Criteria for selecting children with special needs for dental treatment under general anaesthesia

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ABSTRACT

Objective: To study criteria for helping to select children with special needs for dental treatment under general anaesthesia.

Materials and methods: Group of 30 children (aged under 18) examined on the Course at the Universidad Complutense de Madrid (UCM) (Specialisation on holistic dental treatment of children with special needs) and subsequently referred to the Disabled Children's Oral Health Unit (DCOHU) within Primary Health Care Area 2 of the Madrid Health Service (SERMAS) where dental treatment under general anaesthesia was given during 2005.

Relevant data were taken from their case histories with regard to their general health, oral health and behaviour.

Results: In most of the children (22 children), it was possible to carry out a complete dental diagnosis. With regard to medical diagnoses, the most frequent pathology was cerebral palsy (8 children), but it was not possible to establish a link between the pathology and the use of general anaesthesia. With regard to oral health, most of the children received restorative treatment in all 4 quadrants (26 children). On the basis of scales for behavioural evaluation and movement, most of the children (17 children) showed clearly negative behaviour, with movements that interrupted or hindered examination.

Conclusions: With the exception of certain specific medical problems, the reasons for using general anaesthesia for dental treatment in children with special needs are extensive treatment needs and bad behaviour, both of which can be judged objectively.

Key words: *Children with special needs and general anaesthesia; selection criteria for general anaesthesia, behaviour and general anaesthesia.*

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INTRODUCTION

General anaesthesia (GA) can assist in providing quality dental care in many patients who could not be treated otherwise. This is especially true for children with special needs who increasingly attend dental clinics for treatment. In spite of the different resources available – psychological methods, physical restriction and sedation which should be used in a scaled way (1, 2) - in some cases it eventually becomes necessary to use GA for carrying out the necessary dental treatment. This should not be used systematically for the convenience of the dental team, but rather should be seen as the last resource for treatment (3).

Indications for the use of GA, as laid down in a number of studies (4-9), can be classified in three main groups:

A. Patients with general medical problems. When it is risky to treat them in the usual way. Sensory or mental problems. Physical disabilities with uncontrollable motor deficits making it impossible for them to collaborate. When local anaesthesia is not effective or for reasons of allergy. When there are uncontrollable epileptic crises.

B. Patients with extensive dental needs. When it is impossible to treat them in the clinic and for some reason they must be treated in a single session. Extensive orofacial trauma or fractured maxillae. With serious craneo-facial anomalies and the need for extensive dental care. This includes extractions, which are usually multiple, even in patients without other added problems.

C. Patients who do not collaborate. For reasons of fear or phobia. Because of incapacity for collaborating because of a physical or mental impairment or immaturity (age). Because treatment is rejected violently and any other type of control is impossible. Cases of severe autism and psychosis with uncontrollable behaviour.

Combinations of the above are frequent, and there may be added factors of a non-clinical, social nature.

Indications reflected in different proportions and percentages in the studies reviewed. Grytten and co-workers, 1989 (10), find that dental anxiety (86%) and associated medical problems (14%) are the main reasons for the use of GA in dental treatment for Scandinavian children. For Vermeulen and co-workers (11), the most frequent reasons are: rampant caries (75.3%), fear (35.6%), disability (23.3%), medical problems (10.5%). Behaviour problems / caries (76%) and disability / medical problem (19%) were the reasons for restorative treatment under general anaesthesia in the 80 children studied by O'Sullivan and Curzon (12). Minor oral surgery and handling problems were the most common reasons in the patients treated at the Eastman Dental Hospital in London (13).

Dental extractions were the most common arguments for treatment under general anaesthesia in children in the United Kingdom (14, 15). Although other reasons also justify the use of anaesthesia, such as mental disability, physical disability, medical complications or a combination (disability / complications) and behaviour problems without any added complication (16). In Northern Ireland, the main clinical and social reasons for referring children for GA are multiple extractions followed by anxiety or fear in the patients and very small children. Other reasons are patient or parental preference a prior history of poor cooperation (17).

