

PARENTAL ANXIETY AND CHILD BEHAVIOUR DURING DENTAL SEDATION AND GENERAL ANAESTHESIA

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Abstract

This study primarily sought to compare levels of child behaviour and parental anxiety during tooth extraction under inhalation sedation (IS) or general anaesthesia (GA). A prospective study was carried out within the Charles Clifford Dental Hospital, Sheffield, UK. The sample comprised 46 IS patients (mean age 11.5 years) and 48 GA patients (mean age 9.4 years) who attended the hospital for dental extractions. Child behaviour was assessed before, during and after treatment using a Frankl Scale. After treatment, parents completed a questionnaire, which sought a measure of parental anxiety before and during treatment, and parental satisfaction with the treatment outcome. Visual Analogues Scales (VAS) were employed to grade the responses. The majority of children complied well throughout their treatment, with no significant differences in parental assessment of child anxiety levels between IS and GA patients. However, GA parents were significantly more anxious than IS parents before and during treatment. About a third of GA parents reported they were worried about the risks of GA. Conclusion; It would appear that parents of children undergoing a GA are significantly more anxious about the treatment than IS parents. Furthermore, IS has been shown to be a viable alternative to GA in alleviating anxiety in children and their parents during tooth extractions.

Introduction

Tooth removal is considered to be one of the most distressing and traumatic dental treatment procedures experienced by children. In order to alleviate some of the anxiety associated

with dental extractions, treatment may be provided under general anaesthesia (GA) in selected cases. Although GA is a well-accepted approach to reduce pain and anxiety during dental treatment, it carries a risk of serious morbidity and even death.

These known risks have stimulated a series of reports and clinical guidelines over the last decade, leading to the restriction of dental GA's to the hospital setting and the promotion of inhalation sedation (IS) as an alternative to GA^{1,2}.

In recent years a number of studies have been carried out to investigate the use of IS, in preference to GA, for dental extractions. Success rates in excess of 80% have been reported for children undergoing dental extractions under IS^{3,4,5}. However, when given the choice between IS or GA, children requiring dental extractions are twice as likely to opt for a GA than IS⁶.

It is important that dental professionals are able to identify and address any patient or parental anxieties prior to treatment, thus ensuring that the most appropriate management techniques are employed and successful outcomes are maximised. The present study sought to compare the degree of anxiety associated with treatment under IS and GA in both children and their parents in a dental setting. The specific objectives were to assess: i) the behaviour of each patient throughout treatment; ii) the anxiety levels of parents and patients, and iii) the degree of parental satisfaction with the treatment provided.

Materials and methods

Study population

The study sample was drawn from children attending the Charles Clifford Dental Hospital (CCDH), Sheffield, UK. Two study groups were devised each comprising 50 patients, group one included children attending the paediatric dental clinic, for extractions under inhalation sedation, and group two included children attending the out-patient theatre for extractions under general anaesthesia. All patients had been initially assessed in the

paediatric dental clinic for treatment planning and to determine their suitability to receive treatment under IS or GA. Appropriate risks of the procedure and pre-operative instructions were discussed fully at this assessment. Only medically fit and well children were included in the study. Accompanying parents were invited to take part in the study prior to their child's treatment. Informed consent was obtained for the investigator to observe the patient throughout the treatment and to interview the parent after the treatment. The patient was not involved in the interviews.

Measures of anxiety

The Frankl Scale (FS) was used to assess the behaviour of each child during its treatment⁷. This four-point scale is based on an assessment of overall behaviour as follows⁷:

- Category 1 – Definitely negative: refusal of treatment, crying forcefully, fearful, or any other overt evidence of extreme negativism.
- Category 2 – Negative: reluctant to accept treatment, unco-operative, some evidence of negative attitude but not pronounced, i.e. sullen, withdrawn.
- Category 3 – Positive: acceptance of treatment; at times cautious, willingness to comply, at times with reservation but follows direction co-operatively.
- Category 4 – Definitely positive: good rapport, interested in the procedure, laughing and enjoying the situation.

All assessments were undertaken by one investigator (AT).

