Should neuromuscular blockers be used for every paediatric intubation?

Induction of anaesthesia and intubation is traditionally achieved using a combination of hypnotic drugs, opioids and neuromuscular blocking drugs. However, in current paediatric practice it is not uncommon to intubate without prior administration of a muscle relaxant (Aouad et al, 2012). With concerns regarding the side effects of suxamethonium and non-depolarizing muscle relaxants, as well as the prolonged duration of the latter, there is support for alternative techniques in facilitating intubation (Meakin, 2006). Current evidence suggests short-acting hypnotic agents and opioids can be used to achieve comparable intubating conditions (Crawford et al, 2005).

Benefits of using neuromuscular blocking drugs

The main advantages of neuromuscular blocking drugs are that they allow tracheal intubation and control of ventilation throughout the operation (Meakin, 2006). Neuromuscular blocking drugs provide ideal intubating conditions, reduce the risk of laryngospasm, help facilitate surgery and ensure paralysis when avoidance of movement is essential. They may increase safety as inadequate neuromuscular blockade could put patients at risk of aspiration or laryngeal morbidity at the time of intubation (Meakin, 2006; Aouad et al, 2012).

As part of the induction regimen, muscle relaxants reduce the amount of anaesthetic agent required, thereby avoiding high concentrations of sevoflurane and the resulting potential for hypotension or epileptiform activity (Aouad et al, 2012). The Association of Paediatric Anaesthetists of Great Britain and Ireland and Difficult Airway Society guidelines state that adequate paralysis should be confirmed in cases of difficulty managing the airway.

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Disadvantages and alternatives

Neuromuscular blocking drugs have a higher incidence of anaphylaxis than alternative agents and are relatively contraindicated in particular groups, e.g. those with a suspected or proven neuromuscular disorder (Aouad et al, 2012). While neuromuscular blocking drugs are considered to optimize intubating conditions, Andel et al (2000) demonstrated a similar incidence of sore throat and hoarseness, potentially reflective of traumatic intubation, in those intubated with and without muscle relaxants.

In some situations paralysis may be undesirable, e.g. in surgeries requiring neuromuscular monitoring (Aouad et al, 2012). From a practical viewpoint, avoidance of muscle relaxants in very short procedures may reduce prolonged waiting and improve case turnover. There may be situations where it is preferable to avoid reversal agents and their associated side effects, e.g. to reduce the risk of nausea and vomiting. Despite limited studies, postoperative residual neuromuscular blockade has been frequently observed in paediatric patients (up to 28%), but resulting complications were uncommon (Ledowski et al, 2015). The cost of both neuromuscular blocking drug and reversal agent is another factor to consider, although this should be balanced against the cost of alternate agents.

These arguments have prompted studies looking into intubating conditions without neuromuscular blockade (Meakin, 2006). Co-administration of propofol 4 mg/kg and remifentanil 3 μg/kg provides excellent or good intubating conditions in infants without bradycardia, hypotension or chest wall rigidity (Crawford et al, 2005). In a systematic review of over 1500 paediatric patients, sevoflurane 8% combined with any one of the following provided comparable intubating conditions to neuromuscular blocking drugs: propofol 2–3 mg/kg, lignocaine 2 mg/kg, remifentanil 1 μg/kg or 50% nitrous oxide with remifentanil 2 μg/kg (Aouad et al, 2012). Failed intubation was reported in three out of nine studies considering sevoflurane induction (incidence 2.3%). Haemodynamic complications were minimal in all groups (Aouad et al, 2012).

Conclusions

With the development of new anaesthetic drugs and changes in practice it is reasonable to question the need for muscle relaxation at induction of paediatric anaesthesia. However, this remains an ongoing debate. With limited studies in this area, particularly in paediatric patients, the authors recommend a balanced approach combining moderate anaesthetic depth with a non-depolarizing muscle relaxant unless contraindicated, to achieve the best intubating conditions (Meakin, 2006). BJHM

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