The intubating laryngeal mask airway compared with direct laryngoscopy

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We have compared the ability of naive intubators to intubate the trachea using a laryngoscope and an intubating laryngeal mask airway (ILMA) after receiving basic training, in a randomized, prospective, crossover study in 60 patients. Ventilation of the lungs via the ILMA was also compared with ventilation with a face mask. There was no significant difference in successful intubation between the techniques (38 of 89 with the ILMA and 33 of 93 with direct laryngoscopy; ns). In patients in whom participants failed in their intubation attempts with the ILMA, investigators achieved success in 89% (16 of 18). Satisfactory ventilation was more common with the ILMA (50 of 51) than with the face mask (43 of 60) (P=0.0001). A total of 98% (89 of 91) of ILMA were inserted successfully, with a mean insertion time of 19.6 s, and 78% (69/89) of these insertions were achieved in less than 26 s. The ILMA may be useful for emergency oxygenation and ventilation, but these results do not support its use for intubation by those not trained in advanced airway management and ILMA use.

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Any health worker may be called upon in an emergency to manage the airway of a patient needing ventilatory support. The 1998 European Resuscitation Council guidelines state that tracheal intubation is the gold standard for securing the airway and providing oxygenation and ventilation in this setting.1 The laryngeal mask airway (LMA) offers an alternative and has been proposed as a first-line device to secure the airway in the resuscitation situation.1

Studies comparing learning curves for LMA insertion with direct laryngoscopy and intubation have shown that those inexperienced with intubation learn more quickly to insert an LMA and ventilate the lungs than they learn to intubate using a laryngoscope.2 The success rate in securing the airway was higher and time to achieve adequate ventilation was significantly reduced in the LMA groups.2 However, the LMA does not prevent aspiration, inflation pressures should not exceed 20 cm H2O, and it does not allow optimal techniques of cardiopulmonary resuscitation.4

A recent study showed that nurses achieve a higher rate of successful intubation using an LMA as a conduit compared with direct laryngoscopy.4 The LMA, however, admits a cuffed tube with a maximum internal diameter of only 6 mm, and the length of the standard tube may not be sufficient for its cuff to pass through the LMA.5 Additionally, intubation success in this study was only 60%.4

A new device, the intubating laryngeal mask airway (ILMA) (Intavent), is now available.6 When the ILMA is in place, as with the original LMA, ventilation of the lungs can be achieved. It can also be used as a conduit for a specially designed tracheal tube of up to 8 mm internal diameter.78 Intubation via the ILMA is a blind technique and as such intubation success may not depend on operator experience. The success rate for intubation via the ILMA has been estimated as 93% in a recent study.5 Even patients with difficult airways may be intubated with the aid of an ILMA.9

We conducted a prospective, randomized, crossover study to assess if health workers inexperienced at advanced airway management have a greater chance of successful intubation when using an intubating laryngeal mask compared with a laryngoscope. We also sought to determine if they had a higher rate of successful ILMA insertion and ventilation compared with face mask ventilation.

Subjects and methods

After obtaining approval from the Local Ethics Committee, health workers (doctors, nurses and medical students) with no intubating experience were asked to participate. Before commencing the study, each participant underwent a standardized training programme on ILMA insertion and direct laryngoscopy. Instruction was given using airway
management training manikin (Laerdal) practice and demonstration on anaesthetized patients. Training was provided by the investigators and covered some of the difficulties encountered with each technique. Participants were considered ready when they had achieved two successful intubations with each technique on a manikin. Before recruiting patients, we performed a pilot study with five airway management training manikins and 10 participants, who were then excluded from the patient limb of the study. Participants were involved with a maximum of five patients and were asked to complete a questionnaire at the end of the study. Investigators in the study were anaesthetists who had already gained clinical experience with the ILMA.

Subjects were adult patients undergoing elective surgery with no significant co-morbidity in whom difficult intubation was not anticipated. No subject had a Mallampati score of 4, a sternomental distance less than 13 cm, a thyromental distance less than 6 cm or an inter-incisor gap less than 3 cm. Sixty patients gave informed consent and were recruited for the study. After induction of anaesthesia, hyperventilation with 100% oxygen and administration of a non-depolarizing neuromuscular blocking agent, participants were invited to commence. Each participant attempted to intubate the trachea in up to five different patients using both a laryngoscope and an ILMA on each attempt of a non-depolarizing neuromuscular blocking agent, which was not significantly less than that achieved with the ILMA ($P=0.02$, Fisher’s exact test). Mean time to ILMA insertion was 9.26 s and all insertions were accomplished in less than 22 s.

In the patient limb of the study, participants succeeded in 98% (89 of 91) of ILMA insertions and 43% (38/89) of intubation attempts via the ILMA. Of the intubation attempts using direct laryngoscopy, 35% (33 of 93) were successful, which was significantly lower than the ILMA results (ns, chi-square Yates’ corrected). Satisfactory ventilation through the ILMA was 98% (50 of 51) compared with 72% (43 of 60) when a face mask was used. This difference was statistically significant ($P=0.0001$, Fisher’s exact test). Where participants failed at both intubation attempts using an ILMA, an investigator then tried and the success rate was 89% (16 of 18), significantly higher than that achieved by participants ($P=0.0005$, Fisher’s exact test). Mean time to ILMA insertion was 19.58 s and 78% of attempts took less than 26 s.

In the questionnaires, most participants indicated that they found learning ILMA insertion easier than learning direct laryngoscopy. The greatest difficulties encountered using the ILMA were inserting it beyond the patient’s teeth and recognizing by feel when the tracheal tube was passing into the oesophagus rather than the trachea. Their major concern with direct laryngoscopy was causing trauma.

Discussion

In the manufacturer’s instruction manual for the ILMA, practice on intubation training manikins is recommended. Indeed, a previous study has suggested that manikin-only training in the emergency technique for LMA insertion is as effective as live patient training. The results from the manikin limb of our study, both in terms of ILMA insertion and intubation, were very different from those obtained in...
patients. For the ILMA, practice on currently available manikins may not represent optimal training for tracheal intubation of patients.

While participants were not very successful using the ILMA in patients, the vast majority of ILMA insertions were successful and ventilation with the ILMA was superior to that with the face mask. Where a health worker has used an ILMA to facilitate ventilation, an experienced airway practitioner, on arriving, could intubate without removing the ILMA. This could save time, decrease the incidence of hypoxia and the need for neck manipulation. Intubation conditions are not always ideal in acute resuscitations, and where trauma has occurred cervical spine injury must always be considered. Direct laryngoscopy is not straightforward or without hazard in this setting. ILMA insertion does not require movement of the cervical spine, and impaired vision caused by blood or secretions should not alter success. Additionally, if there is a leak when the ILMA is in place, this can reportedly be diminished by manipulation of the handle of the ILMA. This is in agreement with our limited experience. There is no equivalent simple manoeuvre which allows minimization of leak with the LMA.

An important question remains as to why intubation via the ILMA was more successful in experienced hands when it was a blind technique and when the ILMA was well positioned by participants. Our observations in this study suggest that there are two main reasons: (1) those inexperienced with advanced airway management, and ILMA use in particular, do not appear to recognize the subtle resistance encountered when the tube passes into the oesophagus; and (2) even when participants felt that the tracheal tube was not passing into the larynx, they did not always manipulate the ILMA appropriately to increase their chance of success.

Before recommending the ILMA as a suitable device for resuscitation, its performance should be assessed against that of the standard LMA.

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