

Anaesthesia for the uncooperative child

Lena Tan BMBS MRCP FRCA

George H Meakin MD FRCA

Anaesthetists are frequently required to deal with a child who is uncooperative at induction of anaesthesia. In studies undertaken in the 1990s, one-third of children were found to be distressed at induction while one-quarter required physical restraint.^{1,2} Dealing with an uncooperative child can be distressing for the patient, parents, and health-care workers. Moreover, the stress of a stormy induction can produce postoperative behavioural changes in the child. This article gives an overview of the methods available for preventing and dealing with this problem.

Preoperative anxiety

Few children are uncooperative at induction of anaesthesia unless they are anxious or stressed. In children, stress of hospitalization has been related to five general fears: fear of separation from their parents, fear of the strange hospital environment, fear of painful procedures, fear of the operation itself, or fear of anaesthesia. Alleviating these fears, as described below, forms much of the basis of reducing anxiety and non-compliance at induction of anaesthesia.³

Postoperative behavioural changes

Postoperative behavioural changes related to stressful hospital experiences/induction of anaesthesia include general anxiety, enuresis, night-time crying, and temper tantrums. These changes are usually transient but may persist for up to 1 yr. The incidence is greatest in pre-school children in whom it can be reduced by psychological preparation, premedication, and the support of parents.⁴

Communication

The preoperative visit is both an opportunity to assess the child's fitness for anaesthesia and to provide reassurance to the child and their parents. The content of the interview, body

language, and tone of voice are all important. Some useful strategies that may be used in this situation are listed in Table 1.⁵

Developmental differences

Children react to the stress of anaesthesia and surgery in an age-dependent manner. In addition, a minority of children display abnormal reactions related to behavioural and psychological disorders. A successful plan for induction of anaesthesia must take the following points into account.^{5,6}

Infants

Infants aged <9 months will readily accept parental surrogates and are less likely to experience anxiety on separation from parents.⁴ They respond to soothing voices, gentle rocking, and being held.

One to 3 yr

Separation anxiety is a problem in children of this age group; however, it is less of an issue in the UK as a parent is usually allowed to be present during induction of anaesthesia. Children at this age are more at risk of a stormy induction as they are less likely to understand the proceedings. Fortunately, some do respond to appropriate distraction, for example, with toys and stories.

Three to 6 yr

At this age, children can have concerns about bodily mutilation and may require reassurance. Simple explanations of surgical and anaesthetic procedures are usually effective in reducing anxiety and postoperative behavioural changes. Figures of speech should be avoided as they are likely to be interpreted literally (e.g. if you say you are going to take the child's temperature, they may ask where you are going to put it!) Play therapy is especially useful in this age group.

Key points

Anaesthetists frequently have to cope with a child who is uncooperative at induction of anaesthesia and must be familiar with strategies for preventing and dealing with this problem.

Few children are uncooperative unless they are anxious or stressed.

Psychological and pharmacological interventions aimed at reducing preoperative anxiety can improve compliance at induction and reduce postoperative behavioural changes.

Children with psychological, developmental, or behavioural disorders may be combative or aggressive from the outset and require more extreme measures of sedation or restraint.

It is essential that parents and staff are actively involved with and consent to the preoperative plan for dealing with combative or aggressive patients.

Lena Tan BMBS MRCP FRCA

Paediatric Anaesthetic Fellow
Royal Manchester Children's Hospital
Oxford Road
Manchester M13 9WL
UK

George H Meakin MD FRCA

Senior Lecturer in Paediatric Anaesthesia
University Department of Anaesthesia
Royal Manchester Children's Hospital
Oxford Road
Manchester M13 9WL
UK
Tel: +44 161 701 1263
Fax: +44 161 701 1246
E-mail: george.meakin@manchester.ac.uk
(for correspondence)

doi:10.1093/bjaceaccp/mkq003

Continuing Education in Anaesthesia, Critical Care & Pain | 2010

© The Author [2010]. Published by Oxford University Press on behalf of The Board of Directors of the British Journal of Anaesthesia. All rights reserved. For Permissions, please email: journals.permissions@oxfordjournal.org

