BEST EVIDENCE EQUIPMENT REVIEW

The intubating laryngeal mask airway

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Emerg Med J 2005;22:47–49. doi: 10.1136/emj.2004.020644

The laryngeal mask airway (LMA) is accepted as both a rescue ventilation and a primary airway management device in both the prehospital and emergency department environments.^{1–3} A modified version of the LMA, the intubating laryngeal mask airway (ILMA, LMA-Fastrach; Intavent Ltd, Reading, UK) exists, which, when combined with a modified tracheal tube, can be used for blind tracheal intubation. There is evidence that the ILMA is an effective means of maintaining ventilation and oxygenation in the prehospital,⁴ operating theatre,⁵ and emergency department^{6–7} environments. In addition, it has been reported to be effective in facial trauma,⁷ neck immobilisation,^{8,9} in a lateral position,¹⁰ while wearing a chemical protective hood,¹¹ and while in a helicopter.¹² Importantly, it has been shown to be effective even among inexperienced operators.^{6,8,13,14} A best evidence equipment review was undertaken to assess whether, when compared with a conventional LMA, the ILMA would be of use as an airway rescue device.

DESCRIPTION OF DEVICE

The ILMA is a modified version of the LMA, which, in addition to permitting ventilation, is designed to facilitate blind tracheal intubation with a tracheal tube in an obtunded or anaesthetised patient. It has a soft inflatable laryngeal mask and a rigid, anatomically curved airway tube terminating in a standard 15 mm connector and is wide enough to accept a cuffed 8 mm tracheal tube. The rigid handle permits removal and “steering” of the device in relation to the larynx. The device measures about 20 mm in transverse diameter at its widest point. An epiglottic elevator bar in the mask aperture elevates the epiglottis when an endotracheal tube is passed through the aperture (fig 1)

PURPOSE AND INDICATIONS

The ILMA permits single handed insertion from any operator position, without moving the head or neck from a neutral position and without placing fingers in the patient’s mouth. It can be used as an airway device in its own right, permitting ventilatory control and oxygenation between intubation attempts. Indications include use during difficult airway situations, specifically including the need for manual in-line stabilisation and situations where there is restricted access to the patient or when personnel with intubation skills are not available, or where there is suspected cervical spine injury. The laryngeal mask component serves to guide the reinforced tracheal tube directly to the glottis without displacing anatomical structures. Unless the patient is deeply unconscious or has had topical anaesthesia applied to their upper airway, this will require concomitant neuromuscular block. Intubation through the ILMA is contraindicated in the presence of oesophageal or pharyngeal abnormality, although oesophageal abnormality alone is not a contraindication to the use of the ILMA purely as a rescue ventilation device.

CLINICAL SCENARIO

A young adult is involved in a road traffic collision resulting in a head injury and lower limb entrapment. He has a

reduced level of consciousness and is unable to maintain an effective airway. Tracheal intubation by direct laryngoscopy is impossible. You wonder whether the prehospital use of an ILMA as a primary airway management or rescue ventilation device would be better than a standard LMA.

THREE PART QUESTION

In [patients with a reduced level of consciousness] is [pre-hospital insertion of an ILMA] more or less likely to be [successful and associated with effective ventilation and oxygenation] compared with a standard LMA?

SEARCH STRATEGY

Primary sources of evidence (Medline and Embase) were searched using [intubating laryngeal mask airway, intubating LMA OR Fastrach.mp] with Medline and [“intubating laryngeal mask airway, intubating LMA OR Fastrach”] with Embase. This search strategy was checked with an information specialist. The same search strategy was applied to the Cochrane Library as a source of secondary evidence. In addition, a text word internet search and direct communication with the manufacturer was undertaken.

Figure 1 The intubating LMA with modified tracheal tube component inserted (with permission of The Laryngeal Mask Company Ltd). The tracheal tube component shown is minus its detachable 15 mm connector.

