Comparison of laryngeal mask and intubating laryngeal mask insertion by the naïve intubator

A. Choyce1*, M. S. Avidan1, C. Patel1, A. Harvey1, C. Timberlake1, N. McNeillis1 and E. Glucksman2

1Department of Anaesthesia and 2Department of Accident and Emergency, King’s College Hospital, Denmark Hill, London SE5 9RS, UK

*Corresponding author

Seventy-five inexperienced participants were timed inserting the laryngeal mask airway (LMA) and the intubating laryngeal mask (ILM) in one of five cadavers. Adequacy of ventilation was assessed on a three-point scale depending on chest expansion and air leak. Participants were also asked to intubate the trachea via the ILM. The ILM was inserted faster than the LMA (P<0.05) with a greater proportion achieving adequate ventilation after their first attempt (P<0.05). Tracheal intubation via the ILM was completed successfully by 67% (52 of 75) of participants. In a questionnaire, participants stated that the ILM was easier to use and the preferred device in an emergency. The results suggest that inexperienced practitioners should use the ILM rather than the LMA for emergency ventilation.

Br J Anaesth 2000; 84: 103–5

Keywords: intubation tracheal; intubation tracheal, training; equipment, masks anaesthesia

Accepted for publication: August 31, 1999

Studies have shown that unskilled personnel insert the laryngeal mask airway (LMA) more rapidly and reliably than a tracheal tube1 and that it provides better ventilation than a face mask.2 The 1998 European Resuscitation Council guidelines for adult advanced life support state that the tracheal tube remains the gold standard for securing the airway but that the LMA offers an alternative.3

A new device is now available, the intubating laryngeal mask (ILM). This is a modified form of the LMA designed as a conduit for tracheal intubation. The success rate for intubation via the ILM has been estimated at 93%.4 But in the hands of those inexperienced in advanced airway management, the ILM failed to increase the chance of successful tracheal intubation compared with direct laryngoscopy.5 The same study showed that in common with the LMA, ventilation with the ILM was superior to ventilation with a face mask.

During resuscitation, the ILM can be inserted by a non-anaesthetist and used to ventilate the patient’s lungs until an experienced airway practitioner arrives. Valuable time could be saved if the tracheal tube was then passed through the ILM, circumventing the need for direct laryngoscopy under difficult conditions. In this study, we have compared the ILM with the LMA in a simulated resuscitation context, where those managing the airway were not trained in advanced airway management.

Participants and results

Participants in the study were 75 medical students without anaesthetic experience. The Local Ethics Committee approved the study and informed consent was obtained from relatives of five recently deceased cadavers. Investigators were anaesthetists with clinical experience of both devices. Participants were trained to insert both devices on the airway management training manikin (Laerdal) and through demonstration on a cadaver. Participants were considered trained when they achieved two sequential successful manikin insertions with each device.

Each participant then inserted both devices, one immediately after the other, in a random sequence (after the toss of a coin) into a single cadaver placed in the supine position with the head supported by the equivalent of a small pillow. A size 4 device was used for female cadavers and a size 5 for males. To standardize cuff inflation volume, the recommended maximum was used. The time taken from first handling the device to insertion and attaching a self-inflating bag was recorded. Ventilation was then attempted and graded by two investigators as either poor (large leak, minimal or no ventilation), moderate (some leak but adequate ventilation) or good (minimal or no leak and adequate ventilation). Adequate ventilation was taken as visible chest expansion. If a participant failed to achieve adequate ventilation (i.e. moderate or good) then a second and final attempt at insertion was allowed.
Each participant then attempted tracheal intubation with an 8-mm Euromedical ILM tracheal tube using the ILM they had sited as a conduit. Two investigators assessed success at intubation by observation and auscultation of the chest. One investigator, using the same ILM placement, repeated the attempt at intubation. Finally, participants completed a questionnaire assessing their views on the two devices.

Data were analysed on an AEC P300 personal computer using Analyse-It for Microsoft Excel from Analyse-It Software Ltd. The Wilcoxon rank sum test was used to compare the time to insertion of each device. Fisher’s exact test was used to compare adequacy of ventilation and evaluate participants’ responses to the questionnaire. $P<0.05$ was regarded as significant.

Figure 1 shows box and whisker plots for time to insertion at the first attempt with each device. The ILM was inserted significantly faster than the LMA ($P<0.05$). The median reduction in time from first handling the device to insertion and attachment of a self-inflating bag was 3.5 s (95% confidence interval (CI) 1.5–6 s).

The likelihood of adequate ventilation after first insertion of the ILM was 92% (69 of 75) compared with 76% (57 of 75) with the LMA. This 16% difference was statistically significant ($P<0.05$, 95% CI 4.5–27.5%). A comparison of ventilation was made between the devices after one or, if indicated, two attempts at insertion. The likelihood of adequate ventilation (moderate or good) with the ILM was 89% (72 of 81) compared with 71% (65 of 91) with the LMA. This 18% difference was statistically significant ($P<0.05$, 95% CI 5.9–29.0%). Similarly, the likelihood of good as opposed to moderate or poor ventilation with the ILM was 58% (47 of 81) compared with 30% (27 of 91) with the LMA. This 28% difference was statistically significant ($P<0.05$, 95% CI 14.1–42.6%). When asked to attempt tracheal intubation via the ILM, this was completed successfully by 67% (52 of 75) of participants. The attending investigator achieved 95% (71 of 75) success.

All but three participants completed the questionnaire.

(1) Which device did you find easier to use? Forty-four said the ILM; eight the LMA ($P<0.05$); and 20 both said the same.

(2) Would you feel confident using these devices in an emergency situation? ILM: 64 yes; eight no. LMA: 53 yes; 19 no.

(3) Offered a choice of device in an emergency, which device would you choose? ILM 53; LMA 17 ($P<0.05$); two said either.

**Comment**

We have shown that the ILM was inserted significantly faster than the LMA in the hands of the naive intubator. A reduction in the median insertion time of 3.5 s, although statistically significant, appears to have limited clinical relevance. However, we have shown additional advantages of the ILM; it provided superior ventilation and was the preferred device among participants.

Unlike intubation of the trachea, the technique of LMA insertion is easily taught to nurses, paramedics and doctors. This has led to the suggestion that the LMA should be used as a first-line airway adjunct for those who do not have the skill to intubate the trachea. Our results suggest that the ILM may be more useful than the LMA in emergency resuscitation. But data from this and a previous study do not support the use of the ILM as a conduit for tracheal intubation by the non-anaesthetist. However, the results of both studies strongly suggest that inexperienced practitioners may use the ILM for ventilation.

Use of the ILM in the management of the difficult airway and during manual in-line neck immobilization shows that its role in anaesthetic practice is evolving. Experience of tracheal intubation with this device in manikins has been shown to be a poor predictor of success in patients. We accept the limitations of performing this study on a relatively small number of cadavers but our results have led us to undertake a similar study on anaesthetized patients. If anaesthetists are to gain the experience necessary to achieve a high success rate at intubation with the ILM, it may be prudent to obtain it on cadavers before using it on anaesthetized patients.

**Acknowledgements**

Intavent Ltd provided the ILMs used in this study. We thank Mrs E. Packham (relative liaison officer at King’s College Hospital) for gaining consent from the relatives of the deceased.

**References**


Comparison of the LMA with the ILM

5 Avidan MS, Harvey A, Chitkara N, Ponte J. The intubating laryngeal mask airway compared with direct laryngoscopy. Br J Anaesth 1999; 83: 615–17
6 Branthwaite MA. An unexpected complication of the intubating laryngeal mask. Anaesthesia 1999; 54:166–7