APPENDIX

KING TUBE

KING LTS-D:

Consists of a curved double lumen tube with separate pathways for ventilation and access to the stomach. The ventilation lumen ends between the two inflatable cuffs with a variety of openings intended to align with the laryngeal inlet. Attached to the proximal end of the ventilation lumen is a 15 mm connector for attachment to a standard breathing circuit or resuscitation bag. The gastric access lumen is a separate conduit that allows passage of up to an 18 Fr standard gastric tube from its external proximal opening to the distal tip of the KING LTS-D, which is intended to be positioned in the upper esophagus. This allows the gastric tube to be easily inserted into the stomach for removal of fluids. In the absence of a gastric tube, the gastric access lumen allows channeling of gases and fluids from the esophagus and stomach to a point outside the patient's mouth.

INDICATIONS FOR USE:

The KING LT(S)-D is intended for airway management in patients for controlled (30 cmH2O or higher) or spontaneous ventilation. It is also indicated for difficult and emergent airway cases and is well suited for ambulatory and office-based anesthesia.

CONTRAINDICATIONS:

The following contraindications are applicable for routine use of the KING LT(S)-D:

- Responsive patients with an intact gag reflex.
- Patients with known esophageal disease.
- Patients who have ingested caustic substances.

WARNINGS/PRECAUTIONS:

- Is not proven to protect the airway from the effects of regurgitation and aspiration.
- High airway pressures may divert gas to the atmosphere (or stomach with KING LT-D).
- Intubation of the trachea cannot be ruled out as a potential complication of the insertion of the KING LT(S)-D.
- After placement, perform standard checks for breath sounds and utilize an appropriate carbon dioxide monitor as required by protocol.
- Lubricate only the posterior surface of the KING LT(S)-D to avoid blockage of the ventilation apertures or aspiration of the lubricant.
- The KING LT(S)-D is not intended for re-use.

Size:	Patient Criteria	Connector Color	Inflation volumes
3	**4-5 ft**	**Yellow**	**40-55 ml**
4	**5-6 ft**	**Red**	**50-70 ml**
5	**greater than 6 ft**	**Purple**	**60-80 ml**

LATEX-FREE - The KING LT(S)-D is 100% latex-free and should be considered safe to use on patients
who are latex sensitive.

APPENDIX

KING TUBE

KING LT(S)-D INSERTION INSTRUCTIONS:

1. Using the information provided, choose the correct KING LT(S)-D size, based on patient height.
2. Test cuff inflation system by injecting the maximum recommended volume of air into the cuffs (refer to Sizing Information chart). Remove all air from cuffs prior to insertion.
3. Apply a water-based lubricant to the beveled distal tip and posterior aspect of the tube, taking care to avoid introduction of lubricant in or near the ventilatory openings.
4. Have a spare KING LT(S)-D ready and prepared for immediate use.
5. Pre-oxygenate.
6. For EMS/Non-Operating Room Applications: Ensure gag reflex is not intact.
7. Position the head. The ideal head position for insertion of the KING LT(S)-D is the "sniffing position". However, the angle and shortness of the tube also allows it to be inserted with the head in a neutral position.
8. Hold the KING LT(S)-D at the connector with dominant hand. With nondominant hand, hold mouth open and apply chin lift unless contraindicated by C-spine precautions or patient position.
9. With the KING LT(S)-D rotated laterally 45-90º such that the blue orientation line is touching the corner of the mouth, introduce tip into mouth and advance behind base of tongue. Never force the tube into position.
10. As tube tip passes under tongue, rotate tube back to midline (blue orientation line faces chin).
11. Without exerting excessive force, advance KING LT(S)-D until base of connector aligns with teeth or gums.
12. For EMS/Non-Operating Room Applications: Fully inflate cuffs using the maximum volume of the syringe included in the EMS kit. For KING LT(S)-D typical inflation volumes see Sizing Information chart.
13. Attach the breathing circuit or resuscitator bag to the 15 mm connector of the KING LT(S)-D. While gently bagging the patient to assess ventilation, simultaneously withdraw the airway until ventilation is easy and free flowing (large tidal volume with minimal airway pressure).
14. Depth markings are provided at the proximal end of the KING LT(S)-D which refer to the distance from the distal ventilatory openings. When properly placed with the distal tip and cuff in the upper esophagus and the ventilatory openings aligned with the opening to the larynx, the depth markings give an indication of the distance, in cm, to the vocal cords.
15. Confirm proper position by auscultation, chest movement and verification of CO_2 by capnography.
16. Readjust cuff inflation to 60 cm H_2O (or to just seal volume).
17. Secure KING LT(S)-D to patient using tape or other accepted means. A bite block can also be used, if desired. DO NOT COVER THE PROXIMAL OPENING OF THE GASTRIC ACCESS LUMEN OF THE KING LTS-D.
18. KING LTS-D Only: The gastric access lumen allows the insertion of up to a 18 Fr diameter gastric tube into the esophagus and stomach. Lubricate gastric tube prior to insertion.

