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Paediatric Dentistry

How to Minimise Repeat Dental General Anaesthetics

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How to Minimise Repeat Dental General Anaesthetics

Abstract: This article aims to provide general dental practitioners (GDP) with the knowledge to improve their referrals primarily for children who they feel require a dental general anaesthetic. It discusses the impact of a general anaesthetic (GA) on a child and the financial impacts of dental general anaesthetics (DGA). The risks of DGA are well recognised and the ways in which the dental team in primary, secondary care and service commissioners can reduce the risk of repeat DGA are discussed.

Clinical relevance statement: Dentists should be aware of the risks involved in GA and the importance of reducing repeat DGA.

Objective statement: To reduce repeat DGA, dentists should ensure the referral process and assessment prior to DGA is optimal.

How to minimise repeat General Anaesthetics

Introduction

Dental caries is a preventable disease yet it is still the most common reason a child between five to nine years old is admitted to hospital in England and Scotland (1). Dental caries can have a significant impact on a child's life; they may suffer pain, difficulty eating, sleepless nights, have time off school and it can affect their body weight, cause communication difficulties and impaired cognitive development (2). Dental caries is often treated under general anaesthetic (GA), particularly because the patient is pre-cooperative, anxious, medically compromised or because of the nature of the treatment.

In addition to the impact of caries on a child's life there are also risks associated with a GA and therefore it should only be undertaken when absolutely necessary (3). Short term effects include nausea, vomiting, headache, sore throat, dizziness and mild allergic reaction; these usually resolve in 48 hours but can take up to a fortnight (4). Recent research (5) has identified pre -, peri- and post-operative impacts of dental general extractions from a child's perspective. Interestingly, the most negative physical impact described was not pain but hunger and disturbed eating and in some cases the children reported greater discomfort from the cannula post operatively than from the extractions. A dental general anaesthetic (DGA) has been said to carry a risk of a life-threatening problem of about 1 in 400,000 which is considerably less than a child being seriously injured in a road accident (6). With correct assessment, treatment planning and preventive care the number of children undergoing a repeat DGA can be markedly reduced.

Cost of Dental General Anaesthetics in the UK

The cost of hospital admissions for the treatment of caries in children in England in 2012/13 was £30 million (7) and this increased to £35 million for tooth extractions in 2014/15 (8).

The rate of tooth extractions was 462.2 per 100,000 population in 2014/15 (33,871 episodes of care). This is statistically similar to 2013/14 (455.5 per 100,000 population, 32,741 episodes), but a significant increase since the start of the time series in 2011/12 (445.7 per 100,000 population, 30,761 episodes) (9).

Dental General Anaesthetics Services

In the UK, since 2001, DGA has been restricted to a hospital setting. There are differing services available but unfortunately a postcode lottery still exists as to which services you may be able to access. Some NHS Trusts may offer an extraction only DGA “exodontia”, while others a comprehensive care service with and without access to intra-oral radiographs peri-operatively. Comprehensive dental care under GA is primarily available for medically compromised patients or those needing complex care. This latter service is clearly superior to an extraction only service. A study of children presenting for DGA extractions concluded that perhaps ‘pre-cooperative’ children should have a greater opportunity for tooth restoration rather than extraction under general anaesthetic (10). Figure 1 shows a child with oral intubation undergoing comprehensive dental care and Figure 2 a child having extractions under GA.

There is a useful guideline available on the Management of Children Referred for Dental Extractions under General Anaesthetic (4) and the recent Standards for Conscious Sedation in the Provision of Dental Care (11). Both recommended that all children should be under the

care of a Consultant in Paediatric Dentistry and treatment planned by a specialist with appropriate training. This recommendation has not been implemented across the UK.

In fact the majority of children are treated on direct referral to an exodontia list, without a full assessment including radiographs.

Full treatment planning by a specialist or consultant will reduce the incidence of repeat DGA.

After all is there any other group of patients who have treatment under GA without a specialist or consultant treatment plan in place? Why does this matter? Poor assessment and treatment planning will result as evidenced below in unjustifiable repeat procedures.

Repeat Dental General Anaesthetics

Unfortunately, new carious lesions have been reported in 37-52% of children only 6 months after their initial treatment under GA (12, 13). In a recent cohort study (14) the recurrence of caries (relapse) rate was 21.6% during a three year follow up. This study identified that ASA-2 children and those with less than a full primary dentition present at the initial GA were almost three times more likely to experience relapse as compared with ASA-1 and children with more than 20 teeth present. A survey of children attending six district general hospitals in the Northwest of England children found 12 – 37% of these patients were attending for a repeat DGA (2). These hospitals provided in the main a direct referral to the GA appointment without a treatment planning visit. On the other hand consultant led services with pre-assessment including radiographs (either before or during the procedure for pre-cooperative children) show repeat GA rates within two years of approximately 1%. It must be remembered these services will see many ASA II patients and these are included in these figures.