A simple Visual Analogue Scale (VAS) was employed to

quantify the level of anxiety reported by the accompanying parent⁸. This comprised a 100 mm scale with bipolar extremes of anxiety (e.g. 0=not anxious at all, 100=extremely anxious). The VAS has been shown to be a valid and reliable measure of anxiety⁹. Five questions were posed to the accompanying parent, which sought a graded response, regarding: anxiety of parent before and during the child's treatment; parental assessment of their child's anxiety before and during treatment, and parental satisfaction with the treatment outcome. All VAS measurements were obtained by one investigator (AT) using a 10 cm ruler. Parents were also asked to indicate what form of treatment they would choose if their child required extractions in the future (GA, IS or unsure). Finally, the parent was asked to state which part, if any, of the treatment they felt most anxious about.

Procedure

The following data were recorded for each patient: age and gender and previous personal or sibling experience of IS or GA. The investigator (AT) observed each child throughout their treatment and graded their behaviour using the Frankl Scale at three stages: stage 1 (on entering the surgery), stage 2 (on mask application and during treatment) and stage 3 (during the recovery period). For patients treated under IS, observation was done via a one-way mirror to avoid any upset that could be caused by the investigator's presence in the surgery. Following the recovery period, the parent was re-approached and invited to complete the questionnaire. During the study period, two

senior paediatric dentists provided the treatment under IS. However, a number of different oral surgeons and anaesthetists provided the treatment under GA.

Statistical analysis

Chi-square tests were used to assess statistically differences between IS and GA groups for the following categorical data at the 95% level of significance: gender, patient's previous experience of IS or GA, and siblings' past experience of IS or GA. Independent sample T-tests were employed for the following continuous data: age of subjects and VAS scores for reported levels of parental and child anxiety and satisfaction of the treatment outcome. Significance levels were set at $p < 0.05$.

Results

Of the 100 children who participated in the study, 94 (46=IS, 48=GA) accepted and completed their treatment. The six subjects who failed to complete their treatment were excluded from the subsequent analysis. No parents refused to take part in the study.

Profile of subjects and previous treatment experience

Table 1 records demographic details and previous treatment experiences of the 94 children included in the study. It can be seen that the mean age of IS subjects was 11.5 years, and that of the GA subjects was 9.4 years, with IS patients being significantly older than the GA subjects ($p < 0.05$). However, there was an equal gender distribution

Table 1. Demographic profile and past treatment experiences of study population

Variable	Study group	
	IS (n = 46)	GA (n = 48)
<i>Age (in years)</i>		
Mean	11.5	9.4
SD	2.66	1.33
Range	5.5 -15.3	8.0 -13.8
<i>Gender</i>		
Male n(%)	20 (43.5%)	23 (47.9%)
Female n(%)	26 (56.5%)	25 (52.1%)
<i>Previous treatment experience</i>		
IS n(%)	19 (41.3%)	1 (2.1%)
GA n(%)	14 (30.4%)	21 (43.8%)
None n(%)	13 (28.3%)	26 (54.1%)
<i>Siblings' previous experience</i>		
IS n(%)	3 (6.5%)	0
GA n(%)	11 (23.9%)	19 (39.6%)
None n(%)	24 (52.2%)	23 (47.9%)
Patients without any siblings n(%)	8 (17.4%)	6 (12.5%)

IS = Children receiving inhalation sedation.

GA = Children receiving general anaesthesia sedation.

Table 2. Visual analogue scores (VAS) for self-reported levels of parental anxiety and parental assessment of child's anxiety before and during extractions under inhalation sedation (IS) and general anaesthesia (GA)

	Mean VAS (±SD)	
	IS group (n = 46)	GA group (n = 48)
<i>Parental assessment of child's anxiety</i>		
Before treatment	44.8 (± 35.61)	44.5 (± 34.71)
During treatment	40.7 (± 30.83)	41.8 (± 35.70)
<i>Parental assessment of own anxiety</i>		
Before treatment	36.3 (± 31.03)	53.7 (± 33.76)*
During treatment	36.3 (± 30.17)	57.8 (± 33.22)*

