Facemask ventilation before neuromuscular blockade?

During induction of elective general anaesthesia and before the placement of an oro-endotracheal tube, intravenous induction agents are administered followed by a neuromuscular blocking agent, which paralyses the vocal cords and skeletal musculature.

Traditional teaching advocates that the anaesthetist checks that facemask ventilation is possible before paralysing the patient. The rationale for this is that if facemask ventilation does not allow adequate oxygenation, the patient can be allowed to wake up as the induction agent wears off, thereby resuming spontaneous respiration.

Current opinion is divided as to whether neuromuscular blocking agents should only be given after demonstrating effective facemask ventilation. This article looks at arguments on either side of the debate.

A neuromuscular blocking agent is needed

There is no standard definition of difficult facemask ventilation. The American Society of Anesthesiologists have defined it as when there is inadequate manual ventilation as a result of 'inadequate mask seal, excessive gas leak or excessive resistance to the ingress or egress of gas'. The largest prospective study of 22 600 manual ventilation attempts by Kheterpal et al (2006) reported an incidence of 1.4% cases of difficult facemask ventilation using a grading scale. Is it not therefore a relatively rare scenario?

Giving neuromuscular blocking agents early may improve facemask ventilation as muscles become more relaxed easing the resistance to the ingress of gas. Warters et al (2011) found that facemask ventilation significantly improved after rocuronium but not with placebo. In some cases, neuromuscular blockade is the treatment when faced with laryngospasm or opioid-induced muscle rigidity that may be causing difficult facemask ventilation in the first place.

Waking patients who are difficult to ventilate might appear logical but is not a realistic option for most, as the induction agent takes a few minutes to wear off. Until then, one has to oxygenate the patient using facemask ventilation until spontaneous respiration recommences.

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A neuromuscular blocking agent is not needed

Goodwin et al (2003) suggested that a relaxed muscle tone does not affect the efficiency of ventilation. They found no difference between inspired and expired tidal volume in 30 patients with normal airways before and after muscle relaxant administration. In light of this, it is reasonable to question the benefit of additionally paralysing the patient before facemask ventilation.

Xue et al (2011) argue that available evidence is not strong enough to answer this question and advocate facemask ventilation. In patients who are initially easy to ventilate neuromuscular blocking agent can be administered without any concerns. However, in those who are initially difficult to ventilate, they suggest laryngoscopy and neuromuscular blocking agent if tracheal intubation is possible. If not, they follow the 'can't intubate can't ventilate' algorithm including laryngeal mask airway insertion.

Ramachandran and Kheterpal (2011) argue that difficult mask ventilation highlights a possible need to deviate from the primary airway management plan. Demonstrating ease of mask ventilation is important for later management.

Fourth National Audit Project

The Fourth National Audit Project of the Royal College of Anaesthetists and Difficult Airway Society looked at the incidence of major complications of airway management in the UK. Cook et al (2011) commented that when faced with the problem of being unable to establish or maintain airway, one of the strategies is appropriate abolition of laryngeal reflexes.

They recommend: 'Where facemask or laryngeal mask anaesthesia is complicated by failed ventilation and increasing hypoxia the anaesthetist should consider early administration of further anaesthetic agent and or a muscle relaxant to exclude and treat laryngospasm', and 'No anaesthetist should allow airway obstruction and hypoxia to develop to the stage where an emergency surgical airway is necessary without having administered a muscle relaxant.'

Conclusions

For most patients, it is probably safe and beneficial to administer neuromuscular blockade before facemask ventilation, but the truly difficult patient in whom inducing muscle paralysis may be detrimental may occasionally catch out the anaesthetist.

The key may be to try and identify these patients with predictors like changes to neck following radiation, male sex, sleep apnoea, Mallampati III/IV or presence of beard (Kheterpal et al, 2009).

If facemask ventilation and intubation are going to be difficult, awake fibreoptic intubation or regional anaesthesia should be considered. Suggamadex at high doses can reverse neuromuscular blocking agents shortly after administration and may be increasingly used in the future. BJHM

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