Some studies evaluate changes in the use of GA. Few changes in the indications (dental anxiety and medical problems) for general anaesthesia were noted in Norwegian children during the period studied (1975 – 1983) (10). Nor did Bohaty and Spencer (18) find marked changes with indications continuing to be extensive treatment needs, anxious or fearful very small children and the mentally and/or physically disabled. In a London hospital from 1972 to 92, Mason and co-workers (1995) (19) found increased use of GA in older children and of surgical procedures related to orthodontic treatments although treatment of caries continued to be the main reason. In a Newcastle hospital (20), multiple disability, learning difficulty (including autism) and dental phobia continue to be the main reasons for treating children with general anaesthesia and, among the changes noted was a tendency to carry out more thorough treatments in younger children and, with regard to patient type, there was an increase in the number of children with a medical problem and of children requiring extensive treatment but who were either too small or too uncooperative to accept it.

More recently, extensive caries in younger-aged groups and an inability to accept treatment under local anaesthesia (21,22) were seen to be the main reasons for the use of GA, although a medical problem was the most usual reason in children aged over 9 (22). In the study by Cahuana and co-workers in 2003 (23), of 1,827 patients aged under 18 requiring general anaesthesia for treatment, 50.4% had a physical or mental disability.

Children with special needs accounted for the majority - 78 out of 96 children receiving dental treatment under GA, most of them having a learning disability (24). An added difficulty for treatment under GA is the pre-operation work-up (25) for both collecting information which patients are often unable to give and for carrying out a proper clinical examination.

Hulland and Sigal, 2000 (26) drew up criteria to help identify the disabled patients who are most likely to need GA for their dental treatment. In their retrospective study which included both adults and children, they found that the patients treated had the following characteristics in decreasing order of importance – behaviour problems (moderate to severe); mental retardation (moderate to severe); convulsive disorders (uncontrolled movements); scoliosis; autism; and regular anti-convulsion or psychotropic medication. The two factors most related to the use of GA were behaviour problems and mental retardation. The rest were considered co-factors.

The systemic conditions of these patients seemed to influence the treatment received with a large number of extractions (27), fewer conservation treatments (27-29) and treatment at older ages (29).

GA is a useful and necessary resource for this group of patients. It is recommended (16) that dental treatment should be all-inclusive and given in hospital and should include

subsequent support in the form of a preventive programme to prevent repeat operations.

Some publications, however, warn about excessive use of GA and the need to take into account a large number of factors, not all of them clinical, in the decision to reduce GA usage levels (30).

In a disabled population in Spain, Limereset al, 2003 (31) emphasised the importance of individualised pre-operation examination of severely disabled patients prior to dental treatment under general anaesthesia. Of the 564 patients referred for treatment under general anaesthesia to a specialist centre for dental care for special patients, 15% of patients did not need dental treatment at the time of the examination. In 42% of cases, the treatment was carried out under general anaesthesia and in 43% with local anaesthesia. They concluded that the systematic application of selection criteria for dental treatment under GA for the severely disabled reduced indiscriminate use of this technique for behaviour control, reducing complications and the need for repeat operations.

Some characteristics that can be considered usual in the use of GA include: extensive indications, referral by different professionals, greater need for use in children with special needs, need to select patients and coordinate with the Unit / Service that is to provide the treatment. With a view to establishing criteria that can help select patients (referral criteria), we reviewed the clinical histories of children receiving care on the Course at the Universidad Complutense de Madrid (Specialisation in holistic dental care for children with special needs) and referred for treatment under GA to the Disabled Children's Oral Health Unit (DCOHU) within Primary Health Care Area 2 of the Madrid Health Service (SERMAS). The most common aspects observed in the referred patients were analysed.

