Tracheal intubation without neuromuscular blocking agents: is there any point?

This issue of the British Journal of Anaesthesia includes an article describing tracheal intubation of children under sevoflurane/alfentanil anaesthesia without any neuromuscular blocking agent.1 The authors demonstrated that the technique is feasible and used Dixon’s up-and-down method to estimate the ED50 of alfentanil for this purpose.2

Method to estimate the ED50 of alfentanil for this purpose. Br J Pharmacol 2009; 158: 1982–95


15 Egan TD, Kern SE, Johnson KB, Pace NL. The pharmacokinetics and pharmacodynamics of propofol in a modified cyclodextrin formulation (Capsisol) versus propofol in a lipid formulation (Diprivan): an electroencephalographic and hemodynamic study in a porcine model. Anesth Analg 2003; 97: 72–9


19 Dutta S, Ebling WF. Emulsion formulation reduces propofol’s dose requirements and enhances safety. Anesthesiology 1997; 87: 1394–405


doi:10.1093/bja/aeq060
requires several minutes to achieve peak effect, and therefore, its optimal use facilitating intubation requires either a larger dose or patience.

In addition to propofol, neuromuscular blocking agent-free facilitation of tracheal intubation has been described with other hypnotics, notably thiopental. However, this provides conditions inferior to those achieved using propofol. Propofol appears to have a singular depressant effect on laryngeal reflexes which also underlies its suitability for facilitating laryngeal mask airway placement.

Why would we want to intubate the trachea without neuromuscular blocking agents? It is important to address this question as if we cannot provide a robust clinical explanation for our choice of drugs and technique, we are then left with the conclusion that this is being performed, principally for the satisfaction of the clinician rather than the benefit of the patient.

Allergy to neuromuscular blocking agents is rare, but real and may be catastrophic. In practice, even where allergy has been convincingly demonstrated, an alternative safe neuromuscular blocking agent, typically vecuronium, can be found. Thus, neuromuscular blocking agent-free facilitation of intubation may be explicable in such circumstances, but it is seldom essential.

Certain neuromuscular disorders alter the clinical pharmacology of neuromuscular blocking agents and may cause difficulties in the choice, dosage, and reversal of the neuromuscular blocker. In such circumstances, neuromuscular blocking agent-free facilitation of tracheal intubation may be logical and has frequently been used, for example, in patients with myasthenia gravis requiring thymectomy.

There are some surgical procedures where paralysis is undesirable, such as certain ENT and neurosurgical procedures and some thyroid surgery where the use of a nerve stimulator to identify nerves or to confirm their integrity is required. For this monitoring to work, the neuromuscular junction must be functional at the time the stimulator is used. This may be achieved by allowing an initial dose of neuromuscular blocking agent to wear off, which can be confirmed with a peripheral nerve stimulator, or by the use of a neuromuscular blocking agent-free technique.

What about short procedures? When a skilled surgeon is undertaking a short procedure without teaching, the duration of action of a neuromuscular blocker may exceed, sometimes by a considerable margin, the operating time. Can the avoidance of neuromuscular blocking agents be justified in this case? Perhaps, but we must be clear about the rationale for making such a choice. For example, gynaecological laparoscopy may safely be performed with the airway managed by laryngeal mask airway rather than tracheal intubation. Further, the availability of sugammadex allows prompt reversal of both rocuronium and vecuronium well before this would be possible using neostigmine and glycopyrrolate. Thus, if a procedure is truly short, there are sound alternatives through choice of equipment or pharmaceutical which allow the avoidance of neuromuscular blocking agent-free intubation.

Is the avoidance of the use of succinylcholine a valid reason? The side-effects of succinylcholine are well described and range from inconvenient to potentially catastrophic. Further, certain patients may not receive succinylcholine because of enzymatic deficiency, neuromuscular disorder, or recent spinal cord injury. All of these cases could be intubated without the use of a neuromuscular blocking agent however, rocuronium is well documented in rapid sequence induction and it seems irrational to avoid it.

Is tracheal intubation without neuromuscular blocking agent as good as that when a neuromuscular blocking agent is used? The answer depends on how you ask the question! Typically, comparisons of intubating conditions with and without neuromuscular blocking agent use the scoring system of Viby-Mogensen and colleagues and combine the categories ‘excellent’ and ‘good’ to define a successful intubation. Such a combination of categories, however, typically hides differences between the techniques which are evident if only ‘excellent’ conditions are considered. Whenever approach to grading is used, avoidance of neuromuscular blocking agent never improves intubating conditions and may cause them to be significantly worse, occasionally with serious consequences. Minor adverse events reported in association with neuromuscular blocking agent-free intubation are more frequent than in patients who receive a neuromuscular blocking agent. Given these, can the technique be defended?

Finally, we are left with whether the question asked in this study is both sensible and appropriately ethical. The up-and-down method adjusts the dose of the study drug according to whether the dose used on the previous patient was successful or not in achieving a predetermined endpoint. In this study, a successful case was the one in which intubating conditions were good or excellent. If they were, then the next patient received a smaller dose of alfentanil. The method therefore hunts for the threshold between success and failure. By doing so, the investigators can be sure that a proportion of the patients will have an intubation that is other than ‘successful’. Is this fair?

The research question that is being addressed in this study is well defined: what is the right dose of alfentanil? We should, however, ask whether the question is an important one. After all, giving alfentanil requires venous access, so the lack of a neuromuscular blocking agent is a definite choice and not simply a matter of venous access. Why bother defining the dose for a technique which may not be clinically important?

In 2010, we are expected to engage in a true dialogue with our patients with informed consent a necessary prelude to clinical intervention. In the broad context of our clinical practice, the use of tracheal intubation without a neuromuscular blocking agent in the absence of a good clinical reason represents substitution of an inferior technique for one with greater efficacy. Anaesthetists should
pause and ask their motives for choosing their technique and whether it justifies the additional risk to their patient.

Conflict of interest
None declared.

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