

# Anaesthesia for appendicectomy in childhood: a survey of practice in Northern Ireland

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## SUMMARY

**A postal questionnaire was sent to all members of the Northern Ireland Society of Anaesthetists to determine current practice in anaesthesia for children with acute appendicitis. Respondents were asked to describe their usual practice in such cases. They were also asked about the occurrence of complications due to the use of suxamethonium, and for their views on the use of rocuronium in such cases. Few major differences in anaesthetic technique were demonstrated. 74% of consultants and 84% of trainees always perform a rapid sequence induction for appendicectomy. However 15% of consultants do not feel that this is necessary. Only 6% of consultants and 6% of trainees would normally use rocuronium, with the majority still preferring suxamethonium. Only 28% of consultants and 20% of trainees see rocuronium as a possible alternative to suxamethonium in these cases, although others expressed increasing concern over the use of suxamethonium in children. There was wide variation in the type of intra-operative and post-operative analgesia prescribed, with less than one third of consultants and trainees using combinations of opioids, local anaesthetics and non-steroidal anti-inflammatory drugs.**

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## INTRODUCTION

In 1993, following an increase in reports of cardiac arrest in children who had been given suxamethonium, the Food and Drug Administration (F.D.A.) in the United States advised the manufacturers of suxamethonium to alter their product information sheets to state that the drug was contraindicated for routine use in children and adolescents. This led to much heated debate in the anaesthetic literature both in North America and in Europe. The F.D.A.'s guideline has since been revoked, but in the U. S. the drug still carries a caution against its routine use in children.

In one month in Coleraine hospital one case of malignant hyperthermia and one of masseter muscle spasm were reported in children who had been given suxamethonium prior to appendicectomy. As a newer muscle relaxant, rocuronium bromide, is available which may allow rapid and safe control of the airway without the use of suxamethonium, I decided to survey the practice of my colleagues in cases of acute appendicitis, with particular interest in their use of suxamethonium.

## METHODS

In July 1995 an anonymous questionnaire was sent to 188 members of the Northern Ireland Society of Anaesthetists (119 consultants and career grades, 69 anaesthetists in training). Respondents were asked to indicate their grade and number of years' experience, and to describe their usual anaesthetic management of a child with acute appendicitis. Included were questions on pre-operative fasting, pre-medication, induction and maintenance agents, airway management, intra-operative and post-operative analgesia.

Respondents were also asked whether they had witnessed any adverse effects due to the use of suxamethonium, and whether they felt that rocuronium is a suitable alternative in appendicectomies.

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## RESULTS

Replies were received from 82 consultants and 35 trainees giving an overall response rate of 62%.

Fifty-four consultants (66%) and 17 trainees (49%) insist on a period of fasting prior to surgery, with times quoted varying from 2 to 8 hours. Apart from analgesia and EMLA cream, pre-medication is rarely prescribed.

Thiopentone is the most commonly used induction agent, favoured by 50 consultants (61%) and 27 trainees (77%). Propofol is the only other commonly used agent. Maintenance of anaesthesia is almost exclusively by volatile agent, with halothane and isoflurane used almost equally. Nine consultants (11%) and two trainees (6%) use enflurane, while one trainee uses a propofol infusion. All respondents intubate children for appendicectomy. Sixty-one consultants (74%) and 30 trainees (86%) always perform some type of rapid induction and intubation, although this is not universal. Some anaesthetists may or may not perform rapid sequence induction, depending on the state of each individual patient, while others never do.

Sixty-four consultants (78%) and 31 trainees (87%) normally use suxamethonium for intubation. Five consultants (6%) and two trainees (6%) use rocuronium, with the remainder using other non-depolarizing relaxants.

Intra-operatively, almost half of consultants who replied give opioid analgesia only. In contrast, trainees tend to use combinations of analgesic drugs more often. Post-operatively however, the differences in the two groups are much less marked, with only a minority of trainees continuing to prescribe non-steroidal anti-inflammatory drugs (NSAIDs) in the post-operative period.

Regarding adverse effects related to the use of suxamethonium in their practice generally, 47 consultants (57%) reported witnessing problems. Prolonged duration of action of the drug ("Scoline apnoea") was the most common (46 cases reported) with malignant hyperthermia next (11 cases). Two consultants reported cardiac arrests. Fewer trainees (11, 31%) have so far seen problems with suxamethonium administration, with the same two events being most commonly reported.

Only 23 consultants (28%) and 7 trainees (20%) feel that rocuronium is a suitable alternative to suxamethonium for children with acute appendicitis. Of the majority that do not, the commonest reason given was lack of experience with the drug, stated by 43 consultants (52%) and nine trainees (26%). Speed of onset and duration of action, especially if faced with a failed intubation, were also common reasons given. When asked for any other comments, eight consultants and five trainees expressed increased concern over the use of suxamethonium, while five consultants commented strongly in favour of its continued use.