In addition to the effects on the child of a repeat GA, it impacts on already highly stretched services in several areas including waiting list length, staffing and financial pressures.

Of course the best outcome would be if the patient's caries risk could be reduced from high to low. Unfortunately those with a high caries risk are more susceptible to further carious lesions (15) and due to the aforementioned risks, it is essential that patients undergoing a DGA have their caries addressed in such a way to minimise new lesion development.

Appropriate Treatment Planning

A DGA should only be undertaken if it is the most appropriate form of clinical management for the patient. It is often used to manage the most anxious children but this process can be distressing for both the child and their parent and may compound existing dental anxiety.

It is important to consider behavioural management techniques alongside local anaesthetic (LA), LA and inhalation sedation (IS) or intravenous sedation for the provision of dental treatment rather than proceeding straight to GA. Various studies have shown less morbidity and psychological distress when opting for IS (16, 17). Similarly to DGA services, the availability of these options varies greatly between areas so it is important that you know which services are available in your region. The referring practitioner must ensure that patients are aware they are not necessarily going to receive a GA. Dentists should all be aware that orthodontic extractions are rarely if ever undertaken under a GA in healthy children so should not propose this as an option to children and their parents. However, since this article is focusing on DGA and reducing repeat DGAs we will not discuss these management strategies any further.

The importance of thorough treatment planning to prevent repeat GA cannot be overemphasised. When the decision has been made to proceed with GA it is essential to minimise and ideally eliminate repeat GAs. GDPs have a duty of care to provide preventative information to children and their parents and it must be stressed that the child is susceptible to further carious lesions if it is not followed. Some units will offer preventive care alongside a GA appointment but this is not the norm so the GDP must provide full preventative advice and care. In any case the child's dental practice is the only site where effective on-going prevention can be provided.

As well as prevention, it is important to manage existing caries appropriately prior to an exodontia DGA. All carious teeth that are amenable to restoration should be restored prior to the GA as the patient may refuse restorative treatment planned for after the GA. Therefore, all specialists plan for the patient to wake dentally fit with no remaining restorative treatment need. The waiting period for exodontia services are a lot shorter than comprehensive care services (if these are even available in your area) so if a child can co-operate for restorative treatment but not extractions, appropriate, timely, restorative treatment followed by exodontia will minimise their time in pain by avoiding the wait for a comprehensive GA list.

All restorative care should be provided to an adequate standard. For example intra-coronal restorations placed without LA have a much poorer prognosis than those that are (18). The success of Hall PMC's mean these are a very effective treatment and can be left in place at the time of the GA.

The specialist or consultant treatment planning works to the rule that any tooth whose prognosis is unclear will be removed. Therefore, restorations placed without local anaesthetic or large restorations - either in terms of area or closeness to the pulp - will be

removed. The aim is to try to ensure that there is no reason for further treatment within two years.

The role of the GDP in the referral process

Table 1 presents the information required for a new patient consultation at a dental hospital and associated children's hospital within the UK and will highlight relevant information that a GDP should be providing in their referral letter. The provision of this information will aid the consultants and specialists, it should minimise repeat radiographs and generally improve the pathway of care for patients.

Many services provide a "one stop" service working to the GDP's treatment plan.

Unfortunately these are the services with the highest repeat GA rates (2). Therefore, ensure you know what sort of service you are referring to, starved children with anxious parents presenting to an assessment appointment is never appropriate. This can cause people to be understandably upset or even angry and is clearly completely avoidable with some thought.

Informed consent must be obtained in writing from a parent or guardian with parental responsibility (19). It is important that you advise the family of this at the time of referral as often patients attend appointments with grandparents who are unable to provide consent unless they are the legal guardians.

Importance of radiographic examination

Every effort should be made to obtain as detailed clinical and radiographic examination as possible to avoid repeat general anaesthetics. Dentists often seem to dismiss children's

ability to be able to cope with radiographs without even trying. This is not the case a study of 82 children (mean age 6.4 years) referred for extractions under GA, reported that only a small percentage (10%) found it hard or very hard to accept radiographs, the majority (75%) found it very easy or easy and the remaining 15% didn't mind it (20). If the child is unable to tolerate radiographs due to behavioural or medical issues, the facilities to take radiographs under GA should be available and utilised.