Table 1 Strategies for interviewing children before operation⁵

Speak in a quiet, reassuring voice and get down to the child's eye level
Do not be condescending
Do not give the impression that the child's feelings are irrelevant
Do not laugh at the child unless you are sure they are being humorous
Do not tease the child unless you know them
Use age-appropriate language in discussing anaesthetic care with the child
Avoid using terms that may cause alarm or increase anxiety

Seven to 12 yr

Children of this age need more explanation and participation; they need to feel in control. They may benefit from choosing an anaesthetic facemask or being allowed to hold the mask during induction. Play, storybooks, photographs, and videos/DVDs can all be useful.

Adolescence

This group has increased body awareness, independence, and need for privacy. Adolescents may have better coping strategies but are still concerned about pain, awareness, and losing control. Some are mature enough to cope with explanations, but others cannot, despite having an adult appearance. Involving this age group in the anaesthetic plan gives them a sense of control and reduces their anxiety.

Mental disorders

Children with psychological, developmental, or behavioural disorders are frequently fearful and suspicious of strangers making rapport difficult. They are more likely to be aggressive and combative at induction of anaesthesia requiring more extreme measures of sedation, restraint, or both.

Identifying the anxious child

Some factors predicting anxiety and distress in the child at induction of anaesthesia are listed in Table 2. Gender appears to have no influence on preoperative anxiety.

Table 2 Factors predicting child anxiety and distress at induction of anaesthesia^{4,5}

Age	Children between the ages of 1 and 3 are more likely to experience separation anxiety and be distressed/less cooperative at induction of anaesthesia
Temperament	Shy, inhibited, dependent, and/or withdrawn children have higher levels of anxiety and are more likely to exhibit uncooperative/turbulent behaviour at induction
Parental anxiety	Children of anxious parents have higher levels of anxiety at induction of anaesthesia and are more likely to develop postoperative behavioural problems
Previous hospital/theatre experiences	Negative hospital experiences increase child anxiety and reduce cooperation at induction
Negative reaction to vaccination	Predicts non-compliance and a distressed state during induction of anaesthesia

Psychological interventions

Pre-hospital programmes

Tours of the hospital and theatre, videos, leaflets, and interactive books are used with the aim of reducing anxiety. They are based on behavioural modelling and providing the child with coping strategies and knowledge. These programmes have a positive effect on reducing perioperative anxiety; however, their timing can be crucial. If the programme is implemented 5–7 days before surgery in children age over 6 yr, anxiety is lowered; however, this is negated if the programme is implemented only 1 day before surgery.^{4,7} The interventions tend to be more effective in children aged over 4 yr and less effective in children with low levels of sociability, adaptive behaviour, emotionality, and/or high levels of impulsivity. They are also less effective in the children of anxious parents and those who have had previous negative surgical experiences.⁷

Play therapy

This is usually provided by trained play therapists using visual aids such as videos, interactive books, and dolls. Play therapy has to be timed correctly and tailored to the child's temperament, but when done correctly, it generally reduces anxiety. It is particularly useful in young children who have had repeated painful procedures or previous negative anaesthetic experiences. In addition, experienced play therapists can often identify the minority of patients who will benefit from sedative premedication.

Parental presence at induction

In the UK, a parent is usually invited to accompany their child at induction of anaesthesia to eliminate separation anxiety; however, the benefits of this practice have been questioned. Recent randomized studies using adequate sample sizes and appropriate outcome measurement tools concluded that parental presence did not reduce the child's overall anxiety at induction or the incidence of post-operative behavioural problems.⁴ Furthermore, several studies have shown that parental presence can sometimes increase the child's anxiety, as anxious parents may project their own anxieties onto their child. On the other hand, surveys from the 1990s have shown that most parents prefer to be present during induction of

anaesthesia and believe their presence is helpful to the child and to the anaesthetist. Therefore, it should not be surprising that a recent study, which included a parental satisfaction questionnaire, showed that while parental presence did not provide added value in terms of reduced child anxiety, it did improve parental satisfaction with both the separation process and the overall function of the hospital.

