Poll question:

Do you routinely draw suxamethonium up before elective lists? Yes

No

The Royal College of Anaesthetists recommends to new trainees that suxamethonium is drawn up before a case for use in an emergency [1], which is most likely to be laryngospasm. However the incidence of laryngospasm is just under 1%. In children from 0-3 months this incidence doubles to trebles. In young children with reactive airways this can increase to 10%. In patients undergoing Tonsillectomy + Adenoids the incidence can rise above 25%. The use of LMAs and inexperienced non-paediatric anaesthetists are also associated with an increase in incidence of laryngospasm [2].

A review of the Australian Monitoring Study 189 reports of laryngospasm showed significant morbidity related to laryngospasm. 61% had significant hypoxaemia, bradycardia in 6%, but this increased to 23% in children <1 year. Post-obstructive pulmonary oedema was seen in 4% and aspiration in 3%[3].

A survey of West Midlands anaesthetists in 2004 showed that 26.8% of those responding routinely pre draw up suxamethonium. The more experienced the anaesthetist the less likely they were to routinely pre prepare suxamethonium [4].

The advantage of having suxamethonium pre drawn up reduces the 'decision to delivery time'. This may be very relevant for paediatric practice where doses may need to be calculated pre operatively, the solo anaesthetist and in unfamiliar or distant working environments.

There may however been some risks, which outweigh the benefits of routinely drawing up drugs. The major one is accidental delivery of the drug with the risks of awake paralysis and painful fasciculations as well as the known side effects/adverse reactions to suxamethonium including anaphylaxis, prolonged apnoea and malignant hyperpyrexia. Therefore the true cost of one dose is equal to the actual cost of the drug plus the cost of any complications or untoward outcomes from using that drug. This has been estimated at 20x the original cost of the drug [4].

Whilst pre filled syringes may reduce the wastage of drugs and potentially reduce errors they do not reduce the time to calculate the correct dose in paediatric practice.

Severe laryngospasm is the most common reason for unplanned use of suxamethonium, and the most common cause of upper airway obstruction post extubation. It is important therefore to have a plan for the management of laryngospasm, especially if not pre preparing suxamethonium.

Once laryngospasm has been recognised and other causes of acute airway obstruction ruled out this plan should be put into action. If required help should be called for, especially in the case of the inexperienced anaesthetist.

Any triggering causes should be removed. Consider gentle suctioning to ensure a larynx clear of blood or stomach contents, although this may risk worsening the situation. Ensure any supra glottic component of airway obstruction is removed and apply 100% oxygen via CPAP. Applying a jaw thrust with pressure at 'Larson's Point' or the 'laryngospasm notch' which is located behind the lobule of the pinna, bounded anteriorly by the ascending ramus of the mandible adjacent to the condyle, posteriorly by the mastoid process and superiorly by the base of the skull, may break the laryngospasm [4].

If laryngospasm does not start to rapidly resolve, the options for treatment are deepening anaesthesia with propofol and the use of potent opioid analgesics such as fentanyl and neuromuscular blocking agents.

If electing to deepen anaesthesia, then a fast acting iv agent such as propofol is the ideal agent. Inhalational agents are of limited use in this situation. The recommended dose for propofol is 0.5mg/kg in repeated doses if needed. This may cause the patient to become apnoeic but cardiovascular effects are usually non significant at this dose. If the child does become apnoeic, the laryngospasm has usually settled and manual ventilation can take place. Propofol has been seen to reverse laryngospasm in 75% of cases [2].

If propofol fails then suxamethonium is usually the agent of choice, although it can be used first. Doses from 0.1mg/kg to 2mg/kg have been shown to reverse laryngospam. If no iv access is available then suxamethonium can be given via the intramuscular (im), intraosseus (io). or intralingual (il). route [2].

The im dose is 4mg/kg and should be injected with a needle of sufficient length into the deltoid or lateral quadriceps. The time to full relaxation will take 3-4 minutes but laryngospasm will break within 45 seconds to 1 minute. If this route is used late, when muscle perfusion is poor, then uptake will be variable [2].

The il route is 2mg/kg dose given into the body of the tongue. Full relaxation occurs in 75 seconds although this route has been associated with arrhythmias and requires the removal of CPAP in order to give it and risks the addition of blood into an already compromised airway [2].

The io route may be the most useful in a peri arrest situation as it allows the delivery of other drugs. The dose of suxamethonium is 1mg/kg and in animal models worked within 35 seconds. There may however be a delay in locating and inserting an io needle. The dose for suxamethonium via io is 1mg/kg [2].

Giving suxamethonium to a hypoxic patient may lead to bradycardia and arrest and therefore a dose of iv atropine 20mcg/kg may need to be given with the suxamethonium.

If such a stepwise plan is followed then suxamethonium should rarely be needed un-planned, but it may still be wise for the inexperienced, solo anaesthetist in unfamiliar

surroundings, especially when anaesthetising young children for airway surgery to draw up and calculate the expected doses.

1. https://www.e-lfh.org.uk/e-learning-sessions/rcoa-novice/content/started/theatre.html

2. Laryngospasm in anaesthesia
Gil Gavel, FRCA Robert WM Walker, FRCA
Contin Educ Anaesth Crit Care Pain (2014) 14 (2): 47-51.

3. Qual Saf Health Care. 2005 Jun;14(3):e3.
Crisis management during anaesthesia: laryngospasm.
Visvanathan T1, Kluger MT, Webb RK, Westhorpe RN.

4. Anaesthesia, 2004, 59, pages 211–215 Pre-preparation of succinylcholine: significant waste for questionable benefit. A. M. Gurung et al

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