A mouth can appear caries free or as is often the case when a patient is referred from their general dental practitioner that a single cavitated lesion is present and radiographic examination reveals multiple interproximal lesions. Figure 3a and b shows a child referred for management of an unrestorable upper right first primary molar. The other teeth appeared clinically sound. However once bitewing radiographs were taken (Figure 3c and d) the following was diagnosed: mesial dentine caries upper right, lower left, lower right first primary molars and upper left second primary molar. There is also an impacted upper left first permanent molar, which has resorbed the upper left second primary molar to involve the pulp. If this child had proceeded to exodontia without a full assessment including radiographs, the treatment plan would have been very wrong and almost certainly resulted in a repeat general anaesthetic within a short time.

Dentists should all be aware of the guidelines available for taking radiographs and follow the appropriate intervals depending on caries risk as laid out in the FGDP Selection Criteria for Dental Radiographs (21) and always when cooperation allows before referring for GA, especially when this is to a "one stop" service without assessment and treatment planning by a specialist or consultant.

Examples of poor assessment

Below are three cases where poor assessment and treatment planning has led to pain, increased anxiety, time off school and work for patients and their parents or guardians and a repeat GA in a short time span. They were initially seen at services not run by paediatric dentists but were then seen at the Paediatric Dentistry Department Charles Clifford Dental Hospital, Sheffield, UK because of further pain from remaining teeth.

Figure 4 shows a sectional OPT bitewing from an eight year old child. The patient presented in pain two weeks after having a GA for removal of the upper left first primary molar, lower right and left first and second primary molars.; this radiograph demonstrates ectopic eruption of the maxillary first permanent molars (upper left first permanent molar into pulp of upper left second primary molar and the upper right first permanent molar close to pulp of upper right second primary molar) and caries in the upper left first permanent molar. The patient's level of anxiety means she will require a further GA to complete her treatment.

Figure 5 presents the clinical images and sectional OPT of a five year old girl who presented with pain affecting her sleep ten days after having her upper right second primary molar and lower right first primary removed under GA at a "one stop" service without treatment planning by a specialist or consultant. With the exception of the caries detected on the radiograph in the upper left first primary molar, the caries is obvious clinically. The referring dentist has clearly neither adequately treatment planned nor made an adequate referral.

Figure 6 presents a three year old pre-cooperative child who had had an upper clearance and his lower primary molars removed two weeks previously. He presented in severe pain and required the removal of his lower anterior teeth under GA, as an urgent procedure.

All three of the above cases were not treatment planned by a specialist/consultant in Paediatric Dentistry. It is clear that all three should not have needed a repeat GA. They are

extreme examples of what must be happening at a lower level across the country because of inadequate services.

Conclusion

Despite the risks and impacts DGA remains an important way of managing dental disease for children but it is important that a child is under the care of a paediatric dental consultant or specialist to optimise care and minimise the risk of repeat DGA. The DGA must not be a standalone procedure – prevention is key to further minimise the risk of recurrence of dental disease and the Delivering better oral health: an evidence based toolkit (22) for prevention is an invaluable toolkit for dental care professionals.

Referring clinicians have a responsibility to make sure patients are appropriately referred for treatment. They should ensure that carers are aware of the different options available and the risks involved.

References:

1. NHS Dental Statistics for England. London (UK): Health and Social Care Information Centre; 2013-2014.
2. Goodwin M, Sanders C, Davies G, Walsh T, Pretty IA. Issues arising following a referral and subsequent wait for extraction under general anaesthetic: impact on children. *BMC Oral Health*. 2015;15:3.
3. A conscious decision: a review of the use of general anaesthesia and conscious sedation in primary dental care. London (UK): Department of Health; 2000.
4. Guidelines for the Management of Children Referred for Dental Extractions under General Anaesthesia. London (UK): Association of Paediatric Anaesthetists of Great Britain and Ireland; 2011.
5. Rodd H, Hall M, Deery C, Gilchrist F, Gibson BJ, Marshman Z. 'I felt weird and wobbly.' Child-reported impacts associated with a dental general anaesthetic. *Br Dent J*. 2014;216:E17.
6. Your child's general anaesthetic for dental treatment. The Royal College of Anaesthetists and The Association of Anaesthetists of Great Britain and Ireland; 2008.
7. Reference costs. London (UK): Department of Health; 2013.
8. Hospitals spending £35 million on "rotting teeth" in children: Local Government Association; 2016 [Available from: http://www.local.gov.uk/media-releases/-/journal_content/56/10180/7784916/NEWS.
9. NHS Outcomes Framework England. Department of Health; 2016.
10. Hosey MT, Bryce J, Harris P, McHugh S, Campbell C. The behaviour, social status and number of teeth extracted in children under general anaesthesia: a referral centre revisited. *Br Dent J*. 2006;200:331-4.
11. Standards for Conscious Sedation in the Provision of Dental Care. Report of the Intercollegiate Advisory Committee for Sedation in Dentistry. London (UK): The Dental Faculties of the Royal Colleges of Surgeons and the Royal College of Anaesthetists; 2015.
12. Graves CE, Berkowitz RJ, Proskin HM, Chase I, Weinstein P, Billings R. Clinical outcomes for early childhood caries: influence of aggressive dental surgery. *J Dent Child (Chic)*. 2004;71:114-7.
13. Berkowitz RJ, Amante A, Kopycka-Kedzierawski DT, Billings RJ, Feng C. Dental caries recurrence following clinical treatment for severe early childhood caries. *Pediatr Dent*. 2011;33:510-4.
14. Amin M, Nouri R, ElSalhy M, Shah P, Azarpazhooh A. Caries recurrence after treatment under general anaesthesia for early childhood caries: a retrospective cohort study. *Eur Arch Paediatr Dent*. 2015;16:325-31.
15. Poureslami HR, Van Amerongen WE. Early Childhood Caries (ECC): an infectious transmissible oral disease. *Indian J Pediatr*. 2009;76:191-4.
16. Shepherd AR, Hill FJ. Orthodontic extractions: a comparative study of inhalation sedation and general anaesthesia. *Br Dent J*. 2000;188:329-31.
17. Arch LM, Humphris GM, Lee GT. Children choosing between general anaesthesia or inhalation sedation for dental extractions: the effect on dental anxiety. *Int J Paediatr Dent*. 2001;11:41-8.
18. Holland IS, Walls AW, Wallwork MA, Murray JJ. The longevity of amalgam restorations in deciduous molars. *Br Dent J*. 1986;161:255-8.
19. Standards for the Dental Team. Obtain valid consent: General Dental Council; 2013. p. 31.
20. Subka S. Validity and acceptability of a laser fluorescence device compared to conventional methods for detection of proximal caries in primary teeth: The University of Sheffield; 2015.
21. Selection Criteria for Dental Radiography. 3rd ed. London: FGDP (UK); 2013.

22. Delivering better oral health: an evidence-based toolkit for prevention. Public Health England; 2014.

Table Legends:

Table 1. Information that should be provided in the referral

Table 1

	Information required
Urgency	Pain history
Language	Is an interpreter required?
Detailed medical history	Provide an up-to-date medical history Including any hospital treatment they are receiving or due to receive
Detailed social history	How will they travel to and from the hospital
Detailed dental history	Are they a regular or symptomatic attender? Have you provided any treatment? Was restorative treatment completed with LA. What is their view of the prognosis of the restorations present.
Oral hygiene habits	Adherence to the Oral Health Prevention Toolkit
Clinical and radiographic examination	Provide a full clinical report Provide radiographs or confirm none have been taken and send the radiographs, with the referral (either originals or CD – print not acceptable, as these are of very low diagnostic value)
Provision of information to parents and consent	You must inform the parents of the risks of a general anaesthetic if this is the reason for referral

List of Figures

1. A child with oral intubation undergoing comprehensive care under general anaesthesia

2. A child who has had all primary molars and upper primary incisors removed under GA

3. The upper and lower dental arches of a six year old child referred because of unrestorable caries upper left first primary molar.

3a. Upper arch showing the caries upper left first primary molar

3b. Apparently caries free lower arch

3c&d. Right and left bitewing radiographs showing mesial dentine caries upper right, lower left, lower right first primary molars and upper left second primary molar. There is mesial enamel caries upper right, lower left, lower right second primary molars and upper left first primary molar. There is also an impacted upper left first permanent molar.

4. Sectional OPT taken only 2 weeks after the patient had received a DGA. It demonstrates the impacted upper right and left second molars and caries in the occlusal surface of upper left first molar.

5. The upper and lower arches and right and left bitewings of a child who had had upper right second primary molar and lower right first primary molar removed under GA 10 days previously.

5a. Upper arch showing healing socket upper right second primary molar. Caries upper right primary canine and upper left primary second molar. There is also significant tooth surface loss affecting the upper primary incisors.

5b Lower arch showing healing lower right first primary molar. Caries lower left first and second primary molars and possibly lower right second primary molar.

5c. Sectional OPT showing in addition to the caries noted clinically caries upper left first primary molar

6. Anterior view of three year old patient who had had an upper clearance and his lower primary molars removed two weeks previously under GA. The caries present in his remaining lower teeth is obvious.