VAS=0, not at all anxious; VAS=100, highly anxious

significant difference between IS and GA groups, * $p < 0.05$, independent t test

across the two groups with females constituting just over half of the subjects (IS = 56.6%, GA = 52.1%). Overall, 21.3% (n=20) of the subjects had experienced IS previously, which was less than the 37.2 % (n=35) who had undergone a previous GA. Just under half of the study population had no past experience of either forms of treatment (n=43, 45.7%). Chi-square tests revealed that IS

subjects had a significantly greater previous experience of IS ($\chi^2 = 20.88$, 1df, $p < 0.001$) than their GA counterparts but there was no significant difference for previous GA experience ($\chi^2 = 1.26$, 1df, $p > 0.05$). No statistical differences were found between the two groups regarding their siblings' past experience of IS ($\chi^2 = 3.88$, 1df, $p > 0.05$) or GA ($\chi^2 = 2.69$, 1df, $p > 0.05$).

Table 3. Reported reasons for parental anxiety

Reason given	Frequency of response n(%)
<i>Inhalation sedation group (n=46)</i>	
Nothing reported	18 (39.1%)
Child's first experience of IS	1 (2.2%)
Needles / Injections	8 (17.4%)
"Taking the tooth out"	11 (23.9%)
When child's jaw dislocated	1 (2.2%)
"Not knowing what to expect"	3 (6.5%)
Everything about the treatment	3 (6.5%)
Watching the treatment	1 (2.2%)
<i>General anaesthetic group (n=48)</i>	
Nothing reported	15 (31.3%)
Explaining the procedure to the child	1 (2.1%)
Coming to have treatment	1 (2.1%)
The risk of GA / "fear of things going wrong"	13 (27.1%)
Entering the operating theatre	1 (2.1%)
"When the child was being put to sleep"	6 (12.5%)
Waiting for child to come out of the theatre	2 (4.2%)
Waiting for child to wake up during recovery	6 (12.5%)
Reaction of child to the GA	4 (8.3%)
After-care of child at home	1 (2.1%)

Assessment of patient behaviour

Figure 1 summarises the Frankl behavioural scores for IS and GA patients at the three stages of observation described previously. It can be seen that, overall, the vast majority of patients in both groups behaved positively or very positively throughout their treatment. At stages 1 and 2, there was no significant difference in the percentage of IS or GA patients who were rated as having positive or definitely positive behaviour ($p > 0.05$). However, during stage 3, the proportion of IS patients with positive or definitely positive behaviour was significantly higher than that noted for the GA patients ($\chi^2 = 10.24, 1df, p < 0.01$)

Parental assessment of anxiety levels

Parents were asked to describe their own anxiety levels

and that of their child. Dental anxiety was recorded at two stages (before and during treatment) for parents and children using a VAS. The means and standard deviations of the scores are presented in Table 2.

It was found that parents of both IS and GA subjects rated their children as being moderately anxious before and during treatment. The mean VAS for IS and GA subjects pre-treatment was 44.8 and 44.5 respectively. Interestingly, during treatment the mean scores for both groups decreased slightly, indicating that parents viewed their child as becoming a little less anxious (IS=40.7; GA=41.8).

However, self-reported levels of anxiety for the parents themselves were quite different between the two groups. The mean VAS for IS and GA parents pre-treatment were 36.3 and 53.7 respectively. Anxiety levels remained constant during treatment

for IS parents (VAS=36.3) but rose slightly in GA parents (VAS=57.8). Independent-sample T-tests showed that GA parents were significantly more anxious than IS parents both before treatment ($p < 0.05$) and during the treatment itself ($p < 0.001$).