MATERIALS AND METHODS

Of a total of 148 patients aged under 18 receiving dental treatment at the time on the UCM Course for Experts on clinical dental care for disabled children, a total of 30 patients (20%) were referred to the Disabled Children's Oral Health Unit (DCOHU) within Primary Health Care Area 2 of the Madrid Health Service (SERMAS) for treatment and/or completion of dental treatment under general anaesthesia. Of them 21 were boys (M) aged between 6 and 16, and 9 (F) were girls aged between 7 and 16.

All the patients had a clinical history covering, among others, the following three sections:

A. Evaluation of general health

B. Evaluation of oral health

C. Evaluation of behaviour

With regard to the first of these sections, the normal protocol was followed for collecting information, starting with completion of a full health questionnaire by the parents. This was followed by a guided pre.-operative work-up carried out by a student on the UCM Course. Finally, photocopies of paediatric reports were requested, including any hospital treatment, analyses, etc. and included in the history. A diagnosis or diagnoses were then drawn up on the patient's health problems, medication, warning situations, etc.

Evaluation of oral health started out with consideration of prior treatment and the reason for consultation, before carrying out the clinical examination. If possible, any dental, gingivoperiodontal and soft tissue pathology was noted in the history. Two wing X-rays and one panoramic X-ray were taken systematically, where possible. When required for the diagnosis or as alternatives to the above, complementary occlusal and/or periapical X-rays were taken. The findings of the X-rays were also noted in the case history.

We then proceeded to evaluate behaviour, the aspect we considered most relevant for GA for dental treatment.

The behaviour of all the children was analysed on the basis of the amended Frankl scale (32) (Table 1). Only categories 3 and 4 were amended. These include patients who are cooperative but do not show clear signs of interacting verbally with the operator. Many patients are collaborative even though they are not able to carry out interactive communication with the operator because of their special conditions.

Also in patients in categories 1 and 2, movement during examination was evaluated on the basis of the scale drawn up by Houpt and co-workers (33) (Table 2), although these authors applied the scale during dental treatment on children under conscious sedation. We consider that movement (whether or not associated with shouting, crying and other manifestations of non-cooperative behaviour) may be a good indicator as to whether out-patient treatment can be give or not.

After completing the three sections of the case history, the most appropriate treatment plan for each patient was drawn up, following common principles in paediatric dentistry, with distribution by quadrants/sextants, and prioritisation of therapeutic needs (preventive, conservative, surgical). The treatments were recorded as follows:

- Preventive treatment (PT) which, in all patients, includes systematic scaling/cleaning and fluor application, also the placement of sealants where appropriate.
- Restorative treatment (RT) including pulp treatment in primary teeth and restorative treatment in both primary and permanent teeth.
- Surgical treatment (ST), including simple and impacted tooth extractions, gingivectomies, frenectomy and other minor oral surgery.

The abbreviations for the treatment given go with a number for the number of quadrants in which treatment was given. In the case of preventive treatment, the number is only given when sealants are placed.

Table 1. Frankl scale for evaluating behaviour (modified).

Category 1. Clearly negative.	Total lack of cooperation.
Category 2. Negative.	Signs of lack of cooperation.
Category 3. Positive.	Accepts treatment with caution. May require reminders (open mouth, hands down, etc..).
Category 4. Very cooperative.	No sign of resistance. Very cooperative.

Table 2. Scale for evaluating movement (Houpt and co-workers 1985) (modified).

1. Violent movement constantly interrupting examination.
2. Constant movements that hinder examination.
3. Controllable movements that do not interfere with the procedure.
4. Lack of movement.

RESULTS

The characteristics of the patients treated with general anaesthesia regarding the aspects considered key for referral – general health, oral health and behaviour – are given in Table 3.

- *Medical diagnosis*

The most usual systemic pathologies in this group were cerebral palsy present in 8 patients (6 girls and 2 boys) followed by autism (3 boys), Down's syndrome (3 boys) and syndrome with hyperactivity (3 boys). The other cases were less frequent syndromes and pathologies. There was a relatively high frequence of other medical conditions in addition to the main diagnosis (epilepsy, congenital alterations, etc.). In no cases did the pathology alone determine patient referral. In three patients in view of the extensive oral pathology, it was recommended that the treatment be given under general anaesthesia.

