Endotracheal tube or laryngeal mask for airway control during percutaneous dilatational tracheostomy

Percutaneous dilatational tracheostomy is a common procedure in the intensive care unit. It involves bronchoscope-guided tracheal puncture with a needle and guide wire followed by dilatation of the tract and placement of a tracheostomy tube. The bronchoscope helps ensure the puncture is midline and at the correct level in the trachea as well as avoiding serious complications such as perforation of the posterior tracheal wall. Airway maintenance during the procedure is traditionally via an endotracheal tube but studies suggest that using a laryngeal mask and its variants is more beneficial to the patient.

Laryngeal mask is better

The traditional method of airway control during a percutaneous dilatational tracheostomy is to deflate the cuff and withdraw the tube until it lies at the level of the vocal cords, but the tube rests in an unstable position making it vulnerable to accidental extubation. Other problems include tube transection or cuff puncture which leaves the airway unprotected and may make ventilation more difficult, risking hypoxia.

An endotracheal tube obscures the glottis, making it more difficult to determine the level at which the cannula enters the trachea. The laryngeal mask is a supraglottic airway device, which allows bronchoscopic examination to be performed at the laryngeal inlet allowing more accurate identification of the tracheal rings during tracheal puncture without risking accidental extubation or damage to the bronchoscope. The wider lumen of the laryngeal mask also facilitates easier passage of the bronchoscope.

Percutaneous dilatational tracheostomy can result in transient hypercarbia with resultant acidosis and raised intracranial pressure (Reilly et al, 1997). In a comparative randomized prospective study of laryngeal mask *vs* endotracheal tube during percutaneous dilatational tracheostomy using 60 patients Domesci et al (2002) showed a reduced rise in pCO2 and a shorter operative time in the laryngeal mask group. They also noted a greater complication rate in the endotracheal tube group including accidental cuff rupture and extubation, although this was not statistically significant.

The Proseal laryngeal mask has a drain tube at the distal tip to direct gastric content away from the laryngeal inlet if regurgitation occurs. Its deeper mask bowl provides a more effective laryngeal seal allowing ventilation at higher airway pressures. A prospective study of 23 patients showed adequate ventilation and no episodes of tracheal soiling in all patients when using a Proseal laryngeal mask despite airway pressures of up to 35 cmH_2O (Craven et al, 2003).

Endotracheal tube is better

The major concern regarding use of the laryngeal mask as an airway during percutaneous dilatational tracheostomy is loss of a definitive airway and risk of aspiration. In a comparative prospective study of 60 intensive care patients undergoing percutaneous dilatational tracheostomy Ambesh et al (2002) found that 33% of patients in the laryngeal mask group suffered potentially catastrophic complications including loss of airway and inadequate ventilation leading to hypoxia and regurgitation. In contrast, the endotracheal tube group suffered only 3.3% accidental extubation and 6.6% incidence of tube puncture. They felt that, despite technical difficulties, using an endotracheal tube during percutaneous dilatational tracheostomy was safer.

Despite gastric aspiration, there is still a potential risk of regurgitation as not all gastric contents may be emptied. Using a Proseal laryngeal mask for percutaneous dilatational tracheostomies, Craven et al (2003) noted gastric fluid in the drain tube in two out of 23 patients despite starvation and gastric emptying. Domesci et al (2002) highlighted the problems of inserting the laryngeal mask to provide an adequate seal for ventilation. This is a concern with the use of the laryngeal mask as a secure airway is removed during changeover of airway device, in a group of patients that are at a high risk of difficult intubation (Beiderlinden and Eikermann, 2007). Also an endotracheal tube can be life saving in complications that may arise during percutaneous dilatational tracheostomy such as posterior wall perforation or excessive bleeding.

Not all critical care patients are suitable for use of the laryngeal mask. Patients with poorly compliant lungs in whom airway pressures are over 30 cmH_2O are less likely to attain an adequate seal for ventilation, risking hypoxia and gastric insufflation.

Conclusions

Although there are certain claimed advantages to the use of laryngeal mask in percutaneous dilatational tracheostomy, there is still some concern regarding the change of airway in this critically ill group of patients. To give a clearer picture regarding the safety and reliability of the laryngeal mask over endotracheal tube for airway control during percutaneous dilatational tracheostomy more randomized prospective comparative studies are needed. **BJHM**

Dr Nadeem Sabir *is Consultant Anaesthetist and* **Dr David Vaughan** *is Consultant Anaesthetist in the Department of Anaesthetics, Northwick Park Hospital, Harrow, Middlesex HA1 3UJ*

Correspondence to: Dr N Sabir

Ambesh SP, Sinha PK, Tripathi M, Matreja P (2002) Laryngeal mask airway vs endotracheal tube to facilitate bedside percutaneous tracheostomy in critically ill patients: a prospective comparative study. *J Postgrad Med* **48:** 11–15

Beiderlinden M, Eikermann M (2007) The laryngeal mask airway for airway management during percutaneous tracheostomy: everything should be made as simple as possible but not simpler. *Anesth Analg* **104**(3): 743–4

Craven RM, Laver SR, Cook TM, Nolan JP (2003) Use of the Pro-Seal LMA facilitates percutaneous dilatational tracheostomy. *Can J Anaesth* **50:** 718–20

Domesci L, Yilmaz M, Gurpinar F, Ramazanoglu A (2002) The use of laryngeal mask airway as an alternative to the endotracheal tube during percutaneous dilatational tracheostomy. *Intensive Care Med* **28:** 63–7

Reilly PM, Anderson HL, Sing RF et al (1997) Occult hypercarbia. An unrecognised phenomenon during percutaneous endoscopic tracheostomy. *Chest* **107:** 1760–3

Anaesthetic and critical care dilemmas are coordinated by Dr John Orr and Dr Annie Hunningher, Research Fellows at the Centre for Anaesthesia, UCL, London Ideas for future dilemmas can be sent to Rebecca Linssen bjhm@markallengroup.com