Should paralysis take place before or after checking facemask ventilation?

General anaesthesia is a triad of analgesia, hypnosis and muscle relaxation. In adults, neuromuscular blockade is usually required to aid endotracheal intubation, after induction of general anaesthesia, once a patient has lost consciousness.

This article focuses on the induction and intubation of patients undergoing elective surgery, with an unanticipated difficult airway, not requiring a rapid sequence induction.

Before induction of anaesthesia, the patient is pre-oxygenated to extend the apnoeic time should trouble arise with facemask ventilation or intubation. Management should follow a structured approach in accordance with the Difficult Airway Society guidelines. Failure to maintain oxygenation during this period can lead to hypoxic brain injury and ultimately death. Thankfully, this is rare, with the 4th National Audit Project defining the incidence as 1 in 22 000 general anaesthesias (Cook et al, 2011).

Facemask ventilation should be checked before paralysis

Historically, the timing of neuromuscular blockade and confirming facemask ventilation was variable. Broomhead et al (2010) found that 57% of anaesthetists favoured checking facemask ventilation before paralysis. The rationale was to ensure that a patient could be ventilated, maintaining oxygenation, should intubation be difficult, and thus avoid the dreaded 'can't intubate, can't oxygenate' scenario. Can't intubate, can't oxygenate is a rare life-threatening anaesthetic emergency that requires the anaesthetist to promptly perform a cricoidthyroidotomy, which has a high failure rate (Cook et al, 2011). Difficult facemask ventilation requires higher pressures and can lead to insufflation of the stomach, increasing the risk of postoperative nausea and vomiting, and the potential for aspiration. Historically, and incorrectly, if ventilation was impossible, neuromuscular blockade would be withheld.

There is increasing evidence that early administration of neuromuscular blockade improves the ability to oxygenate and ventilate a patient under anaesthesia. A large prospective trial by Amathieu et al (2011) found difficult facemask ventilation 'wasn't made worse and in most cases improved with the addition of paralysis'. This is likely to be multifactorial, including minimizing the incidence of laryngospasm and chest wall rigidity.

Facemask ventilation does not need to be checked before paralysis

The Difficult Airway Society released updated guidelines for unanticipated difficult intubation (Frerk et al, 2015), to standardize and improve practice. These recommend early adequate neuromuscular blockade to improve difficult facemask ventilation and intubation, before advancing to the next steps.

In addition, in 2008 sugammadex entered the European market. This was the first agent to completely reverse deep paralysis (immediately following an intubation dose) for rocuronium and vecuronium, by encapsulating the neuromuscular blockade molecule within 90 seconds (European Medicines Agency, 2019). Therefore, if facemask ventilation is impossible after induction with the best conditions (deep anaesthesia and paralysis), then sugammadex may allow a patient to resume spontaneous breathing, depending on which other anaesthetic agents were given at induction.

Suxamethonium is the only neuromuscular blocker with a rapid onset and offset (normally minutes), providing optimal airway conditions. However, it has a significant side-effect profile, including anaphylaxis, malignant hyperthermia and suxamethonium apnoea. Despite this, it remains a viable alternative to the increasingly popular rocuronium–sugammadex combination, which has similar efficacy and fewer side effects but is more expensive.

Conclusions

Guidance advocates the use of early neuromuscular blockade to improve the chances of successful facemask ventilation and intubation, and this is considered the gold standard. Appropriate preoperative assessment, alongside a structured airway plan, in accordance with the Difficult Airway Society guidelines (Frerk et al, 2015), is imperative for maintaining safe anaesthesia. BJHM

Amathieu R, Combes X, Abdi W et al. An algorithm for difficult airway management, modified for modern optical devices (Airtraq laryngoscope; LMA CTrach™): a 2-year prospective validation in patients for elective abdominal, gynecologic, and thyroid surgery. Anesthesiology. 2011 Jan;114(1):25–33. https://doi.org/10.1097/ALN.0b013e318201c44f

Broomhead RH, Marks RJ, Ayton P. Confirmation of the ability to ventilate by facemask before administration of neuromuscular blocker: a non-instrumental piece of information? Br J Anaesth. 2010 Mar;104(3):313–317. https://doi.org/10.1093/bja/aep380

Cook TM, Woodall N, Frerk C; Fourth National Audit Project. Major complications of airway management in the UK: results of the Fourth National Audit Project of the Royal College of Anaesthetists and the Difficult Airway Society. Part 1: Anaesthesia. Br J Anaesth. 2011 May;106(5):617–631. https://doi.org/10.1093/bja/aer058

European Medicines Agency. 2019. Sugammadex product information. (accessed 1 March 2019) https://www.ema.europa.eu/en/documents/product-information/bridion-epar-product-information_en.pdf

Frerk C, Mitchell VS, McNarry AF et al; Difficult Airway Society intubation guidelines working group. Difficult Airway Society 2015 guidelines for management of unanticipated difficult intubation in adults. Br J Anaesth. 2015 Dec;115(6):827–848. https://doi.org/10.1093/bja/aev371

Dr Jagdish Sokhi, ST7 Anaesthesia and Intensive Care Medicine, Department of Anaesthesia, University College London Hospitals NHS Foundation Trust National Hospital for Neurology and Neurosurgery, London WC1N 3BG

Dr Robert John, Consultant, Department of Anaesthesia, University College London Hospitals NHS Foundation Trust National Hospital for Neurology and Neurosurgery, London

Correspondence to: Dr J Sokhi (jagdish.sokhi@nhs.net)

Anaesthetic and critical care dilemmas are coordinated by **Dr Yasser Mandour**, Anaesthetic Registrar (ST7), Royal Free London NHS Foundation Trust, London and **Dr Anna Petsas**, Specialist Registrar in Anaesthesia and Intensive Care, Guy's and St Thomas' Hospital, London

© 2019 MA Healthcare Ltd