airway (endotracheal intubation) as soon as possible. With mechanical ventilation, tidal volume, respiratory rate, and inspiratory-to-expiratory ratios need to be adjusted to prevent high peak airway pressures.[4,5,9] Monitors adequate oxygenation. May indicate problems with the LMA position. Do not add more air to the cuff because it may force the soft cuff off the larynx.[5,9] Allows drainage and clearance of fluid from the airway tube. If airway problems, difficulty with ventilation, or regurgitation continue, remove the LMA and establish an airway by other means.[9]	• Inability to ventilate patient • Decreased oxygen levels despite adequate oxygen delivery • Indications of an air leak, especially with a prolonged expiratory phase or lack of normal smooth oval swelling around the cricothyroid membrane4,5 • The LMA's cuff pressures may need to be adjusted during ascent and descent portions of air transport for unpressurized cabins • Monitor for signs of excessive or deficient LMA cuff pressures, namely, ventilation difficulties and excessive air leaks • Airway problems, difficulty with ventilation, or regurgitation

Documentation

Documentation should include the following:

- Initial patient assessment that indicates a need for LMA insertion
- Performance of visual inspection, inflation and deflation tests
- After insertion, assessment of end-tidal carbon dioxide and chest rise and fall
- Before removal, presence of swallowing and ability to open mouth
- Any complications while the LMA is in place (e.g., regurgitation or air leaks)
- Preoxygenation and ventilation before LMA insertion
- Insertion technique
- Initial cuff inflation pressure
- Signs of correct placement and cuff inflation
- Securing of the LMA
- After removal, patency of airway, effectiveness of breathing, pulse oximetry and vital sign readings, patient symptoms, or signs of complications

References and Additional Readings

For a complete list of references and additional readings for this procedure, scan this QR code with any freely available smartphone code reader app, or visit http://booksite.elsevier.com/9780323376624.