- *Behaviour*

In more than 50% of the children (17 children), behaviour classified as clearly negative (F1) was observed. Of these, in 10 movements interrupted the examination (H1) and in 7 hindered it (H2). Eleven patients exhibited non-collaborative behaviour (F2) with movements that hindered examination (H2) in 5 children and more controllable movements (H3) in another 5. In one child examination was impossible (H1).

- *Dental diagnosis*

In most of the children (22 children), it was possible to complete the clinical and X-ray examination (although the latter was not always complete and did not always include a panoramic X-ray). Although movements interrupted the examination in some of these patients, it was possible to carry out a diagnosis with the help of physical restrictions.

In the remainder (8 children), although it was considered that GA was necessary for treating an oral problem, the difficulties faced led us to discontinue the examination because we considered the information we sought would not lead to any substantial change in the treatment plan.

- *Treatment given*

Although we established a treatment plan in the patients for whom we were able to draw up a more or less complete dental diagnosis, the treatment eventually given in the DCOHU covered the services offered by the SERMAS (9) (Table 4).

Restorative treatments were the most frequent dental treatment, being given in 29 out of the 30 patients, with an average of 7.2 procedures per patient; followed by extractions in 18 patients, with an average of 7.2 procedures, and pulp treatments in just 7 patients, with an average of 2.4 procedures.

In 26 out of the 29 children, the restorative treatment involved the 4 quadrants, and half the children who received surgical treatment had extractions in 2 quadrants. All the patients, except one, receiving an extraction, also received conservation treatment.

Preventive treatment (professional cleaning / scaling and fluor application) was given in all the patients and in 24 of them sealants were applied. The number of sealants applied was 142, with an average of 5.9 per child.

DISCUSSION

The figures are surprisingly high for patients who, after referral for dental treatment with GA, were eventually and for different reasons treated without the need for GA – 48% in the Limeres and co-workers study (31) - and even without any special dental treatment being necessary. This is perhaps because patients are referred by professionals who are not familiar with dentistry. Although patient referrals came from many different sources, according to most studies the largest percentage of referrals are by general dentists – over 50% (14-16), between 41 and 50% (10, 12, 20, 24) and 21.5% in Alcaino (21); next come community dental services with 32% (24), 30% (20), 23% (15), also other non-dental health professionals (paediatricians, GPs, hospitals, institutions, etc.) with different percentages: 24% (11), 13% (10), 9% (20), 4% (21). The rising percentages lead some authors (16) to consider the need to strengthen collaboration with such groups which anyway are showing increasing interest in oral health. It is also of interest to note the high percentages of patients who call "on their own initiative", "on paternal initiative" without being referred: 42 and 34% (21), 35% (10), 24% and 16% (15). This seems to indicate that they are missing out on regular dental care. In our case, ours is a landmark centre for children with special needs who are referred to us by institutions, schools, associations, in many cases because local dentists have not been able to treat them. We in turn refer those who need GA for hospital treatment

Table 3. Characteristics of children referred to the DCOHU for dental treatment under general anaesthesia

