

Intubation for short procedures

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A challenge for any anaesthetist is intubating a patient for short procedures that last 10 or 15 minutes during a busy list. While most day-case surgery can now be performed using a pharyngeal airway device, certain procedures, such as dental work, laparoscopy, microsurgery, open-eye surgery, ENT and some paediatric procedures, require intubation. Unfortunately, most of the literature focuses on how to achieve a successful, rapid intubation under optimal conditions, without any regard for needing to extubate a spontaneously breathing, awake patient within a few minutes of putting the tube in. Many techniques have been described, all of which are successful in the hands of the person describing the technique, but for everyone else, result in either a coughing, bucking, recently intubated patient, or an apnoeic patient needing half an hour's ventilation post-surgery.

This practical review will attempt to look at the techniques available, with the aims for anaesthesia being:

- Quick intubation;
- Optimal intubating conditions;
- Extubation within 15 minutes;
- No residual paralysis.

Techniques that have been reported

Using neuromuscular blocking agents (NMBA)

The use of short-acting muscle relaxants

Suxamethonium is the ideal agent for rapid intubation under all conditions, producing optimal intubating conditions in less than 90 seconds when used with all the induction agents. Its clinical effect of 5-10 minutes means that it is still widely used for short intubation day-case surgery, but its

side-effect profile is so poor that numerous calls have been made for its withdrawal.^{1,2}

Using combinations of muscle relaxants

Historical attempts to speed up the onset of non-depolarising muscle block by priming awake patients with small doses of rocuronium (0.1 mg/kg) and following this with small doses of atracurium (0.4 mg/kg) led to faster onset time than with atracurium alone, but with a very unpredictable action duration.³

Using small doses of muscle relaxants

Onset time of blockade with NMBA is inversely related to the potency of the agent. The less potent the agent, the more molecules need to be given. As a result, more receptors get blocked quicker, leading to a more rapid onset of paralysis. Recovery from blockade depends on the metabolism of the free drug that has been displaced from receptors. When large numbers of molecules of drug are given, metabolism is slowed and duration of action can become unpredictable. Rocuronium is the least potent non-depolarising muscle relaxant currently available. It has been shown to have a lowest optimal dose of 0.2 mg/kg, which provides good intubating conditions within three minutes, and a return of the first twitch on a train-of-four (TOF) at 15 minutes with a full TOF by 30 minutes.^{4,5,6}

Topicalising the airway

The use of lignocaine, sprayed onto the vocal cords, aids intubation, but may not prevent the coughing experienced once the tube enters the trachea. Patients are often uncomfortable, with a resultant hoarse voice that may persist for a few hours.

Using no muscle relaxants

Intubating with volatiles

Early anaesthesia made use of high doses of inhaled ether to intubate the trachea, a practice that is now used for halothane and sevoflurane. While this is probably the commonest technique used in paediatrics, it is not nearly as effective in adults. The period of induction is longer and potentially more violent than with intravenous agents, and it can take a long time to get a high enough concentration of volatile agent on board to allow for the insertion of an endotracheal tube.

Propofol and opiate techniques

- **Propofol and alfentanil**
This well-described technique has been the quoted technique for intubation without NMBAs since it was first described in the early 1990s. Propofol (2.5 mg/kg) alone improves the quality of intubation when compared to thiopentone, but it only produces optimal intubating conditions in 73% of cases. When alfentanil (20–40 µg/kg) is used with propofol, conditions are optimal in 83–90% of cases. In addition, alfentanil attenuates the haemodynamic responses seen with intubation better than propofol alone.⁷
- **Propofol and remifentanyl**
Propofol aids intubation while remifentanyl, a rapid-onset opiate, has pharmacokinetic principles that make it superior to alfentanil in intubation. This rapid onset means timing of administration is crucial. Remifentanyl must be given after the propofol. A technique using doses of remifentanyl of 2 and 4 µg/kg given 30 seconds after propofol induction produces dose-dependent improvements in intubating conditions that, at 4 µg/kg, are equal to suxamethonium. The period of apnoea produced by these large doses is about 10 minutes. There are some problems associated with this technique. Haemodynamic changes are significant, with a drop in blood pressure between 20–30 % and marked bradycardia. Chest wall rigidity has also been described.⁸

Use of novel reversal agents

Sugammadex

This novel reversal agent, that irreversibly binds rocuronium (95%) and vecuronium (90%), producing reversal of muscle blockade within minutes, may well render the above debate academic. At present, it has not yet been registered in South Africa and the USA, while its cost may limit its use.

Combinations of the above techniques

Combinations of the above techniques make sense, as the benefits from a number of agents can be added to each other without increasing the dose of drug given, resulting in rapid, good intubating conditions and rapid recovery, while reducing the haemodynamic changes.

Comparing the techniques

Post-intubation symptoms of sore throat and hoarseness are more frequent in patients intubated without the use of a muscle relaxant (up to 40% at 24 hours). Intubation conditions are improved by using a muscle relaxant and haemodynamic stability is better when using muscle relaxants, but the risk of recurarisation and residual paralysis remains.⁹

The technique I have personally adopted and use successfully in healthy adults on a daily basis is as follows (all the 2s):

- Propofol 2.0 mg/kg.
- Rocuronium 0.2 mg/kg.
- Wait 30 seconds.
- Remifentanyl 2 µg/kg as a bolus.
- Intubation conditions are good within the next 30 seconds and optimal at one minute.
- Extubation following 1.25 mg neostigmine and 0.2 mg glycopyrrolate is achieved within 15 minutes, while extubation without using reversal agents has been possible at 30 minutes after induction.

Paediatrics

Intubating paediatric patients raises different concerns. Children can easily be intubated under volatile anaesthesia alone with the conditions being better than with propofol and opiates.¹⁰ Due to age and size variations, their pharmacokinetic ability to respond to agents varies greatly and doses of drugs need to be altered accordingly. Doses of propofol below 4 mg/kg do not offer good intubating conditions, whether used with or without opiates.^{11,12} Up to six years, intubation can be easily achieved with 0.3 mg/kg rocuronium, with paralysis lasting around 20 minutes. Above this age needs 90 seconds before intubation, with the effect lasting less than 15 minutes.¹³

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