Figure 1



Figure 2



Figure 3a

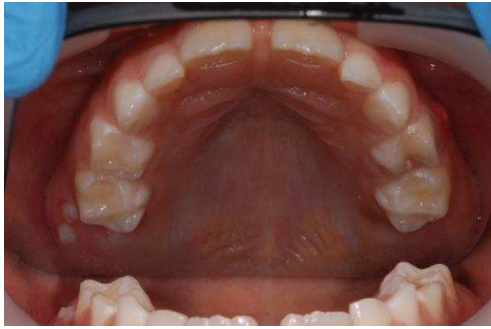


Figure 3b



Figure 3c&d

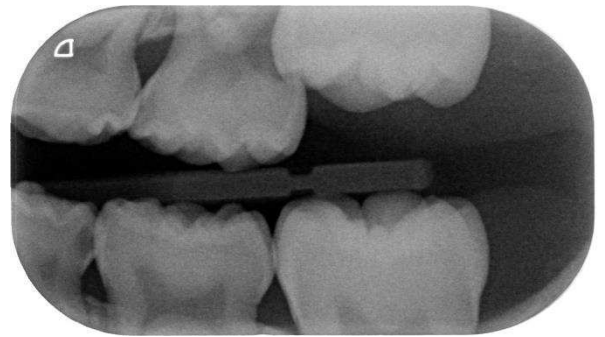


Figure 4

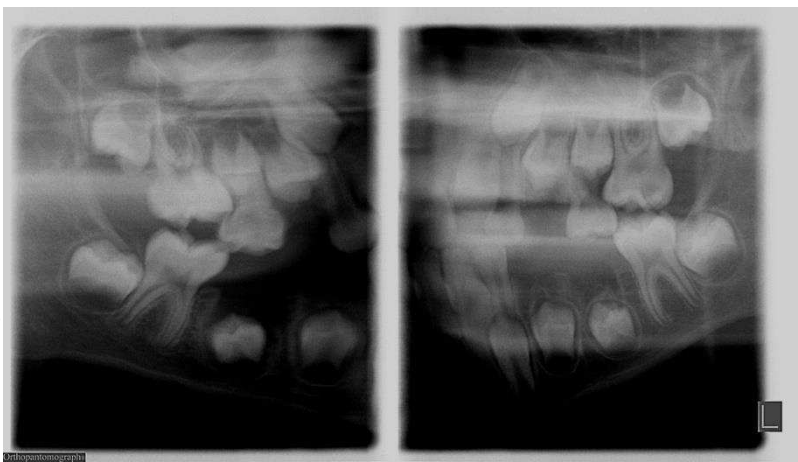


Figure 5a

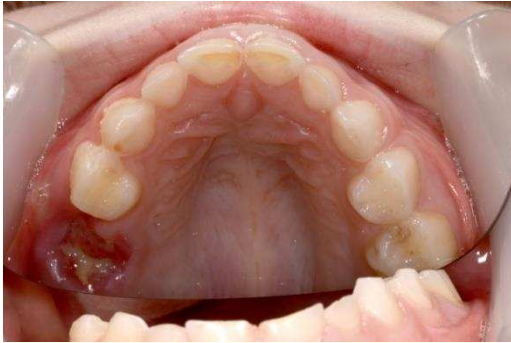


Figure 5b.



Figure 5c

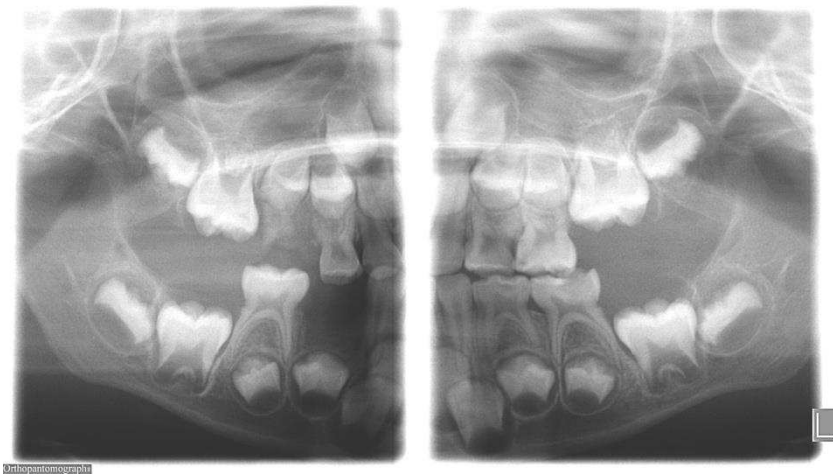


Figure 6

