An investigation of patient management methods used for orthodontic extractions by general dental practitioners in North West England

A. R. Shepherd,¹ and F. J. Hill,²

Objective To quantify the patient management methods used by dental practitioners for orthodontic extractions and to determine what factors influence their choice of method.

Design Practitioners working in the General Dental Service in the area of the former North West Regional Health Authority were randomly sampled and sent a postal questionnaire.

Setting General Dental Service in the North West of England.

Subjects 204 completed questionnaires were returned; a response rate of 71.1%.

Interventions Practitioners were asked about the patient management methods that they used for orthodontic extractions and what factors were important in choosing to use a general anaesthetic.

Outcome measures The mean percentages of patients treated with local anaesthetic alone, general anaesthesia and inhalation sedation with local anaesthesia were calculated for the sample. Factors influencing the choice of method used were scored by the practitioners on a ten point scale.

Results Local anaesthesia alone was used for two thirds of orthodontic extraction patients and general anaesthesia for one third. Inhalation sedation was rarely used. Poor patient cooperation and a nervous patient were the most important factors in choosing a general anaesthetic.

Conclusions Local anaesthesia is used for the majority of orthodontic extractions. However there remains an overuse of general anaesthesia and an underuse of inhalation sedation.

In the United Kingdom general anaesthesia has long been regarded as the method of choice for controlling behaviour in children needing dental extractions. However, general anaesthetics given for dental purposes carry a small but definite risk of mortality and since the 1960s a series of expert reports has emphasised the importance of developing and employing alternative safer methods. In 1989 the Department of Health commissioned a working party to report on these issues and subsequently the 'Poswilllo Report' (1990) made several important recommendations.¹ One of these was that conscious sedation by the inhala-

tion of nitrous oxide — oxygen mixtures (IS) should be recognised as a safe and effective alternative to general anaesthesia and that its use should be encouraged, especially for children.

Although previous work has established that orthodontic extractions can be carried out very successfully with IS and local anaesthesia,^{2–5} the traditional use of general anaesthesia persists.⁶ However the extent to which dentists employ this and other management techniques for this purpose is unknown.

An investigation was therefore undertaken to quantify the patient management methods used by a defined group of dental practitioners for orthodontic extractions and to determine what factors may influence their choice of method, particularly in relation to general anaesthesia and inhalation sedation.

Methods

The population of dentists which was sampled was defined by a database which was produced in March 1995 to provide the names and practice addresses of all dentists listed as working in General Dental Services in the area of the former North West Regional Health Authority. From this population of around 1,500 general practitioners, a one-in-five random sample was taken by choosing every fifth name after a random start. To avoid using more than one practitioner from the same practice, when a practice was repeated, the next dentist on the list was substituted.

In the Autumn of 1996 the targeted practitioners in this sample were then sent by post a questionnaire, an explanatory letter and a pre-paid return envelope. The questionnaire had been piloted by sending it to a small number of practitioners and then slightly modified prior to the main mailing. The questions are given together with the results obtained in the next section. Reminder letters and a further questionnaire were sent to those practitioners who failed to respond within 3 weeks.

Appropriate statistical comparisons were undertaken using student *t* and chi-squared analysis.

Results

Of the 287 targeted practitioners making up the sample, 204 returned a questionnaire: a response rate of 71.1%.

Practitioners were asked to estimate the percentages of their patients requiring orthodontic extractions who were treated with one of three management methods:

- Local anaesthesia alone (LA)
- General anaesthesia (GA)
- Inhalation sedation and local anaesthesia (IS).

The average percentage usages are shown in Table 1 where it is

¹Community Dental Officer, Oldham NHS Trust, Cannon Street Health Centre, Cannon Street, Oldham OL9 6EP; ²Consultant in Paediatric Dentistry, University Dental Hospital of Manchester, Higher Cambridge Street, Manchester M15 6FH

*Correspondence to: F. J. Hill

REFEREED PAPER

Received 8.03.99; accepted 13.12.99

© British Dental Journal 2000; 180: 614–616

Table 1 Mean estimated percentages of patients having orthodontic extractions with three different management methods, for three groups of practitioners

	All dentists <i>n</i> = 204	Frequent GA users <i>n</i> = 32	Frequent IS users <i>n</i> = 8
Local anaesthesia alone	66.7	16.1	25.5
General anaesthesia	31.2	83.9	26.3
Local anaesthesia and sedation	2.1	0	48.2

Table 2 The numbers and (percentages) of practitioners with general anaesthetic facilities at their practices by frequency of use of general anaesthesia

	Frequent GA users	Remaining practitioners
GA facilities	17 (53.1)	32 (18.6)
No GA facilities	15 (46.9)	140 (81.4)
	32	172

Chi squared (with Yates' correction) = 16.99
P < 0.0001 *df* = 1.

seen that local anaesthesia alone was used for two thirds of orthodontic extraction patients, and general anaesthesia for nearly one third. Inhalation sedation was rarely used, the average usage being only 2.1% of patients.