Patient	Sex M/F	Age (years)	Diagnosis (Dx) (medical)	Behaviour (Scales F and H)	Dental dx (Cl; Rx; No)	Treatment given
1	M	6	Lennox syndrome	F-1; H-2	Cl	TP4;TR4
2	F	15	Cerebral palsy	F-1; H-1	Cl	TP3;TR4
3	F	11	Hydrocephalus	F-2; H-3	Cl + Rx	TP4;TR4
4	M	11	Autism	F-1; H-4	Cl	TP4;TR4
5	M	17	Down's syndrome	F-2; H-3	Cl + Rx	TP4;TR4;TQ4
6	M	9	Encephalopathy	F-2; H-2	Cl	TP;TR4;TQ2
7	F	10	Cerebral palsy	F-2; H-2	Cl	TP3;TR4
8	M	11	Down's syndrome	F-1; H-2	Cl	TP1;TR4;TQ2
9	M	13	Noonan's syndrome	F-2; H-3	Cl + Rx	TP3;TR4;TQ2
10	M	16	Psychomotor r.	F-1; H-1	No	TP4;TR4;TQ1
11	F	8	Encephalopathy	F-2; H-1	Cl	TP2;TR4;TQ2
12	M	10	Autism	F-1; H-1	No	TP1;TR4;TQ3
13	M	12	Hyperactive s.	F-1; H-2	Cl	TP4;TR2;TQ2
14	M	11	Chromosomopathy 7	F-1; H-1	No	TP4;TR2;TQ2
15	M	8	Hyperactive s.	F-1; H-1	No	TP42;TR4;TQ2
16	M	8	Autism	F-1; H1	No	TP4;TR4
17	M	6	Neurofibromatosis	F-2;H-2	Cl	TP3;TR3;TQ4
18	F	7	Cerebral palsy	F-1; H-2	Cl	TP3;TR4;TQ2
19	M	10	Cerebral palsy	F-1; H-2	Cl	TP;TR4;TQ1
20	F	9	Cat-cry syndrome	F-1; H-1	Cl	TP;TR4
21	F	12	Cerebral palsy	F-1; H-2	Cl	TP4;TR2;TQ1
22	M	11	Hyperactive s.	F-1; H-1	No	TP4;TR4
23	M	11	Leucodystrophy	F-3; H-3	Cl + Rx	TP2;TR4;TQ4
24	M	6	Trisomy 9	F-1; H-1	No	TP4;TR4
25	F	16	Cerebral palsy	F-1; H-2	Cl	TP4;TR4;TQ4
26	M	10	Tuberous sclerosis	F-2; H-3	Cl + Rx	TP4;TR4;TQ2
27	M	6	Down's syndrome	F-2; H-2	Cl + Rx	TP;TR4;TQ3
28	F	9	Cerebral palsy	F-2; H-2	Cl	TP4;TR4
29	M	16	Cerebral palsy	F-2; H-3	Cl + Rx	TP;TR4
30	m	9	Wagr syndrome	F-1; H-1	No	TP4;TR4

Sex: M – male, F - female
Scales F and H : Frankl and de Houpt scales and categories.
Dental diagnosis: Cl – Clinical diagnosis; Rx – radiographic diagnosis: No – a full diagnosis was not possible
Treatments given: TP – preventive treatment and number of quadrants in which sealants were applied; TR – restorative treatment and quadrants; TQ – surgical treatment and quadrants involved

Table 4. Dental treatments given in the DCOHU with GA in the children referred.

Patient	Fillings	Pulp treatments	Extractions	Sealants	Scaling / fluor
1	5			7	1
2	14	1		6	1
3	7			8	1
4	4			12	1
5	14	2	4	5	1
6	9		2		1
7	10			4	1
8	8		2	1	1
9	7		2	5	1
10	8	4	1	9	1
11	11	4	2	2	1
12	6		3	2	1
13	2	1	3	5	1
14	2		3	4	1
15	6		2	5	1
16	5			7	1
17	6		5		1
18	11	1	2	3	1
19	12	4	2		1
20	12				1
21	2		1	11	1
22	8			4	1
23	4		5	2	1
24	5			9	1
25			4	14	1
26	4		3	4	1
27	8		3		1
28	4			6	1
29	10				1
30	7			7	1
TOTAL procedures	**211**	**17**	**49**	**142**	**30**

The treatments given are those covered by the SERMAS

(20% of those studied).

