Should patients be manually ventilated during rapid sequence induction of anaesthesia?

Pulmonary aspiration of gastric contents has been recognized as a cause of significant morbidity and mortality during anaesthesia since the classic publication by Mendelson in 1946. The introduction of suxamethonium 5 years later allowed tracheal intubation to be achieved under complete muscle relaxation within 1 minute of induction of anaesthesia. In 1961 Sellick described the use of cricoid pressure to prevent gastric regurgitation.

From these beginnings, the technique of rapid sequence induction developed during the 1960s and 1970s and is now routinely used. Rapid sequence induction is indicated when an empty stomach cannot be guaranteed and in patients at higher risk of gastric regurgitation including emergencies, obstetric patients and patients with symptomatic oesophageal reflux. Although rapid sequence induction represents a standard of care in the UK and may be considered best practice, it is used less widely elsewhere in Europe. However, even in the UK previous surveys of the conduct of rapid sequence induction have found wide variations in practice (Thwaites et al, 1999; Morris and Cook, 2001). Interestingly, neither of these surveys looked at whether or not the lungs were manually ventilated during rapid sequence induction.

Guidelines for the performance of rapid sequence induction have been published by the Difficult Airway Society (www.das.uk.com/guidelines/rsi.html). The technique classically comprises:

1. Optimal preoxygenation of the patient
2. Induction of anaesthesia using a predetermined dose of hypnotic drug followed immediately by suxamethonium to produce complete paralysis of the patient within 60 s
3. Application of cricoid pressure as consciousness is lost
4. Performance of laryngoscopy and tracheal intubation.

Manual ventilation of the lungs with oxygen is only advocated if tracheal intubation fails. A footnote to the Difficult Airway Society guidelines comments that 'gentle facemask ventilation (inspiratory pressure less than 20 cm water) is acceptable to some experienced practitioners whilst waiting for the suxamethonium to work', followed by the question: 'is this reasonable?'. Sellick's original paper stated: 'During cricoid pressure the lungs may be ventilated by intermittent positive pressure without risk of gastric distension'.

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Manual ventilation is needed

The argument for manual ventilation of the lungs during rapid sequence induction is straightforward. A significant proportion of patients will become hypoxaemic during a successful routine rapid sequence induction. High-risk groups include critically ill patients (who may already be hypoxaemic at the onset and whose respiratory effort is insufficient to denitrogenate the lungs adequately during preoxygenation), morbidly obese patients, pregnant patients and children (in whom preoxygenation may not be possible). If tracheal intubation is not achieved in these patients, the failed intubation drill will be called in circumstances of already acute severe hypoxaemia. Proponents of manual ventilation argue that the risk of such hypoxaemia outweighs the unquantifiable potential increased risk of gastric regurgitation and pulmonary aspiration.

Manual ventilation is unnecessary

The argument against manual ventilation of the lungs during rapid sequence induction centres on the potential risk of gastric insufflation, raised intragastric pressure and a concomitant increased propensity to regurgitate. What little evidence there is does not tend to support this view. Manual ventilation via a bag-mask rarely causes insufflation of the stomach at airway pressures below 15 cm water in the absence of cricoid pressure although airway pressures greater than 25 cm water do so in most patients (Ruben et al, 1961). Application of cricoid pressure increases the maximal airway pressure without insufflation of the stomach to about 45 cm water, although it may also make both effective manual ventilation of the lungs and tracheal intubation more difficult (Petito and Russell, 1988).

Conclusions

The risk of developing acute severe hypoxaemia during rapid sequence induction before successful tracheal intubation often outweighs the perceived benefit of avoiding manual ventilation, especially in those at higher risk. Experienced practitioners must consider the risk–benefit in such situations, in whom gentle ventilation of the lungs during rapid sequence induction may be appropriate. Simultaneous use of a head-up rather than a supine posture will increase lung compliance and reduce the risk of gastric regurgitation. If effective manual ventilation of the lungs in patients considered at high risk of acute severe hypoxaemia is difficult to achieve with cricoid pressure applied, the relative risks of halting manual ventilation *vs* continuing to ventilate with reduction or complete release of cricoid pressure must be carefully considered. **BJHM**

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