Using the responses to this initial question two subgroups were defined within the sample:

Frequent GA users: This subgroup consisted of 32 practitioners whose reported usage of general anaesthesia was at least twice the average of 31.2% for the whole sample.

Frequent IS users: This much smaller subgroup consisted of eight practitioners whose reported usage of inhalation sedation and general anaesthesia was at least twice the average of 2.1% for the whole sample. Although for convenience inclusion in this group required a minimum reported sedation usage of only 4.2%, it is seen that on average these eight practitioners used sedation for almost half of their orthodontic extraction patients (Table 1).

Table 1 also compares the practices of these two subgroups with that of the whole sample. It is seen that the 'frequent GA users' estimated using general anaesthesia for 83.9% of their orthodontic extraction patients, the remainder of only 16.1% being treated with local anaesthesia alone and inhalation sedation not being used.

The practice of 'frequent IS users' is more complex: inhalation sedation is used to support local anaesthesia for nearly half (48.2%) of orthodontic extraction patients, but it is the use of local anaesthesia alone (22.5%) rather than of general anaesthesia (26.3%) which is markedly less than in the whole sample.

The questionnaire asked dentists to state whether or not they held general anaesthetic sessions in their practices and 49 of the 204 had this facility (24.0%). Table 2 examines the relation between this ready access to general anaesthesia and its usage by dividing the total sample into frequent GA users as described above and the remainder. It is seen that 53.1% of frequent GA users had facilities at their own practices in contrast to only 18.6% of less frequent users.

The reasons for choosing general anaesthesia for orthodontic extractions were also examined with the questionnaire by asking

practitioners to score the importance of each of six factors on a ten point scale (0 = no importance, 10 = great importance). Table 3 compares frequent and less frequent GA users according to the importance scores given for each factor (mean $\pm$ SD). Both groups produced similar mean scores for the five following factors.

- The patient has cooperated poorly with previous treatment
- The patient is nervous about having any treatment
- The patient requests general anaesthesia
- The patient's parent requests general anaesthesia
- The patient and parent want all the extractions to be completed in one visit.

The two groups differed significantly in the importance given to the factor listed in the questionnaire as 'patient needs extractions from all four quadrants'. The frequent GA users scored this factor quite highly (7.15) while the less frequent GA users did not (4.62).

Discussion

In recent decades the traditional use of general anaesthesia for routine dental extractions in Britain has been increasingly questioned, most recently in the important guidance document issued to dentists by the General Dental Council in 1998.⁷ These developments will have far-reaching effects on dental practice and it is important therefore to evaluate alternative management methods and to investigate factors which contribute to the continuing and probably excessive use of general anaesthesia.

The extent to which practitioners use different management methods for orthodontic extractions was previously unknown and the findings of this investigation that local anaesthesia alone is used for an estimated two thirds of patients needing this treatment was initially encouraging. However, because a number of studies has shown that almost all such patients can be treated without recourse to general anaesthesia, attention should now focus on reducing the continuing use of general anaesthesia for the remaining third of patients.

Inhalation sedation was little used by the sampled practitioners with an estimated average of only 2.1% of orthodontic extraction patients being treated with this method. However, it was possible to

Table 3 The importance attached by practitioners to factors which may influence the decision to use general anaesthesia for orthodontic extractions

	Frequent GA Users <i>n</i> = 32		Remaining practitioners <i>n</i> = 172		<i>t</i> / <i>P</i> values
	Mean	SD	Mean	SD	
Poor cooperation	8.58	0.97	8.35	1.85	<i>t</i> = 0.67 <i>P</i> = 0.5
Nervous	8.02	1.86	7.83	1.90	<i>t</i> = 0.51 <i>P</i> = 0.61
Patient requests GA	7.75	1.90	7.64	2.17	<i>t</i> = 0.26 <i>P</i> = 0.79
Multiquadrant extractions	7.15	2.86	4.62	3.28	<i>t</i> = 4.0 <i>P</i> < 0.0001
Parent requests GA	6.92	2.51	6.76	2.61	<i>t</i> = 0.31 <i>P</i> = 0.75
1 visit only requested	6.72	2.83	6.38	2.75	<i>t</i> = 0.63 <i>P</i> = 0.53

define a small group of eight practitioners who reported using inhalation sedation for almost half of their patients. Although this group clearly possessed the equipment and skills to administer inhalation sedation, it is important to note that their reported use of general anaesthesia was not markedly less than that of the whole sample (26.3 v 31.2% of patients). It would seem therefore that in this population of dentists inhalation sedation was used to support patients most of whom would have accepted treatment with local anaesthesia alone, rather than as an alternative to general anaesthesia. This is a very disappointing finding because in at least two of the relevant clinical trials^{2,5} inhalation sedation was used very successfully to treat patients who had been referred specifically for extractions under general anaesthesia.