Several sources of information should be considered when planning rational use of GA, aiming to reduce it and apply it only in patients for whom it is absolutely necessary. Some studies suggest that programmes should be drawn up for general dentists (10,11), offering information and skills for dealing with behaviour (21, 22). Many other non-clinical considerations and social factors (26) should also be taken into account.

In spite of the many different sources of information and many professionals involved, one study (17) recognises that the reasons given by 35 different clinics for referring the 190 patients covered by the study tally with the information collected in the pre-operation work-up.

Considering that many referrals come from dental professionals, we should try to establish which characteristics they can evaluate in order to achieve more appropriate patient referrals. It seems necessary to draw up selection criteria to reduce the use of GA.

We therefore drew up three pillars that we consider basic for assessing each case before taking a decision on the most appropriate dental treatment and where it should be given – general health, oral health and behaviour.

Regarding general health, the first question is to ask whether they are any specific systemic conditions associated with systematic use of GA. If so, then referral would seem to be appropriate rather than making unsuccessful attempts to give the dental treatment by other means. Although in certain pathologies and groups there is a larger proportion of patients: autism (26), autism and cerebral palsy (31), we were unable to find any direct link between a systemic pathology and the use of GA. Although disabling conditions coming together with medical problems in children treated with GA are covered in a number of publications (10-12, 15, 28) and in some cases were the main cause for referral (16, 20, 24-27, 31), few of these mention the specific weight of general health on its own for referral, excluding associated factors (behaviour, oral health, etc.). Hulland and et al (26), in an attempt to link general disorders in patients treated with GA, only found mental retardation (moderate to severe) as an associated factor, and considered the other disorders studied (autism, scoliosis, uncontrolled convulsive disorders and anticonvulsive and psychotropic medication) as co-factors.

It seems obvious that, although children with special needs account for a large proportion of patients treated with GA, the determining factor is not their general health. We should avoid establishing a link between diagnosis and referral, accepting that it is other associated characteristics that most influence the decision. It is precisely the other two pillars to be evaluated – oral health and behaviour – that provide the factors that bear most weight in the decision. This requires an effort on the part of the professionals involved in order to see treatment needs and the degree to which the child collaborates in an objective way. Regarding the dental diagnosis, it is essential to determine at least whether there is any oral pathology that needs to be treated with GA, to prevent the referral of patients having no pathology at all (31). In most children it is possible to carry out a clinical examination with the use of physical restriction. In our case we were able to carry out this examination in all 30 children and, in 22 of them, the study was completed with X-rays.

In general, it is the need for dental care together with behaviour that will determine the need for referral and this seems true for normally healthy children as well as for those with special needs. Some studies place priority on the extent of treatment (18,19) whereas others also associate this with children who are too small or uncollaborative because of fear, anxiety, disability (10-12,16,17,20-22,28). Even in cases referred for simple extractions, it is considered that the use of GA should be limited to very small children for treatment ni more than one sextant.

In our study, 26 of the 30 children received restorative treatment in 4 quadrants, and in half of the cases involving extractions, these included 2 quadrants.

The third pillar, also widely mentioned in different studies but difficult to evaluate, is behaviour. This, seen in the form of lack of collaboration for different reasons (dental anxiety, fear, age, disability, etc.), is another of the arguments given in most studies as a cause for referral (10-12, 16, 17, 20-28, 31). However, no explanation is given as to how the evaluation was carried out, perhaps because of a common idea amongst dentists regarding "difficult" patients. Although most authors agree that GA should be reserved for non-collaborating patients, we consider that we should find tools or criteria for evaluating this objectively. When linking GA with behaviour problems, Hulland (26) specifies that GA is more frequent in patients with moderate behaviour problems (in whom it is only possible to carry out preventive treatment in the dental clinic) or severe behaviour problems (when it is only possible to carry out examinations in the clinic). We have tried to establish an objective method of evaluation based on two scales that are widely used in paediatric dentistry and that enabled us to classify all the patients with regard to very negative or non-collaborative behaviour with the presence of movements that interrupted or hindered examinations.

