Intranasal and intravenous sedation with midazolam in a child with special needs – a case report

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Abstract
The dental profession should be concerned with providing a quality of care for people with disability that is equitable to that of the patient with no disability. This report describes the management of an avulsed upper central incisor in an 8-year-old girl with cerebral palsy and hearing impairment. Conscious sedation, using midazolam was administered intranasally and intravenously. Treatment was provided within the primary care setting by a skilled and experienced operator with all necessary facilities required for conscious sedation in children. It is important to recognise that practitioners providing such techniques should do so only within their individual level of knowledge, skill and experience and commensurate with the particular procedure planned. This novel technique was shown to be effective and safe in this case of a child with cerebral palsy, epilepsy and hearing impairment.

Key words: Conscious sedation, midazolam; special needs, trauma, cerebral palsy

Introduction
The concept of providing a standard of dental care for children with disability equal to that provided for children without disability is one that the dental profession should strive to attain. The success or failure of this goal may be judged by examining the oral health of children with disability. Evidence suggests (Maclaurin et al., 1985) that when comparing the oral health of children with and without a disability, children with a disability have a greater number of missing rather than restored teeth, despite having a similar level of caries to those with no disability (Mellor and Doyle, 1987). The implication of this evidence is that there is a lower standard of care provided for the child with disability compared with that of the child without a disability. For some children with profound disability it may be that the treatment has been completed under a general anaesthetic. In such circumstances, the provision of aspects of advanced restorative care or treatment requiring repeated sessions is contraindicated.

This situation has existed for many years. However, it is understandable that a more radical approach to the treatment of dental caries is practised for two reasons. The prevention of pain is a major priority for the person with challenging behaviour, and the removal of a symptomatic tooth provides the ultimate solution to pain relief. The avoidance of repeated sessions of general anaesthesia is also a consideration.

The use of conscious sedation provides a valuable solution for a good standard of care by enabling repeated treatment sessions and thereby opening a full range of treatment options. Oral sedation may be effective in some cases although this method may be somewhat unpredictable. Inhalation sedation is an excellent option however, the requirement of continuous nasal breathing may not be achievable for the child with profound disability. The use of intravenous sedation for the dental care of children may be regarded by part of the dental profession with some caution (Scottish Intercollegiate Network, 2002), despite its extensive use in other areas of medicine (Rosen and Rosen, 1998). Evidence from America (Cote et al., 2000), where the concept of ‘deep sedation’ is practiced, illustrates how adverse reactions may occur in the situation where the operator is lacking in skill and experience and fails to maintain adequate monitoring and vigilance. It is stressed that the sedation provided in this case study ensured that at all times throughout the procedure, consciousness was maintained and the patient carefully monitored. Within the United Kingdom the practice of deep sedation is considered unacceptable and should never be considered to be appropriate within the primary care setting, (Standing Dental Advisory Committee, 2003).

The following case report describes the use of conscious sedation techniques to provide multi-visit care to a young girl with a hearing impairment, epilepsy and cerebral palsy.

Case report
The patient was an 8-year-old girl who fell forwards out of her wheelchair during a convulsion, resulting in the avulsion...
of her upper right central incisor. The tooth was placed in milk and Sarah was taken to the local Dental Emergency Department. At the request and agreement of the mother, physical intervention was used and the staff replaced and splinted the tooth, which was out of the mouth for a period of approximately one hour. Following this episode the patient was referred to the author for review.

On review radiographically the tooth had no obvious evidence of pathology but presented with an open apex (Figure 1). The prognosis for retention of this tooth was discussed with the patient’s mother. After a period of one month, when the tooth appeared firm, an appointment for sedation was arranged in order to remove the splint. Cooperation for treatment was very limited with random head and arm movements. The use of inhalation sedation was judged to be inappropriate. The unknown response to endodontic intervention and likelihood of repeated and possible frequent episodes of root canal therapy suggested a contraindication for the use of general anaesthesia. Oral sedation was considered however, this was felt to be unpredictable for providing the appropriate level and length of sedation, for what was judged to be a very short procedure.

Conscious sedation was achieved by using midazolam: this was first given intra-nasally. Five milligrams were administrated using a special preparation at a concentration of 40mg/ml (Figure 2). The total amount of midazolam (0.125ml) was administered via a Mucosal Atomisation Device –MAD (Intavent Orthofix, Burney Court, Cordwallis Park Maidenhead, Berks SL6 7BZ) attached to a 1ml syringe (Figure 3).