Table 1 Relevant papers

Reference	Study	Outcomes	Key results	Weaknesses
15	Randomised crossover study 25 electively anaesthetised patients with manual in-line stabilisation. LMA crossed over with ILMA. Randomised first device selection	(1) Speed of placement (2) Ease of placement (3) Adequacy of ventilation based on chest movement, compliance and the presence of leak	(1) Insertion of ILMA was significantly faster than LMA ($p<0.001$) (2) Insertion of ILMA was significantly easier than LMA ($p<0.001$) (3) Adequate ventilation achieved in 100% of ILMA insertions v 88% of LMA	(1) Unblinded (2) Hospital based ASA 1–2 patients (3) Patients with neck/upper respiratory abnormality or at risk of aspiration excluded (4) Muscle relaxants used (5) Capnography/pulse oximetry not used
13	Randomised crossover study. 55 electively anaesthetised patients. Randomised to use either LMA or ILMA	(1) Speed of insertion (2) Successful ventilation as shown by positive end tidal CO_2	(1) No significant difference in mean insertion time (2) No significant difference in success of ventilation	(1) Unblinded (2) Hospital based female patients only (3) Inexperienced operators (4) BMI >30 /reduced mouth opening/reduced neck movements excluded
16	Prospective study. 75 electively anaesthetised patients. 24 inexperienced operators. LMA crossed over with ILMA. Randomised first device selection	(1) Speed of insertion (2) Adequacy of ventilation based on chest expansion and end tidal $CO_2>4kPa$ (3) Pressure at which leak developed around device	(1) No significant difference in insertion time (2) No significant difference in success of insertion or ventilation (3) The ILMA was better at providing adequate ventilation without an audible leak $p=0.009$	(1) Unblinded (2) Hospital based ASA 1–2 patients (3) Inexperienced operators (4) Patients with risk factors for regurgitation excluded

SEARCH OUTCOME

There were no randomised controlled trials comparing the use of the ILMA with that of a standard LMA in the prehospital setting. Three hospital based research reports were found to be relevant (see table 1).^{13 15 16}

RESULTS

These studies suggest that, in hospital, the intubating laryngeal mask is at least as quick and as easy to insert as a standard LMA. The ILMA is more likely to provide successful ventilation than a standard LMA. There were no significant complications reported as a result of using an ILMA.

PRACTICAL CONSIDERATIONS

Availability

Most UK anaesthetic departments will have the device available as part of a difficult airway equipment set. Most emergency departments and ambulance services, however, will be unfamiliar with the ILMA and the prehospital care practitioner can expect the need to assist emergency department staff in its use.^{4 17}

Presentation

The device comes packaged as three separate components—the ILMA, a straight reinforced tracheal tube and a stabiliser rod. The stabiliser rod is used to prevent dislodgement of the tracheal component while the LMA component is being extracted around it, although for short periods the LMA component may be left in situ to facilitate airway control on subsequent extubation. Three sizes of ILMA are available—size 3 (children 30–50 kg), size 4 (adult 50–70 kg), and size 5 (adult 70–100 kg). Use of a standard cuffed tracheal tube (rather than the specifically designed tracheal tube) is not recommended by the manufacturer.

Sterilisation

It is delivered non-sterile and must be cleaned and sterilised before initial use and before each subsequent use. Steam autoclaving is the recommended method of sterilisation. The ILMA device can be reused up to 40 times. The dedicated tracheal component can be steam sterilised and used up to 10 times. A single use plastic version of the ILMA is currently awaiting CE approval and has an anticipated launch date of

early 2005. A single use dedicated tracheal tube will also be available in late 2004.

Training

Complimentary video and manikin based training is provided by the UK distributor (<http://www.intaventorthofix.com>). This would normally be done within a half day session and include theoretical training, maintenance, and two consecutive successful manikin based insertions (which have been shown to predict successful insertion and ventilation among patients).¹⁸

Expiry

The device is reusable and warranted against manufacturing defects for 40 uses or one year from the date of purchase (whichever is earlier).

Cost

Single reusable ILMA: £304. Single reusable tracheal component: £46. Complete set: £1050 (containing mask sizes 3, 4, and 5 with reinforced tracheal tubes size 7, 7.5, and 8 and three stabiliser rods). A reusable standard (non-intubating) LMA is £91 and the disposable standard (non-intubating) LMA (also available in sizes 3, 4, and 5) is £9 (Intavent-Orthofix, personal communication).

CLINICAL BOTTOM LINE

There is reasonable evidence that the ILMA can be inserted with as much success as a standard LMA with the additional advantage of probable subsequent successful tracheal intubation if necessary. Individual practitioners may find the cost prohibitively expensive and the practical considerations of sterilisation overburdening. However, single use versions are expected to be significantly more affordable and should be available soon. For prehospital care practitioners or systems that regularly encounter difficult airways in patients anaesthetised or with reduced levels of consciousness, the ILMA is a useful rescue ventilation and primary airway management device that could be carried as an alternative to the standard LMA.

Funding: this work was supported by the MAGPAS Research Programme.

Conflicts of interest: none declared.

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