The decision to allow parental presence at induction will depend on parental and patient factors, institutional protocols, and the preference of the anaesthetist. Some parents may be so anxious that they decline the invitation to attend induction and other very anxious parents should be gently discouraged from doing so. In either case, another family member may be nominated. In our practice, the parents of infants weighing <5 kg, children with potentially difficult airways, acutely ill children, and those requiring rapid sequence induction are discouraged from attending induction of anaesthesia.

Other interventions at induction

Hypnosis, music, and lighting can be used to provide a calm and soothing environment for the child in the anaesthetic room. However, there is no evidence to show these interventions reliably reduce anxiety levels in children. In our institution, it has been found that distraction methods (blowing bubbles, toys, action books) work best for children undergoing i.v. induction, while engagement with the anaesthetist and the anaesthetic process itself (choosing and handling the face mask, blowing up the 'balloon' etc.) work best with inhalation induction.

Pharmacological interventions

Various drugs have been used as premedication for the uncooperative child. The most commonly used routes are the oral, nasal, and rectal routes in decreasing order of acceptability. Parenteral routes are generally avoided unless an i.v. cannula has previously been sited.

Midazolam

The benzodiazepine drug midazolam is the most commonly used sedative premedicant in UK paediatric anaesthetic practice. It produces excellent anxiolysis at induction of anaesthesia and reduces postoperative behavioural disturbances.⁸ In the recommended doses, it has a minimal effect on recovery times and is suitable for children undergoing either day-case or inpatient surgery.

Following an oral dose of midazolam 0.5 mg kg⁻¹, sedative effects are seen within 5–10 min, the peak effect occurs within 20–30 min and the effect is waning at 45 min. Thus, the timing of administration of midazolam is crucial. Oral midazolam is associated with a bitter taste that is not fully masked by mixing it with fruit juices or syrups. Commercially available syrups tend to be more concentrated and have a more pleasant taste than preparations concocted in the ward environment, which may improve patient acceptance.

Intranasal administration of midazolam 0.2 mg kg⁻¹ requires less patient cooperation and elicits a rapid response, although the burning sensation produced is unpleasant. Sublingual midazolam in a dose of 0.2 mg kg⁻¹ appears to be well tolerated and is effective within 10 min. If parenteral administration is desired and there is an i.v. line *in situ*, midazolam 0.1–0.2 mg kg⁻¹ can be given i.v.⁹

Ketamine

Ketamine is a phencyclidine derivative with anxiolytic, analgesic, and sedative properties. It is highly lipid soluble and rapidly absorbed after i.v., i.m., intranasal, or oral administration. Ketamine has been used successfully as an oral premedicant in doses of 5–8 mg kg⁻¹; onset of sedation occurs in 10–15 min and peaks at 20–25 min.⁹ However, this dose of ketamine may be associated with increased salivation, hyperventilation, random limb movements, hallucinations, and serious emergence reactions, the latter being more likely after short surgical procedures. Children premedicated with ketamine require close observation in a quiet environment where resuscitation equipment is readily available.

Fentanyl

Fentanyl is an opioid analgesic whose effects are mediated via the μ -opioid receptors. It is rapidly absorbed via the transmucosal route and for premedication, it is presented as a pleasant tasting lollipop. The bioavailability by this route is 33%, but it is reduced if the lollipop is chewed or swallowed.⁹ A dose of 15–20 μ g kg⁻¹ produces sedation in 20 min and has a peak effect at 30–45 min. Although it has been shown to be as effective as midazolam, it has unwanted side-effects like vomiting, pruritus, and respiratory depression.⁶

Other drugs

Temazepam is a short-acting benzodiazepine available as an elixir and in a tablet form. The tablet form may be used as an alternative to midazolam in older children undergoing day-case surgery. Both preparations need to be given 1 h before surgery.⁶ The phenothiazine trimeprazine tartrate (Vallergan) has antihistaminergic (H₁), antiemetic, sedative, and antimuscarinic properties and a pleasant taste; however, it is not as effective as midazolam and its use has waned in recent years.