This then allowed safe and effective cannulation and the titration of midazolam intravenously, if required. For the procedure of splint removal no further intravenous midazolam was required. On removal of the splint the tooth remained firm. The patient was reviewed after two weeks during which time the tooth remained stable, without any painful symptoms. However, over a period of four months the tooth became non-vital resulting in pain and a buccally discharging sinus. The mother was understandably very anxious about her child losing the tooth and the provision of endodontic treatment for the patient was discussed and agreed.

Over a series of appointments, the root canal was cleaned and then dressed with calcium hydroxide paste. The technique of intranasal (5mg midazolam) followed by intravenous sedation was used on each occasion. For the endodontic procedures undertaken, intravenous midazolam was required and the additional intravenous dose administered varied from 2–4mg. Pulse oximetry was used throughout and on no occasion did the oxygen saturation drop below 98%.

Once the infection had resolved and the root canal had been cleaned and shaped, an apical seal was achieved through the use of MTA cement (Figure 4). The root canal was filled with a gutta percha master point and accessory points. All treatment was completed under dry dam, and the author was both the sedationist and the treating dentist. Since completing endodontic treatment three years ago the tooth has been asymptomatic and complete resolution of the buccal sinus has occurred. The dark discolouration has been treated by placement of a porcelain veneer.

A total of eight sessions were provided to complete all
upper central incisor, which for any young girl would be a considerable detriment to appearance. Why should a young girl with cerebral palsy not have the opportunity of retaining this tooth? The patient’s mother was acutely aware of the consequence of the loss of an upper front tooth and agreed to treatment with sedation.

It can be argued that in order to promote social acceptability for people with disability, aesthetics is of even greater importance than for the person with no disability. The prognosis for retention of this tooth with the subsequent history of infection could have been poor, without the option of repeated endodontic treatment. The option of providing multi-visit endodontic therapy under a general anaesthetic, without knowing the number and frequency of sessions required, would have presented problems of accessibility, availability and certainly acceptability both for the child and mother. The use of the sedation technique selected within primary care for repeated, hour-long appointments therefore provided an opportunity for an improved standard of dental care.

The technique used for sedation in this case study initially involved intranasal midazolam in order to provide the opportunity for safe and effective cannulation. The use of midazolam, concentrated to 40mg/ml, considerably improves the acceptability of the intranasal administration technique. This is due to a reduced volume of fluid required to provide the appropriate dose of 5mg, that is, 0.125ml. If the presently available concentrated proprietary preparation were to be used, the volume of fluid required would be 1ml, a much less acceptable dose via the intranasal route. This 40mg/ml concentrated preparation has been developed by special arrangement with St. Thomas Hospital Pharmacy Production Department and although originally licensed for exclusive use by the author, is now in routine use by hospital and primary care practices throughout the United Kingdom.

The intranasal administration was then followed by further increments of midazolam given intravenously. Midazolam is not licensed for intranasal use in the UK, however dental practitioners have in their own right the authority to use drugs off-licence, provided this is in the interests of their patients and legal requirements are adhered to (British National Formulary, 2005). Although the practice of intravenous sedation in paediatric dental care is considered with some scepticism, there is however mounting evidence to support its safe and effective use (Robb et al., 2003; Wilson et al., 2003; Hopkins, 2005).

Conclusion
Clinical guidelines need to be reviewed and updated in the light of new evidence. Failure of this could result in the procrastination of care that is ultimately not in the interest of the patient. It is however important to recognise that guidelines and standards are developed by regulatory bodies in order to protect the safety of patients undergoing...
sedation. It is essential that practitioners provide care accordingly and within their individual level of knowledge, skill and experience and commensurate with the particular procedure planned. Unusual or novel techniques must be considered carefully and responsibly. The practitioner has the ultimate responsibility in providing a safe and effective standard of care considering all the risks and benefits.

This case study is concerned with extending the options of care for people with a disability. A number of issues are raised associated with this area of dentistry, and it is suggested that when practising in this specialised field of dentistry, the qualities of flexibility and initiative are particularly important in order to provide good care for patients.

References

Hopkins C. An audit of the safety and efficacy of intravenous conscious sedation for children’s dentistry. MSc Thesis 2005 University of London.4

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