Does the ILMA Make Sense in HEMS?

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As first reported by Brain[1] by the early 1980s, the laryngeal mask airway (LMA) represented a new approach to airway management. The LMA has been used to facilitate tracheal intubation by a variety of methods. In fact, the LMA has been used to intubate the patient with difficult tracheal access. A recent addition to this technique, the intubating laryngeal mask airway (ILMA), shown in Figure 1, first was proposed by Brain and coworkers in 1995.[1,2] The ILMA incorporates the standard LMA cuff in sizes 3, 4, or 5, along with a metal airway tube and handle. The handle allows users to manipulate the device within the patient's airway. The airway tube component has a wider internal diameter and is shorter than the standard LMA tube. A silicone rubber bite block surrounds the upper portion of the stem.

In current use, the ILMA introduces an 8.0 mm cuffed endotracheal tube (ETT). The standard LMA only admits up to a 6.0 mm cuffed ETT. In addition, the cuff of such a tube may not reliably come to lie in the trachea below the vocal cords because of the LMA stem length. To overcome these problems, the ILMA was modified to function as a primary airway or as a means to facilitate placement of a variety of cuffed ETTs. As developed, the ILMA's rigid handle allows the operator to transmit position changes directly to the inflatable cuff within the patient's airway, unlike the standard LMA.[3,4] Brain points out that this flexible alignment of the ILMA with the laryngeal inlet facilitates tracheal intubation while allowing the patient's lungs to ventilate throughout the procedure.

Development of the LMA and the ILMA coincides with a growing number of reports that highlight the potential for complications when repeated unsuccessful attempts at invasive endotracheal intubation take place.[5] In fact, recent guidelines from the American Heart Association[6] embrace a less aggressive approach to invasive airway placement until appropriately trained personnel and other resources are available.

The success rate of blind intubation through the ILMA seems to be higher than 90% in large series of patients, even with difficult airways or spine immobilization.[7,8] Only reduced oral opening (less than 2 cm) hampers use of the ILMA. The ILMA more than doubles the blind intubation rate compared with a standard LMA, and the success rate does not appear to depend on the operator's clinical experience. Available literature on the subject suggests that 10 to 20 ILMA intubations are necessary to develop sufficient experience with this device. A steep learning curve appears to be present for the first several attempts at intubation using the ILMA. However, other reports suggest that operators with little experience can achieve a high success rate with this device. One study[9] from the emergency medicine literature evaluated success with ILMA insertion and ventilation in a mannequin model. Inexperienced operators were given a brief demonstration of the ILMA and subsequently had a 97% success rate for blind ETT placement.

Most studies do not mention the incidence of accidental esophageal intubation during blind ETT placement through the ILMA. Three studies report this complication, and in all cases, the mistake was recognized quickly and corrected. The incidence of esophageal intubation with the ILMA is probably 5%.[10,11] End-tidal CO_2 detectors or esophageal detector devices should be available when blind intubation is performed with the ILMA.

A lighted stylet may improve the success rate of blind intubation. A standard lighted stylet or variation of this device may allow manipulation of the ILMA handle to ensure that the glow is directed into the midline at the laryngeal prominence before an ETT is advanced into the trachea.[12] With the addition of a lighted stylet, the intubation success rate with the ILMA is nearly 100%. In one study,[13] nurses with no prior airway experience successfully intubated 95% of patients using the combination of an ILMA and lighted stylet.

In emergency medicine practice today, the most important role for the ILMA appears to be as a part of the difficult airway management protocol, as a backup device for failed direct laryngoscopy, and for ETT placement. Interestingly, available studies suggest the ILMA is just as successful for patients with difficult airway anatomy as for those with normal airway anatomy.[8,14]

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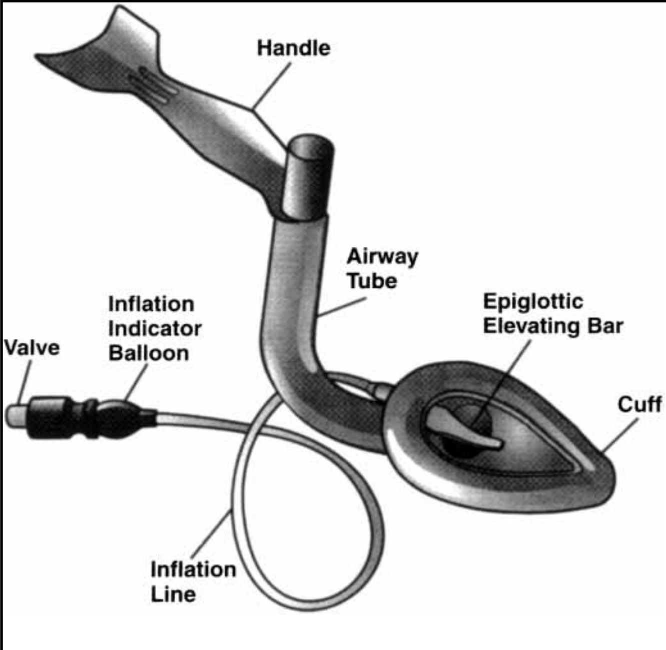

Figure 1. Components of the intubating laryngeal mask airway. An endotracheal tube may be passed through the airway tube.