CONCLUSIONS

In children with special needs, there may be circumstances justifying more frequent use of general anaesthesia for dental treatment. This does not mean that it will be necessary in all of them and requires that all the professionals involved should determine the need for GA in the most objective way possible. If referral criteria are used, professionals have to make an effort in diagnostic evaluation to justify referral and this should lead to more reasoned use of this technique, avoiding the complications that are associated with excessive use. These criteria include the need for extensive treatment and bad behaviour, both of which can be considered objectively, and to a lesser extent any associated medical problems. The use of such criteria should ensure wiser use of this auxiliary method for treating such patients.

REFERENCES

1. De Nova García MJ. Atención odontológica al paciente discapacitado. Manejo del comportamiento. En: Rapport. XV Congress of the International Association of Disability and Oral Health. IADH y SEOEME. Madrid: Aula Médica ediciones; 2000. p. 56-79.
2. De Nova García MJ. Manejo del comportamiento en el paciente discapacitado. En: Bullón Fernández P, Machuca Portillo G, editores. Tratamiento odontológico en pacientes especiales. 2ª ed. Madrid: Laboratorios Normón, Departamento de Publicaciones Científicas; 2004. p. 613-53.
3. Fox LA. The handicapped child: a prelude to care. Dent Clin North Am. 1974 Jul;18(3):535-44.
4. Machuca G, Machuca C, Velasco E, Martínez-Sahuquillo JM, Ríos JV, Martínez-Sahuquillo A, et al. El tratamiento odontológico integrado bajo anestesia general: condicionantes e indicaciones. Av Odontoestomatol 1996;12:465-75.
5. Facal M, Costa F, Cruces L. Utilización de la anestesia general para el tratamiento de pacientes especiales. Indicaciones y protocolo de actuación. Cuidados Odontológicos Especiales 1996;3:5-15.
6. López J, Giménez MJ, Silvestre FJ, Guinda J. Anestesia general en odontología. Cuidados Odontológicos Especiales 1997;4:45-53.
7. Molina JD, Villalón A, Martín V, de las Cuevas C, Estévez Z. Atención odontológica hospitalaria a pacientes discapacitados con anestesia general. Av Odontoestomatol 1998;14:485-92.
8. Vargas Roman Mdel P, Rodriguez Bermudo S, Machuca Portillo G. Dental treatment under general anesthesia: a useful procedure in the third millennium? (I). Med Oral. 2003 Mar-Apr;8(2):129-35.
9. Martín-Sanjuan C, Carracedo-Cabaleiro E, Mourelle-Martínez R, de Nova-García J. Atención odontológica infantil integrada con anestesia general. Arch Odontoestomatol 2005;21:399-406.
10. Grytten J, Holst D, Dyrberg L, Faehn O. Some characteristics of patients given dental treatment under general anesthesia. Acta Odontol Scand. 1989 Feb;47(1):1-5.
11. Vermeulen M, Vinckier F, Vandenbroucke J. Dental general anesthesia: clinical characteristics of 933 patients. ASDC J Dent Child. 1991 Jan-Feb;58(1):27-30.
12. O'Sullivan EA, Curzon ME. The efficacy of comprehensive dental care for children under general anesthesia. Br Dent J. 1991 Jul 20;171(2):56-8.
13. Holt RD, Chidiac RH, Rule DC. Dental treatment for children under general anaesthesia in day care facilities at a London dental hospital. Br Dent J. 1991 Apr 6;170(7):262-6.
14. Smallridge JA, Al Ghanim N, Holt RD. The use of general anaesthesia for tooth extraction for child out-patients at a London dental hospital. Br Dent J. 1990 Jun 9;168(11):438-40.
