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The Anaesthetic Management of Autistic Children

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SUMMARY

Autistic children are difficult to manage and there are no anaesthesia studies to suggest management strategies. We present five case reports which describe an integrated management program taking into account the special needs of autistic children and their families. We describe a method of early warning and recognition of these patients and the establishment of a database to allow review of our program. We also present a process to minimize the stress and problems inherent in the conventional admission process. Oral ketamine (6 to 7 mg/kg) has proven to be the most reliable preoperative sedative for these patients.

Key Words: ANAESTHESIA: paediatric, autism, premedication, ketamine, oral

Autistic children are a neglected group in paediatric anaesthetic practice. There appears to be no relevant information in the anaesthetic literature. From discussions with other anaesthetists it appears that their management ranges from simple oral premedication with unpredictable results to the use of force and restraint, which is distressing to patients, family, hospital staff and anaesthetists. These children present a particular challenge to the anaesthetist and other healthcare workers. They need special consideration and highlight some principles in the management of other types of difficult and uncooperative children. Assessment of medical fitness, explanation of the conduct of anaesthesia and obtaining informed consent is a major problem, as is the actual administration of the anaesthetic as these children are usually uncooperative and may have limited comprehension.

We present a series of five children describing some of the problems and suggest a method for managing autistic children.

CASE 1

A 12-year-old male presented for an examination under anaesthesia and colonoscopy for investigation of bloody diarrhoea. He had severe autism with a large number of phobias, including hospitals, doctors and electric vacuum cleaners, but was fascinated by mechanical objects. The family were contacted a week prior to admission and it became clear that a visit to hospital was likely to result in total lack of cooperation by the patient. The parents were invited to attend a session with one of the authors (JHV) and all the admission papers and consents were completed at this preliminary visit and special arrangements discussed. An oral sedative of midazolam 0.75 mg/kg was given at home with good effect. The child and family were admitted directly to a "quiet room" adjacent to the theatre and a second dose of midazolam was given in the "quiet room" with the parents simultaneously being given a similar looking drink to allay the patient's suspicions. This second dose produced minimal discernible change in the child's mood with a high degree of anxiety and suspicion evident. Father and child in their street clothes were then encouraged to "take a walk" down the theatre corridor. The patient was reluctant at the theatre door to go any further and a halothane gas induction was performed with an extended fresh gas flow hose with the child sitting on his father's knee in the corridor. The induction was performed after some coaxing and the child recovered in a quiet side room in a ward, and discharged uneventfully the following day.

CASE 2

A five-year-old female presented for removal of several minor skin lesions (*Molluscum contagiosum*). The dermatologists had made an abortive attempt under local anaesthesia elsewhere in the hospital and then requested general anaesthesia in the emergency theatre on the same day and no planning was thus possible. The child's autism manifested mainly as

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severe repetitive behaviour patterns. She was premedicated in the "quiet room" adjacent to theatre with midazolam 0.75 mg/kg 30 minutes before anaesthesia with little effect and a decision to give a single intramuscular dose of ketamine 5 mg/kg was made with the intention of using the method described by Berry[1]. However, the injection attempt was poorly executed and only a portion of the drug was injected due to total lack of cooperation from the patient and a halothane induction was performed with manual restraint. Intravenous midazolam 0.1 mg/kg was given intraoperatively to reduce the possibility of emergence phenomena. Surgery proceeded uneventfully and recovery was in the Day Unit as special arrangements could not be made due to the unplanned nature of the admission to theatre. The patient was initially very agitated and distressed, screaming loudly and crying, and her hyperactive movements caused her mother acute embarrassment. She was discharged home with her parents where she apparently settled rapidly.

CASE 3

An eight-year-old autistic male was admitted for bilateral intranasal antrostomies and referred because he had already had a failed attempt at general anaesthesia in another centre where he had run out of the theatre. His mother was contacted by phone and she informed us that his particular phobias included strange sounds and smells but chocolate drinks were a favourite. We arranged for the child to be admitted directly to the "quiet room" and after the apparent failure of midazolam we decided on this occasion to use oral ketamine 8 mg/kg in a syrup with chocolate flavouring. He only ingested approximately 3 mg/kg despite the parents also participating with a similar looking drink. He became sleepy in about 15 minutes, was still not tolerant of handling but tolerated an intramuscular dose of ketamine 5 mg/kg. When he became sufficiently drowsy he was taken into the induction room for an uneventful halothane inhalation induction and after recovery was sent to a side room on the ward. Intravenous midazolam 0.1 mg/kg was given intraoperatively to reduce the possibility of emergence phenomena. He had an uneventful recovery and was discharged later the same day.