Management strategies for the uncooperative child

From a management perspective, uncooperative children generally fall into one of two groups.⁶ By far, the largest group consists of preschool and young children who have an anxious temperament, anxious parents, or both. These patients may appear cooperative when interviewed in the surgical ward, but then become uncooperative in the anaesthetic room or at induction of anaesthesia. Fortunately, they are usually amenable to reasoning and encouragement possibly backed up by sedative premedication and minimal

restraint. A second and smaller group consists of children who are uncooperative and combative from the outset and will resist any form of intervention. The underlying problems in these children may include neurological disability, developmental delay, behavioural disorders, autism, mental health, or personality problems.¹⁰ In addition to the measures described for dealing with the anxious child, these patients often require more powerful sedative drugs before operation, more active restraint, or both. Both groups have issues related to consent and restraint.

Consent

The law on consent in children varies across the UK. In England and Wales, parental consent is usually sought for operations on a child aged <16 yr, although the child has the right to consent for themselves if they have achieved sufficient understanding and maturity to understand what is proposed (i.e. they are Gillick competent). However, in cases where a competent child has refused or resisted medical treatment, the courts have upheld the right of the parents to consent for the child's treatment up to the age of 18 yr. In Scotland, parents cannot overturn the decision of a competent child to refuse treatment. However, it is likely that the doctors involved in such cases would question the competence of a child who was refusing treatment that was clearly in their best interest.

In England, Wales, and Northern Ireland, parents can consent for operations on children who lack the capacity to consent up to the age of 18 yr. In England and Wales, the clinician can also carry out treatment in best interest of a non-competent child without parental consent up to the age of 18 yr, whereas in Northern Ireland, treatment for a non-competent child can be provided without parental consent if a parent cannot be contacted. In Scotland, 16- and 17-yr-olds who do not have the capacity to consent are treated in the same way as adults who lack capacity and clinicians are allowed to provide treatment to safeguard and promote their health.^{6,11}

Restraint, holding still, and containing

The use of physical restraint (overpowering), holding still (immobilizing), and containing (preventing escape or self-harm) in children raises ethical, legal, and practical problems. In 2003, the Royal College of Nursing produced a guideline on the use of restraining methods in children, the main points of which are summarized in Table 3.¹²

To be most effective, restraining and holding still should be performed by or under the direction of experienced staff and not left to the parents alone. Good technique minimizes the risk of harm to the patient and staff. The degree of restraining, holding still, and containing the patient will vary according to clinical circumstances. In an anxious child or infant, it may be limited to holding a limb still for i.v. cannulation. For an older combative child, more rigorous forms of restraint may be required involving restraining the legs at the hips and knees, holding the arms in extension, and holding the

head. In addition to induction of anaesthesia in highly uncooperative children, restraint may be indicated for combativeness during the excitable phase of inhalation induction anaesthesia and some life-saving emergency manoeuvres. Relative contraindications are lack of consent by parents or staff, failure to exhaust all other techniques, and when crying or high levels of stress in the child is medically inadvisable (e.g. cardiac patients).¹⁰

Strategies for anxious children

Distraction techniques such as books, music, or computer games can be used to calm this group of children. However, if the child is inconsolable, the urgency of the surgery and the patient's best interest have to be taken into account and the parents involved in further management. If the surgery is urgent then premedication should be given, providing there are no contraindications, and the anaesthesia should proceed. If the surgery is elective, then the option of postponing the procedure should be considered. Postponing the procedure gives more time for planning, but may not be convenient for the parents. If the operating schedule permits, the child may be sent back to the ward to discuss the situation with their parents, have premedication, or both. There should be a lower threshold for cancelling elective surgery in older children in whom considerable physical restraint may be required. In all cases, an agreement between the anaesthetist and the parents should be reached about the management plan when the patient returns to the theatre.