15. Holt RD, Rule DC, Davenport ES, Fung DE. The use of general anaesthesia for tooth extraction in children in London: a multi-centre study. Br Dent J. 1992 Dec 5-19;173(10):333-9.
16. Wong FS, Fearne JM, Brook AH. Planning future general anaesthetic services in paediatric dentistry on the basis of evidence: an analysis of children treated in the Day Stay Centre at the Royal Hospitals NHS Trust, London, between 1985-95. Int Dent J. 1997 Oct;47(5):285-92.
17. MacCormac C, Kinirons M. Reasons for referral of children to a general anaesthetic service in Northern Ireland. Int J Paediatr Dent. 1998 Sep;8(3):191-6.
18. Bohaty B, Spencer P. Trends in dental treatment rendered under general anesthesia, 1978 to 1990. J Clin Pediatr Dent. 1992 Spring;16(3):222-4.
19. Mason C, Holt RD, Rule DC. The changing pattern of day-care treatment for children in a London dental teaching hospital. Br Dent J. 1995 Aug 19;179(4):136-40.
20. Nunn JH, Davidson G, Gordon PH, Storrs J. A retrospective review of a service to provide comprehensive dental care under general anesthesia. Spec Care Dentist. 1995 May-Jun;15(3):97-101.
21. Alcaino E, Kilpatrick NM, Smith ED. Utilization of day stay general anaesthesia for the provision of dental treatment to children in New South Wales, Australia. Int J Paediatr Dent. 2000 Sep;10(3):206-12.
22. Jamjoom MM, Al-Malik MI, Holt RD, El-Nassry A. Dental treatment under general anaesthesia at a hospital in Jeddah, Saudi Arabia. Int J Paediatr Dent. 2001 Mar;11(2):110-6.
23. Cahuana A, Reverón L, El Halabi L. Odontopediatría y anestesia general. Revisión casuística. Arch Odontoestomatol 2003;19:240-4.
24. Mitchell L, Murray JJ. Management of the handicapped and the anxious child: a retrospective study of dental treatment carried out under general anaesthesia. J Paediatr Dent. 1985 Apr;1(1):9-14.
25. Haywood PT, Karalliedde LD. General anesthesia for disabled patients in dental practice. Anesth Prog. 1998 Fall;45(4):134-8.
26. Hulland S, Sigal MJ. Hospital-based dental care for persons with disabilities: a study of patient selection criteria. Spec Care Dentist. 2000 Jul-Aug;20(4):131-8.
27. Harrison MG, Roberts GJ. Comprehensive dental treatment of healthy and chronically sick children under intubation general anaesthesia during a 5-year period. Br Dent J. 1998 May 23;184(10):503-6.
28. Ibricevic H, Al-Jame Q, Honkala S. Pediatric dental procedures under general anesthesia at the Amiri Hospital in Kuwait. J Clin Pediatr Dent. 2001 Summer;25(4):337-42.
29. Haubek D, Fuglsang M, Poulsen S, Rolling I. Dental treatment of children referred to general anaesthesia--association with country of origin and medical status. Int J Paediatr Dent. 2006 Jul;16(4):239-46.
30. Hastings GB, Lawther S, Eadie DR, Haywood A, Lowry R, Evans D. General anaesthesia: who decides, and why. Br Dent J. 1994 Nov 5;177(9):332-4.
31. Limeres Posse J, Vazquez Garcia E, Medina Henriquez J, Tomas Carmona I, Fernandez Feijoo J, Diz Dios P. Pre-assessment of severely handicapped patients suitable of dental treatment under general anesthesia. Med Oral. 2003 Nov-Dec;8(5):353-60.
32. Roberts SM, Wilson CF, Seale NS, McWhorter AG. Evaluation of morphine as compared to meperidine when administered to the moderately anxious pediatric dental patient. Pediatr Dent. 1992 Sep-Oct;14(5):306-13.
33. Houpt MI, Sheskin RB, Koenigsberg SR, Desjardins PJ, Shey Z. Assessing chloral hydrate dosage for young children. ASDC J Dent Child. 1985 Sep-Oct;52(5):364-9.