CASE 4

A four-year-old male with autism presented to the emergency department requiring suturing of a lip laceration, again with a history of a previous difficult anaesthesia requiring restraint by several personnel. He had previously been documented as becoming hyperactive with oral midazolam. He was given oral ketamine 6 mg/kg in a paracetamol suspension with good result, allowing a straightforward sevoflurane gas induction. Surgery was uneventful as was recovery which was reported as being slow. He was given IV midazolam 0.1 mg/kg intraoperatively.

CASE 5

A four-year-old male with autism, attention deficit disorder and Tourette's syndrome presented for an MRI of the head to investigate a possible neurodegenerative disease. The anaesthesia for the MRI investigation was performed with paediatric anaesthetic staff at the adult hospital two kilometres away and the "quiet room" was thus not an option. The child had also had a previous traumatic general anaesthetic with inhalation induction needing considerable restraint. He was premedicated with oral ketamine 7 mg/kg in a paracetamol suspension with good effect within 30 minutes, allowing a straightforward halothane gas induction and an uneventful procedure and recovery. Intravenous midazolam 0.1 mg/kg was given intraoperatively.

DISCUSSION

Kanner in 1943 described a group of children with impoverished or absent social relationships from the first year of life, with deviant language development[2]. Since then autism has concentrated on four essential features—impaired social development, delayed and deviant language development, insistence on sameness and onset before 30 months. There is now a set of diagnostic criteria—DSM IV—which includes the abnormal development in social interaction and communication and restrictive, repetitive and stereotyped patterns of behaviour, activities and interests, manifesting before three years[3,4].

The condition affects approximately five in 10,000 births, four times more commonly in males than females and is found in all racial, ethnic and social backgrounds. There are significant associations with impaired intellectual functioning, approximately 60% have an IQ of less than 50, and associated medical conditions—notably tuberous sclerosis and congenital hydrocephalus[5]. The clinical picture changes with age, many parents find the pre-school child difficult but are able to cope with early intervention and support. Some improvement can be expected after six years, but unfortunately there is often a deterioration in adolescence, with exacerbation of aggressive and oppositional behaviour or obsessive compulsive

behaviour and increased general anxiety and mood disturbances.

Although first described more than 50 years ago, the autistic child is still poorly understood. There have been numerous studies into possible causes, the only consistent finding being that of abnormal serotonin levels and a tenuous genetic link, though no direct gene locus has been found[6]. As there is no specific biochemical or neurotransmitter lesion, treatment of these children has been to ameliorate behavioural symptoms rather than modify primary pathology. Haloperidol is the most extensively studied drug in autistic children, with significant decreases in stereotypes, hyperactivity, and abnormal object relationships and a "calmer" child, but with no positive effects on learning. Antipsychotics were tried early as autism was originally thought to be a form of childhood schizophrenia, but the prevalence of adverse side-effects limits their use, with 75% of patients having dyskinesia by three years[2]. In patients with marked hyperactivity and inattention, the use of stimulants (amphetamines and methylphenidate) has been tried but this frequently worsens the condition. Tricyclic antidepressants have a role in the management of depression but clomipramine specifically works well in obsessive compulsive behaviour patterns. Uncontrolled aggression may be improved with carbamazepine and sodium valproate. Agents aimed at modifying neurotransmitters, such as flenfluramine, have been tried but unfortunately positive effects have not been observed consistently, and peripherally synthetized serotonin does not cross the blood brain barrier[2].

Autistic children grow up to be autistic adults, although the profile of symptoms usually changes with development. Depressive illness is not uncommon and may be in response to a degree of insight as well as hormonal changes. The course of the illness is, however, chronic and the majority of these individuals need life long care and support, less than 20% of autistics will have developed sufficient social skills to lead an independent or semi-independent life[3].

The five cases we report highlight problems often encountered in paediatric anaesthetic practice. The clinician booking the surgical or investigative procedure frequently does not understand the implications of anaesthesia for these children and gives no warning of the autistic diagnosis which often precludes appropriate planning. There are no studies on the topic of anaesthesia management strategies for autistic children. There is a lack of knowledge regarding appropriate drugs to produce predictable sedation.