APPENDIX

KING TUBE

REMOVAL OF THE KING LT(S)-D

1. Once it is in the correct position, the KING LT(S)-D is well tolerated until the return of protective reflexes.
2. KING LT(S)-D removal should always be carried out in an area where suction equipment and the ability for rapid intubations are present.
3. For KING LT(S)-D removal, it is important that both cuffs are completely deflated.

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1. The key to insertion is to get the distal tip of KING LT(S)-D around the corner in the posterior pharynx, under the base of the tongue. Experience has indicated that a lateral approach, in conjunction with a chin lift, facilitates placement of the KING LT(S)-D. Alternatively, a laryngoscope or tongue depressor can be used to lift the tongue anteriorly to allow easy advancement of the KING LT(S)-D into position.

2. Insertion can also be accomplished via a midline approach by applying a chin lift and sliding the distal tip along the palate and into position in the hypopharynx. In this instance, head extension may also be helpful.

3. As the KING LT(S)-D is advanced around the corner in the posterior pharynx, it is important that the tip of the device is maintained at the midline. If the tip is placed or deflected laterally, it may enter the piriform fossa and the tube will appear to bounce back upon full insertion and release. Keeping the tip at the midline assures that the distal tip is placed properly in the hypopharynx/upper esophagus.

4. Depth of insertion is key to providing a patent airway. Ventilatory openings of the KING LT(S)-D must align with the laryngeal inlet for adequate oxygenation/ventilation to occur. Accordingly, the insertion depth should be adjusted to maximize ventilation. Experience has indicated that initially placing the KING LT(S)-D deeper (until base of connector aligns with teeth or gums), inflating the cuffs and withdrawing until ventilation is optimized results in the best depth of insertion for the following reasons:

- It ensures that the distal tip has not been placed laterally in the piriform fossa (see item #3 above).
- With a deeper initial insertion, only withdrawal of the tube is required to realize a patent airway. A shallow insertion will require deflation of the cuffs to advance the tube deeper (several added steps).
- As the KING LT(S)-D is withdrawn, the initial ventilation opening exposed to or aligned with the laryngeal inlet is the proximal opening. Since the proximal opening is closest to and is partially surrounded by the proximal cuff, airway obstruction is less likely, especially when spontaneous ventilation is employed.
- Withdrawal of the KING LT(S)-D with the balloons inflated results in a retraction of tissue away from the laryngeal inlet, thereby encouraging a patent airway

APPENDIX

KING TUBE

5. When the patient is allowed to breathe spontaneously, airway obstruction can occur even though no obstruction was detected during assisted or positive pressure ventilation. During spontaneous ventilation, the epiglottis or other tissue can be drawn into the ventilatory opening, resulting in obstruction. Advancing the KING LT(S)-D 1-2 cm or initial deeper placement (see item #4 above) normally eliminates this obstruction.

6. Ensure that the cuffs are not over inflated. Cuff pressure should be adjusted to 60 cm H2O. If a cuff pressure gauge is not available, inflate cuffs with the minimum volume necessary to seal the airway at the peak ventilatory pressure employed (just seal volume). Note that nitrous oxide is known to diffuse into cuffs and increase pressure; accordingly, if using nitrous oxide, cuff pressures should be monitored periodically to avoid overinflation.

7. Removal of the KING LT(S)-D is well tolerated until the return of protective reflexes. For later removal, it may be helpful to remove some air from the cuffs to reduce the stimulus during wakeup.