As anticipated a major factor which influences practitioners' use of general anaesthesia is its availability in their own practices, reflecting in part the need to maximise the use of facilities which are expensive to purchase, install and maintain. Equipment for the administration and scavenging of inhalation sedation is similarly expensive and in addition treatment with this method takes much more surgery time than with general anaesthesia.^{2,5} These financial implications will need to be addressed if the use of inhalation sedation in general practice is to increase, with concurrent reductions in the use of general anaesthesia.

The clinical factors which influenced dentists in their decision to use general anaesthesia should be considered in relation to the alternative use of local anaesthesia supported by inhalation sedation. It is certainly true that many parents and children will request general anaesthesia for extractions, particularly if there is no alternative to local anaesthesia alone, emphasising the need to develop and publicise more widely available sedation services. Apprehensive and potentially uncooperative patients are almost always helped by inhalation sedation and with the use of appropriate local

anaesthetic infiltration techniques multi-quadrant premolar extractions can routinely be completed in one visit.⁵

Conclusion

It is difficult to justify the continuing use of general anaesthesia for orthodontic extractions, except in terms of the very limited availability of more acceptable sedation services. The results of this study suggest that in order to change this common area of dental practice a two-pronged approach will be needed. First the use of inhalation sedation should be encouraged with appropriate education, training and financial incentives. However if the growth of sedation services is to be accompanied by a corresponding reduction in the use of general anaesthesia, it will also be necessary to place further constraints on the use of this traditional but now unacceptable approach to orthodontic extractions.

- 1 Report of an expert working party. *General anaesthesia, sedation and resuscitation in dentistry*. London: Department of Health, 1990, publication no PL/CDO (90) 4.
- 2 Blain K M, Hill F J. The use of inhalation sedation and local anaesthesia as an alternative to general anaesthesia for dental extractions in children. *Br Dent J* 1998; **184**: 608-611.
- 3 Crawford A N. The use of nitrous oxide-oxygen inhalation sedation with local anaesthesia as an alternative to general anaesthesia for dental extractions in children. *Br Dent J* 1990; **168**: 395-398.
- 4 Shaw A J, Meehan J G, Kilpatrick N M, Welbury R R. The use of inhalation sedation and local anaesthesia instead of general anaesthesia for extractions and minor oral surgery in children: a prospective study. *Int J Paed Dent* 1996; **6**: 7-11.
- 5 Shepherd A R, Hill F J. Orthodontic extractions: a comparative study of inhalation sedation and local anaesthesia. *Br Dent J* 2000; **188**: 329-331.
- 6 Shaw A, Weatherill S. Is general anaesthesia for orthodontic extractions in children really necessary? *Br Dent J* 1996; **181**: 6-7.
- 7 General Dental Council. *Maintaining standards: Guidance to dentists on professional and personal conduct*. November 1998.

A change in recording tooth notation

The BDJ has traditionally adopted the Palmer tooth notation as the first choice for recording individual teeth in papers and articles. This system, very familiar to dentists in the UK, is reproduced below for both adult and deciduous teeth.

87654321 12345678	EDCBA ABCDE
87654321 12345678	EDCBA ABCDE

In future we are changing the actual way the Palmer system is written because of difficulties of converting the familiar grid format to our website. Instead the position on the grid will be written using the shorthand UR for upper right, UL for upper left, LL for lower left and LR for lower right.

Thus 7 becomes UR7 and 5 is written as LL5. Groups of teeth will be recorded as best we can, so for example 54 will become UR5 and UR4, while 2345 will be written as UL2 to UL5.

Obviously the same will apply to deciduous teeth, for example E will be written as URE.

The FDI notation will still be written in brackets after the Palmer notation, using the familiar FDI notation as described below:

18 17 16 15 14 13 12 11 21 22 23 24 25 26 27 28	for adult teeth
48 47 46 45 44 43 42 41 31 32 33 34 35 36 37 38	

and	55 54 53 52 51 61 62 63 64 65	for deciduous teeth
	85 84 83 82 81 71 72 73 74 75	

Thus using both systems, 7 will be written as UR7 (17) and 5 will become LL5 (35).