Strategies for aggressive combatant children

It is essential that parents and staff be involved in the preoperative plan for this group of children. This should include discussion of possible premedication, the use of physical restraint, or both. Full discussion of the latter is especially important to avoid any misunderstandings during induction of anaesthesia. Often these children have had previous anaesthetics and the parents can be extremely helpful in identifying what works best for them.

Many of the interventions described for preparation of the anxious child may not be applicable. Frequently, oral premedication with midazolam will be rejected, in which case nasal midazolam may be tried. In the absence of i.v. access, the choice for induction of anaesthesia frequently lies between an i.m. injection of ketamine and inhalation of sevoflurane as these methods offer certainty of success with the application of effective restraint by a

Table 3 Guidelines for restraining and holding children still¹²

Restraining and holding still should be used only as a last resort
Make an agreement with the parents or guardians beforehand about the methods to be used
Ensure parental presence and involvement if they wish to be present and involved
Only minimal force should be used: use age-appropriate methods like splinting or wrapping
Take into account the legal implications when carrying out restraining or holding still
Ensure there are sufficient staff available to assist in restraining or holding still
Have a debriefing session with the child and, where appropriate, with staff and parents as soon as possible after the event

parent, staff, or both.¹⁰ In the authors' experience, i.m. ketamine has several advantages over sevoflurane in this situation. The administration of i.m. ketamine can be achieved more rapidly thereby keeping the period of restraint to a minimum. Furthermore, it can be given in the ward situation where, in addition to adequate numbers of staff, it is important to ensure that airway equipment, oxygen, a compressible breathing system (e.g. Jackson Rees T-piece) and a tipping trolley with sides are available to ensure the child's safety during transport to the operating theatre.

A dose of ketamine 4–5 mg kg⁻¹ i.m. provides effective sedation in 93–100% of combative children in 5 min with recovery after about 45 min.⁹ Whenever possible, patients selected to receive i.m. ketamine should be anaesthetized first on the list to minimize preoperative agitation and mitigate the slightly prolonged recovery period. This is especially important in day-case patients. In the postoperative period, they will require the same enhanced facilities as patients given oral ketamine premedication.

References

1. Holm-Knudsen RJ, Carlin JB, McKenzie IM. Distress at induction of anaesthesia in children. A survey of incidence, associated factors and recovery characteristics. *Paediatr Anaesth* 1998; **8**: 383–92
2. Lumley MA, Melamed BG, Abeles LA. Predicting children's presurgical anxiety and subsequent behavior changes. *J Pediatr Psychol* 1993; **18**: 481–97
3. Visintainer MA, Wolfer JA. Psychological preparation for surgical pediatric patients: the effects on children's and parents' stress responses and adjustment. *Pediatrics* 1975; **56**: 187–202
4. Watson AT, Visram A. Children's preoperative anxiety and postoperative behaviour. *Paediatr Anaesth* 2003; **13**: 188–204
5. McGraw T. Preparing children for the operating room: psychological issues. *Can J Anaesth* 1994; **41**: 1094–103
6. Cunnington PMD. Management of the uncooperative frightened child. In: Bingham R, Lloyd-Thomas A, Sury M, eds. *Hatch and Sumner's Textbook of Paediatric Anaesthesia*. London: Hodder Arnold, 2007; 369–81
7. Caldas JCS, Pais-Ribeiro JL, Carneiro SR. General anesthesia, surgery and hospitalization in children and their effects upon cognitive, academic, emotional and sociobehavioral development—a review. *Paediatr Anaesth* 2004; **14**: 910–5
8. McCluskey A, Meakin GH. Oral administration of midazolam as a premedicant for paediatric day-case anaesthesia. *Anaesthesia* 1994; **49**: 782–5
9. Bozkurt P. Premedication of the pediatric patient—anaesthesia for the uncooperative child. *Curr Opin Anaesthesiol* 2007; **20**: 211–5
10. Christiansen E, Chambers N. Induction of anesthesia in a combative child; management and issues. *Paediatr Anaesth* 2005; **15**: 421–5
11. *0–18 Years: Guidance for All Doctors*. General Medical Council, 2007
12. *Restraining, Holding Still and Containing Children and Young People*. Royal College of Nursing, 2003