Advantages

Short learning curve, blind insertion
Rescue airway in ED
Allows ventilation during placement of definitive tracheal tube
Tracheal intubation can be accomplished
Can be used in confined spaces, when operator astride patient
Effective with difficult airway anatomy
Allows intubation in the neutral position in the event of C-spine injury

Disadvantages

Dilute experience with ETT use
Costs more than ETT
Requires muscle relaxant use or deep sedation
Aspiration; vomiting in patient without muscle relaxant

This is because characteristics that make direct laryngoscopy difficult—including an anterior larynx, small mandible, and decreased neck movement—will not affect ILMA placement.

Another group of patients who may benefit from the ILMA is the set with difficult face mask ventilation. Using rapid sequence induction (RSI) on patients who are difficult to ventilate with a face mask can be problematic. Five percent of adults in the general population may be difficult to ventilate with a face mask because of obesity, facial hair, or other anatomic factor.[15,16] The ILMA allows most of these individuals to be ventilated because those problems do not affect successful placement. In fact, the ILMA can ventilate about 99% of all patients and is more effective than face mask ventilation for less experienced providers.

The ILMA also may be a good choice for patients with cervical spine injury. Small randomized studies suggest the ILMA is more reliable than the standard LMA or direct laryngoscopy during in-line stabilization of the cervical spine.[17,18] A variety of case reports also indicate the ILMA may be effectively used during in-line stabilization with awake patients or with RSI. Interestingly, some authors suggest the ILMA may create posterior pressure on the midportion of the cervical spine. These authors warn that the ILMA should be used with caution in patients who are susceptible to injury from cervical flexion.[19] Because the ILMA may move the cervical spine in the opposite direction of the direct laryngoscope, it may be appropriate to choose an intubation technique based on the perceived type of cervical injury.

Perhaps the ILMA's greatest limitation is the risk of aspiration. The anesthesia literature suggests that the risk of aspiration with the LMA is about 2.6 per 10,000 elective cases and 11 per 10,000 emergency cases.[20] Clearly, patients seen in the HEMS arena cannot be assumed to have an empty stomach, and intubation will be attempted under poorly controlled circumstances. Notably, however, intubation in HEMS traditionally is performed using RSI. Limited available literature suggests the use of RSI agents in conjunction with subsequent administration of muscle relaxants, as is common practice in the air medical industry, may reduce the incidence of vomiting. Although the use of muscle relaxants to prevent aspiration is not guaranteed, routine use of these agents should prevent forceful vomiting.[21]

Other complications of the ILMA are unlikely. Sore throat and hoarseness after the ILMA have been reported. Whether these reports relate to trauma from the tip of an inserted ETT or from mucosal pressures created by the ILMA cuff is unclear.[22] Minor laryngeal injuries have been reported after blind intubation with the ILMA. Swelling of the epiglottis after blind ILMA intubation also has been reported; therefore, excessive force should be avoided. Finally, after intubation is accomplished, the ILMA should be removed to avoid pressure injury to the pharyngeal mucosa.[23]

Does the ILMA have a role in HEMS? We ask that you consider these summary points:

The ILMA has a brief learning curve regardless of the operator's background. This less-invasive means provides effective ventilation and should work well in the setting of RSI as performed by HEMS crews. Although the ILMA is designed to facilitate ETT insertion, effective ventilation should be obtained with this device alone.

The ILMA can be placed in an aircraft even if the operator is astride the patient. This device offers a significant advance over simple bag/valve/mask ventilation for the patient whose airway becomes difficult in the air and the only alternative to facilitate invasive endotracheal intubation is landing to allow an operator to reach the head of the stretcher.

The LMA appears worthy of consideration in the HEMS en-

vironment. Polk and coworkers[24] recently reported in *Air Medical Journal* using the LMA in simulation of patients with difficult extraction. Clearly, work such as this needs to be expanded using the ILMA as well in the preclinical and clinical arena.

Finally, should we consider the ILMA as a primary means of airway control rather than a rescue device in the midportion of our difficult airway algorithm? The importance of airway management to successful HEMS practice, as suggested by the volume of literature in this journal alone on this subject, warrants further systematic attempts to answer this question.

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