intubating laryngeal mask into the trachea, the connector is detached, the intubating laryngeal mask removed, leaving the tracheal tube in place. The connector is then re-attached to the tube, and the connector can be fixed to the tube either using a super-glue or a string.

Takashi Asai MD PhD
Moriguchi City
Osaka, Japan

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Intubation with the LMA

To the Editor:
Joo and Rose's[1] use of the intubating LMA for difficult airways may be a safe alternative for patients who dread awake intubation, or for those who may develop acute upper airway obstruction after nerve blocks or topical anaesthesia.[2]

The effect of the intubating LMA on tracheal tube curvature for different 8 mm tubes at 25 and 37°C was reported by Brain *et al*[3] but did not mention Joo and Rose's innovation of introducing a PCV tube with its concavity down as it enters the LMA.

Joo and Rose elected to intubate the trachea for airway management of the three difficult airways, although ventilation was achieved with the intubating LMA, the aspiration risk was low, and there was no contraindication to a conventional or flexible LMA . The use of an LMA would also have been consistent with Benumof's modification of the ASA Difficult Airway Algorithm.[4] Only in one patient is a reason offered for intubation. Do "difficult airways" require intubation if the airway can be managed safely with an LMA? The simple elegance of the LMA is that it allows the separation of airway priorities: effective ventilation and airway protection. If the risk of aspiration is 1: 10,000 in elective ASA I and II patients for traditional airway management or LMA,[5] and the total lung compliance and periglottic anatomy are normal, does a difficult intubation preclude elective use of properly functioning LMA? The LMA compels us to define criteria for tracheal intubation.

Michael Beriault MD
Calgary, Alberta

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REPLY:

We believe that the angle of exit of the tracheal tube from the intubating laryngeal mask-airway (ILMA) is important not only in the success rate but possibly on post-operative sore throat. We have had high success rate (97%) in a randomized controlled study using this method.[1]

Dr. Beriault's comment on the decision to intubate in the absence of aspiration risk or contraindication to LMA is cogent. The reasons for intubation in the second and third patients were subjective: the possibility of large blood loss and prolonged surgery suggested that tracheal intubation might be beneficial. However, we recognize that the LMA has been advocated as an option for patients with difficult airways if surgery is peripheral and short and when access to the airway is not compromised.[2] There is no evidence that the use of the LMA is any safer than tracheal intubation.

The other option in the second and third patients was to leave the ILMA as the primary airway for the surgery without tracheal intubation. However, we were concerned about possible injury to the pharyngeal mucosa after prolonged use, dental damage if the patient bit on *the stainless steel reinforced ILMA upon awakening and the lack of studies on the reliability of the ILMA as a primary airway, especially for surgery of long duration.*

In conclusion, as Dr Beriault stated, the conventional LMA is an option for patients with difficult airways and if we follow the example set by our British colleagues, it is an option we should be examining more often.

Hwan S. Joo MD FRCPC
D.K. Rose MD FRCPC
Toronto, Ontario

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Acute causes of circulatory collapse and neurologic dysfunction after trauma

To the Editor:

The management of patients with multiple trauma is a challenging and formidable task. Two of the commonest problems seen in patients with serious trauma are shock and neurologic dysfunction. As a rule, multiple causes are present, and an exhaustive search for all of them is important. For timely identification of the etiologies, I have devised the following acronyms: C.H.E.S.T. T.R.A.U.M.A. for shock or circulatory collapse:

- Cardiac contusion
- Haemothorax
- Embolism (air, fat)
- Spinal cord injury
- Tamponade
- Tension pneumothorax
- Rupture of the heart
- Aortic injury
- Uncorrected blood and fluid loss
- Myocardial ischaemia, arrhythmias, injury
- Adrenal insufficiency, anaphylaxis, acute severe brain injury, metabolic causes, etc.

H.E.A.D.A.C.H.E. for neurologic dysfunction after trauma:

- Haematoma
- Elevated intracranial pressure
- Air or fat embolism
- Diffuse axonal injury
- Alcohol, drugs, diabetes, hypothermia, thyroidism, metabolic causes, etc.
- Concussion
- Hypoxia or hypoperfusion of the brain from hypotension or cerebrovascular insufficiency
- Epilepsy

Note that some of the conditions could precede and/or follow the traumatic event.

Anthony M.-H. Ho MD MSC FRCPC
Hamilton, Ontario

Erratum

Please note, a correction in the appendix of the article "Volume kinetics of Ringer's solution and dextran 3% during induction of spinal anaesthesia for Caesarean section". Published in the May issue of Can J Anaesth 1998; 45: 443–51.

Appendix

The one-volume fluid space model is described by the following differential equation:

$$dv/dt = k_i - k_b - k_r \frac{(v-V)}{V} \qquad \text{[Eqn. 1]}$$

which is solved as a monoexponential solution. Before induction of anaesthesia, it is

$$w(t)= \frac{(k_i - k_b)}{k_r} (1-e^{-kr\ t/V}) \qquad 0 \le t \le t_1 \qquad \text{[Eqn. 2]}$$

and after (a) induction

$$w_a(t) = (w_1 (t) - \frac{k_i - k_b)}{k_r} e^{-kr (t-t1)/(V-\Delta V)} + \frac{k_i - k_b}{k_r} \quad t_1 \le t \le \infty \ \text{[Eqn. 3]}$$

where w(t) is the dilution $(v(t)-V)/V$ and ΔV is the change in baseline (target) volume induced by the spinal anaesthesia. k_r is calculated from the measured urine excretion and has different values during and after the induction of the anaesthesia.

The following system of differential equations describes the situation in the two-volume fluid space model:

$$\frac{dv1}{dt} = k_i - k_b - k_r \frac{(v_1 - V_1)}{V_1} - k_t \left[\frac{(v_1 - V_1)}{V_1} - \frac{(v_2 - V_2)}{V_2}\right] \qquad \text{[Eqn. 4]}$$

$$\frac{dv2}{dt} = k_t \left[\frac{(v_1 - V_1)}{V_1} - \frac{(v_2 - V_2)}{V_2}\right] \qquad \text{[Eqn. 5]}$$

The solution of the two-volume model, [Eqn. 4] and [Eqn. 5], can be presented in different ways. Both an analytical solution[7] and a matrix solution[9] have been presented previously. As with the one-volume model,