

Intermittent positive pressure ventilation: endotracheal tube vs laryngeal mask airway?

Intermittent positive pressure ventilation was traditionally provided through an endotracheal tube, but indications for endotracheal tube placement are quite separate from the indications for intermittent positive pressure ventilation. The laryngeal mask airway is widely used for intermittent positive pressure ventilation, spontaneous breathing techniques and management of the difficult airway. This article compares the provision of intermittent positive pressure ventilation through an endotracheal tube *vs* a laryngeal mask airway.

The generic advantages of intermittent positive pressure ventilation include controlled minute volumes, carbon dioxide control, reduced metabolic energy expenditure and faster recovery as a result of controlled removal of anaesthetic gases.

Using an endotracheal tube

The indications for intubation are beyond the scope of this article, but in such cases use of a laryngeal mask airway for intermittent positive pressure ventilation is inappropriate. However, in cases where use of a laryngeal mask airway is appropriate, the advantages of using an endotracheal tube for intermittent positive pressure ventilation are fully protected airway throughout the procedure, and better control of ventilation in patients needing high inflation pressures to maintain gas exchange.

The disadvantages of using endotracheal tube intermittent positive pressure ventilation in cases where laryngeal mask airway intermittent positive pressure ventilation is also appropriate relate to: intubation (side effects of drugs, cervical spine compromise, cardiovascular instability, raised intracranial and intraocular pressure, dental damage,

oesophageal intubation, failed intubation, endobronchial intubation, laryngo-pharyngo-tracheal trauma); maintenance (deeper anaesthesia required +/- muscle relaxation to tolerate endotracheal tube, awareness); extubation (cardiovascular instability, increased intracranial and intraocular pressure, cough, laryngospasm, desaturation, aspiration) and postoperative (slower recovery as a result of a deeper plane of anaesthesia, sore throat).

Using a laryngeal mask airway

Laryngeal mask airways are commonly used for intermittent positive pressure ventilation (Verghese and Brimacombe, 1996). The benefits of laryngeal mask airway *vs* endotracheal tube intermittent positive pressure ventilation in appropriate patients are: cardiovascular stability at induction and emergence, reduced cervical spine movement, reduced dental damage, minimal intracranial and intraocular pressure increase, less anaesthetic and muscle relaxant required to tolerate laryngeal mask airway intermittent positive pressure ventilation, less oxygen desaturation, less coughing on emergence in adults and children (Ferrari and Goudsouzian, 1995), and less sore throat.

Disadvantages of using a laryngeal mask airway for intermittent positive pressure ventilation lie in the fact that this is not a definitive airway. There is increased risk of gastric insufflation of air if high inflation pressures overcome the cuff seal. Inflation pressures >17 cmH₂O put children at risk (Wahlen et al, 2004). In adults at 30 cmH₂O insufflation occurs in 35.4% (Devitt et al, 1994). Using the largest appropriate laryngeal mask airway size gives a better cuff seal (Asai et al, 1999). Regurgitation into the oesophagus is more common with laryngeal mask airway intermittent positive pressure ventilation than using an endotracheal tube (Valentine et al, 1994), which may be because of increased gastric insufflation. The theoretical risk of pulmonary aspiration is higher in laryngeal mask airway intermittent positive pressure ventilation techniques, as a result of increased regurgitation into the oesophagus and imperfect airway protection than with an endotracheal tube. The studies

above which evidence gastric insufflation and regurgitation during laryngeal mask airway intermittent positive pressure ventilation use had no aspiration episodes but, anecdotally, most practitioners are aware of cases of aspiration when a laryngeal mask airway was used. A survey found an incidence of 1 in 11 910 laryngeal mask airway anaesthetics (0.009%), and a low rate of other critical incidents (0.14–0.16%) (Verghese and Brimacombe, 1996).

Conclusions

Laryngeal mask airways are not appropriate for all situations requiring intermittent positive pressure ventilation, but where they are appropriate, intermittent positive pressure ventilation can be safely provided.

Intubation provides the definitive airway both during endotracheal tube placement and perioperatively. The risk–benefit of endotracheal tube or laryngeal mask airway use must be weighed up. The risk of aspiration and other critical incidents when using a laryngeal mask airway are rare, but because of the number of anaesthetics administered they are a real source of morbidity and mortality. No technique is perfect but must be well justified and performed with due care and expertise. ***BJHM***

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Anaesthetic and critical care dilemmas are coordinated by Dr Pervez Sultan and Dr Kate Adams, Specialist Registrars in Anaesthetics, University College Hospital London

Ideas for future dilemmas can be sent to Rebecca Linssen bjhm@markallengroup.com

Dr Suyogi Jigajinni is Speciality Registrar (ST4) in Anaesthesia and Intensive Care Medicine, Whipps Cross University Hospital, London E11 1NR and **Dr Pervez Sultan** is Speciality Registrar in Anaesthesia and Intensive Care Medicine in the Department of Critical Care, University College Hospital, London

Correspondence to: Dr S Jigajinni