## DISCUSSION

Appendicectomy is one of the commonest operations in developed countries, particularly in patients 10-19 years of age.<sup>1</sup> Most anaesthetists will be involved in many such cases during their careers. Traditionally it has been taught that because of the risk of aspiration of gastric contents, rapid sequence induction using suxamethonium is the technique of choice in such cases. This is adhered to by 86% of trainee respondents, but by rather fewer consultants (74%). Children with acute appendicitis have usually been fasting for many hours before surgery, and may have been vomiting. Because of this it may be that the remaining 26% of consultants feel that aspiration of gastric contents is unlikely, and therefore that rapid sequence induction is not always necessary.

The adverse effects associated with suxamethonium are well known, and include asystole, brady-arrhythmias, hyperkalaemia, masseter spasm, malignant hyperthermia and prolonged muscle relaxation. Because of these, some authors have suggested that the routine use of the drug in children be re-evaluated.<sup>2</sup> Of particular concern to anaesthetists are the problems which arise if suxamethonium is given to children with undiagnosed or sub-clinical myopathies.<sup>3</sup> In the past the rare but serious problems with suxamethonium have been outweighed by the need for rapid airway control. The availability of rocuronium bromide may now, however, provide an alternative to the use of suxamethonium.

Rocuronium bromide is a new non-depolarizing muscle relaxant which has been generally available since 1994. It is distinguished from other similar drugs chiefly by its rapid onset of action. Some of the pharmacological properties

TABLE  
*Pharmacological properties and adverse effects of suxamethonium and rocuronium*

	<i>Suxamethonium</i>	<i>Rocuronium</i>
Dose	0.5-2mg/kg	0.6mg/kg
Onset of action	30-45 secs.	60 secs.
Duration	3-5 min.	30-40 min.
Elimination	Metabolism by plasma Pseudocholinesterase <sup>1</sup>	Biliary and renal, largely unchanged
Trigger for malignant hyperthermia <sup>2</sup>	Yes	No <sup>3</sup>
Effect on heart rate	Bradycardia <sup>4</sup>	Tachycardia <sup>5</sup>
Myalgia	Yes	No
Effect in children	Increased dose required	More rapid onset
Anaphylactic reactions	Yes	Very rare
Serum electrolytes	Raises potassium <sup>6</sup>	No effect
Intra-ocular/intra-cranial pressure	Raised	No effect

<sup>1</sup> caution with atypical pseudocholinesterase.

<sup>2</sup> Malignant hyperthermia.

<sup>3</sup> in animal studies.

<sup>4</sup> especially with second dose.

<sup>5</sup> with doses >0.9mg/kg.

<sup>6</sup> caution with burns, renal failure, paraplegia, traumatic muscle denervation.

and adverse effects of both rocuronium and suxamethonium are shown in the Table.

It has been reported that at a dose of 0.6 mg.kg<sup>1</sup> rocuronium produces acceptable intubating conditions 60 seconds after administration.<sup>4</sup> Clinical duration of blockade (time to 25% recovery of twitch height) at this dose is reported to be 30 minutes.<sup>5</sup> Thus rapid-onset neuromuscular blockade of intermediate duration can be achieved without exposing children to the rare but potentially lethal complications of suxamethonium. The major drawback of rocuronium is its duration of action if the patient is impossible to intubate. The incidence of difficult intubation is unknown, although in the general population a figure of 1.5 % has been reported.<sup>6</sup> A recent paper showed that of all reported difficult intubations, 33% were not anticipated, and 20% proved impossible to intubate.<sup>7</sup> This would give

an incidence of failed intubation of 3:1000 in the general population, which is similar to the incidence of some of the adverse effects of suxamethonium. An anticipated difficult intubation would of course be a contraindication to rocuronium, but it could be argued that it would also be a contraindication to suxamethonium. Despite this only 28% of consultants and 20% of trainees feel that the use of rocuronium is acceptable in children with acute appendicitis. Perhaps greater experience with the drug will resolve this apparent discrepancy between published research and clinical practice.

It has been shown that combinations of different types of analgesic drugs are highly effective in relieving post-operative pain.<sup>8</sup> In particular, the value of NSAIDs is well documented, and it would appear that they can be given for up to one

week to otherwise healthy patients with no significant incidence of adverse effects.<sup>9</sup> This view is held by the regional centre for paediatric anaesthesia in Northern Ireland, who strongly advocate the use of analgesic regimens combining opioids, NSAIDs and local anaesthetics wherever possible. Presumably because they have passed through this centre recently, more trainees than consultants use such a regimen intra-operatively (83% vs. 51%). It is surprising, therefore, that post-operatively the balance changes, with only 25% of trainees prescribing NSAIDs in addition to opioids, compared with 32% of consultants. Both these figures are, however, too low to suggest that children are receiving the best possible pain relief after these operations.

Overall it would appear that anaesthetists in Northern Ireland practise a safe if traditional technique for children undergoing appendicectomy. The controversy over the safety of suxamethonium has not swayed most anaesthetists from the opinion that it is still the safest drug to obtain rapid airway control.

Anaesthetists in training tend to use more aggressive analgesic regimens intra-operatively. Post-operatively many anaesthetists could do more to provide better pain relief.

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