Parents, and often other siblings, have a fine understanding of the child's fetishes and phobias and have developed management strategies to cope which we have actively sought and tried to implement. We have been impressed with the level of care and commitment these parents demonstrate in extremely trying circumstances. The approach to the autistic child and family needs to be closely coordinated. They need special consideration and highlight the management of uncooperative children, and a flexible attitude is essential taking into account their particular fetishes and phobias. It is important to ascertain from the parents what the likes and dislikes are and what strategies they employ to successfully manage their child. A visit to the hospital is a most stressful exercise for both child and family and simple measures derived from information from parents can minimize this stress. This will allow avoidance techniques to be used, or the adopting of particular approaches.

The most important aspect of anaesthetic management must be the concept of "forewarned is forearmed". It is unfortunate that on too many occasions these patients appear on a routine operating list without warning. Until we started to make special arrangements for autistic children our first contact with the patient had been at the preoperative visit as over 90% of our patients are admitted on the day of the procedure. There must be adequate identification of these patients to allow pre-anaesthetic consultation and careful planning, including timing and place of admission, the need for and type of premedication, technique of induction and maintenance and importantly where and how they are recovered. We have now arranged with the Autism Association of South Australia Inc. to advise their members of our willingness to make special arrangements for autistic children needing anaesthesia and surgery.

Autistic children are now also entered into our Paediatric Anaesthetic Problem Register[7]. This is a database containing anaesthetic details which identifies patients with recurrent anaesthetic problems and their management. When a patient from the Paediatric Patient Problem Register is booked for a procedure or investigation requiring an anaesthetic, the computerized theatre booking system will automatically alert the anaesthesia department so that we can contact the parents and plan the admission and to optimize management. We now hope to capture all the names of autistic children requiring an anaesthetic and with time develop an anaesthetic management profile to help improve our management of these patients.

When we are notified that an autistic child is

scheduled for a procedure requiring an anaesthetic we contact the family prior to admission for a telephone interview or invite them to attend a session with an anaesthetist to devise a management strategy and to complete all the admission papers and consents at this preliminary visit. Special arrangements are made which include parking beneath the hospital with easy access to the operating theatre suite. On arrival in the theatres, a special quiet room is made available with a minimal amount of paperwork on the day of the procedure. Sedative medication is discussed and if relevant, an oral sedative medication is prescribed. This medication is usually mixed with a flavoured syrup of the child's liking which in our experience has ranged from paracetamol syrup, cola drinks and chocolate flavouring to apple juice.

The range of conventional premedication available is varied and often of limited success[8-12]. Oral midazolam 0.5 mg/kg is the routine premedication of choice in many institutions[13]. The effects, however, are unpredictable in these patients and sedation may not be sufficient to allow further anaesthetic intervention[14]. Even if administered prior to hospital admission, as in the first case, midazolam may not be effective.

Ketamine has been shown to be effective as an oral preoperative sedative in children with minimal side-effects and emergence phenomena are said to be less frequent in children[15]. Oral ketamine has a 16% bioavailability compared with 93% when given IM or IV[16]. More recently, ketamine 3 mg/kg has been tried by the nasal route with some success[17]. There is also the option of rectal administration[18] which will be of limited use in the uncooperative aggressive patient. Oral transmucosal ketamine 5 to 6 mg/kg has also been shown to be effective[19].

Gutstein et al demonstrated that oral ketamine 6 mg/kg in a cola flavoured drink was easily administered, well accepted and provided predictable, satisfactory premedication without significant side-effects[15] and this has been supported by other reports of the use of oral ketamine in special circumstances[20,21]. Based on our experience described above, we progressed to the point where oral ketamine appeared to offer the most reliable oral premedication. The IV preparation has a marked bitter taste which has to be masked in a syrup that will be acceptable to the patient. We have tried to ascertain what the most acceptable syrup vehicle was in each case and then devised the stratagem for all the attendant family members to drink a similar fluid to promote compliance. Even so, not all children will consume the entire volume as demonstrated by our third patient although he appeared to become sedated sufficiently for a successful induction of anaesthesia. We also gave all five of these patients IV midazolam because we were unsure whether autistic children would be more prone to emergence delirium. Subsequently, however, in an additional eight autistic children who were given oral ketamine without midazolam there were no emergence problems and we agree with others[15-22] that midazolam is not required.

Once the surgical procedure is completed there needs to be consideration of where the patient is to be managed, particularly if the patient has been assessed as having severe autistic behavioural difficulties. Where possible we have arranged side rooms for them if they had to be admitted as in-patients. However, day stay is preferred as the aim is to discharge them as early as possible both to remove the burden of their care from the hospital but also to help these patients to return to their normal home environment.

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