

Are supraglottic airways a safe alternative to tracheal intubation for laparoscopic surgery?

Laparoscopic surgery is widely used for a range of elective and emergency procedures but presents significant challenges to the anaesthetist managing the airway. Compared to laparotomy, laparoscopic surgery reduces wound size, postoperative pain and ileus while improving postoperative respiratory function, allowing earlier mobilization and shorter hospital stays. However, the creation of a pneumoperitoneum has a number of disadvantageous effects on ventilation. Peritoneal insufflation increases airway pressures and ventilation/perfusion mismatch while reducing functional residual capacity and pulmonary compliance. The risk of regurgitation and gastric aspiration is also increased. These effects can be compounded by head-down patient positioning for lower abdominal procedures.

Given these challenges the tracheal tube has been the gold standard for airway management to facilitate ventilation and prevent aspiration in laparoscopic surgery. However, the advent of supraglottic airways and the attendant risks of laryngoscopy and tracheal intubation have challenged this.

The LMA-Classic is a supraglottic airway device that has been used in some centres for laparoscopic procedures since the mid-1990s and has been widely accepted as a safe alternative to tracheal intubation for gynaecological laparoscopy with a very low reported incidence of aspiration (Verghese and Brimacombe, 1996). However, the LMA-Classic is not recommended in obese patients or those with reduced pulmonary compliance as a result of failure of the airway seal at pressures >20 cmH₂O.

The LMA-ProSeal is a newer supraglottic airway which provides a better airway seal around the glottic aperture and permits peak airway pressures of >30 cmH₂O with-

out leak. It is constructed with a drainage tube, parallel to the ventilation tube, designed to lie at the upper oesophageal sphincter, preventing gastric insufflation and permitting drainage of gastric secretions. This device has been compared with tracheal intubation during laparoscopic cholecystectomy and provides equally effective pulmonary ventilation without clinically significant gastric distension (Maltby et al, 2002). However, in this study, four obese patients required crossover from LMA-ProSeal to a tracheal tube to ensure adequate ventilation. The paediatric LMA-ProSeal has comparable ventilatory efficacy with tracheal tubes in elective short laparoscopic procedures (Sinha et al, 2007).

While these studies illustrate the adequacy of ventilation in laparoscopic surgery using the LMA-ProSeal, in some capacities the supraglottic airway may be better than the tracheal tube. A study comparing the frequency of postoperative nausea and vomiting for the LMA-ProSeal and tracheal tube showed that, for the LMA-ProSeal, airway trauma was less frequent, morphine requirements and time spent in the post-anaesthesia care unit were less, and the absolute risks of nausea and vomiting were reduced by 40% (Hohlrieder et al, 2007). Further advantages of supraglottic airways are quicker insertion, reduced haemodynamic responses to airway manipulation, reduced anaesthetic requirement for airway tolerance and less coughing on emergence.

The LMA-Classic and LMA-ProSeal have been directly compared for positive pressure ventilation during laparoscopic cholecystectomy (Lu et al, 2002). Both provided adequate oxygenation, but ventilation was more often suboptimal with the LMA-Classic. Three episodes of failed ventilation with the LMA-Classic were reported, which were subsequently optimized by placing a LMA-ProSeal. They concluded that the LMA-ProSeal is an effective ventilatory device for laparoscopic cholecystectomy but did not recommend the LMA-Classic.

Novel supraglottic airway devices have been introduced but none yet have the evidence base of the LMA-Classic and LMA-

ProSeal. The Cobra Perilaryngeal Airway has been compared with the LMA-Classic in gynaecological laparoscopy, providing similar insertion characteristics and higher airway seal pressures (Galvin et al, 2007). In an observational study the i-Gel, a single use airway device with a non-inflatable cuff and an oesophageal vent, provided mean seal pressures of 30 ± 7 cmH₂O in non-laparoscopic procedures (Richez et al, 2008).

Conclusions

Supraglottic airways, in particular the LMA-ProSeal, are safe alternatives to tracheal intubation for laparoscopic surgery. They allow comparable ventilatory efficacy with a low risk of aspiration while reducing postoperative nausea, vomiting, airway morbidity and analgesic requirements. Their use in the obese population for laparoscopic procedures requires further investigation and is currently controversial. **BJHM**

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