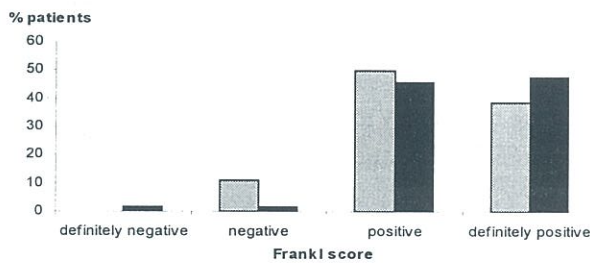
Parental assessment of treatment outcome

Parents were asked to rate how satisfied they were with the treatment outcome by indicating whether it was better (score 0) or worse than they had expected (score 100) using a VAS. As can be seen from Figure 2, parents from both groups gave very positive feedback with 30 (65.2%) IS parents, and 24 (50%) GA parents giving a VAS score of less than 10.0. There was no significant difference in the mean satisfaction score for IS parents (VAS=11.4, SD=15.0) as compared to GA parents (VAS=14.9, SD=14.9) ($p > 0.05$, independent sample T-test).

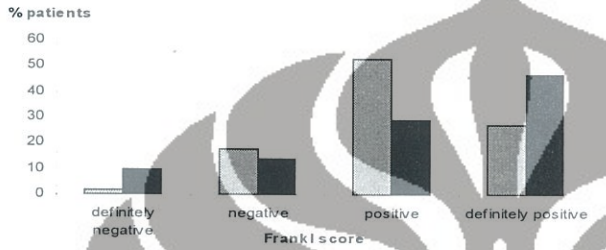
Parents were also asked to simply state which part of their child's treatment had caused them the most anxiety is in Table 3 (some GA parents cited more than one factor). It was of interest that a high proportion of parents in both groups (IS=18, 39.1%; GA=15, 31.3%) did not list anything as causing them any particular anxiety. Parents of IS subjects tended to have been anxious about things associated with the extraction procedure itself, whereas GA parents listed a range of things that appeared to be mostly related to the GA. Notably, nearly a third ($n=13, 27.1%$) of GA parents were the most worried about the risk of the GA itself.

Choice of future treatment

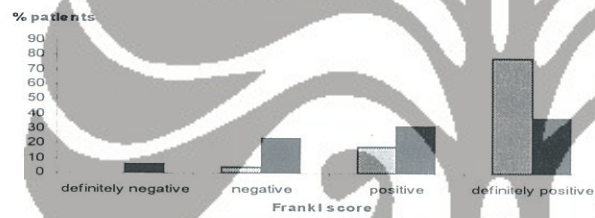
Overall, most parents reported that they would choose the



A. Frankl scores on entering surgery and before mask application (Stage 1).



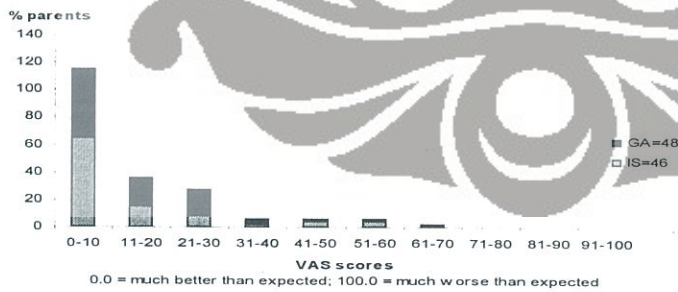
B. Frankl scores on mask application and during treatment (Stage 2).



C. Frankl scores at recovery period (Stage 3).

Key:
 Inhalation sedation group, n=46
 General anaesthesia group, n=48

Figure 1. Bar charts showing mean Frankl scores for children at different stages of treatment.



Mean = 13.2, SD = 14.95, n = 94

Figure 2. Bar chart showing mean parent satisfaction score (visual analogue score) for treatment outcome.

same treatment again in the future (n=82, 87.2%). Interestingly none of the IS parents were adverse to their child having IS again in the future whereas five (10.4%) GA parents stated that they would not choose a GA again.

Discussion

Ninety-four children successfully completed treatment and were included in the study. The finding that IS patients were significantly older than the GA patients was not unexpected and can be explained by the fact that children receiving IS require a certain level of comprehension in order to co-operate with treatment, and thus tend to be older. Whilst it is accepted that IS and GA patients should have ideally been age-matched in this study, it is felt that any behavioural and developmental differences between 9- and 11-year-olds are not so marked as to make our comparisons between IS and GA subjects inappropriate.

In terms of past IS or GA experience, it was found that a GA had been experienced by 37.2% of children. Furthermore, for those children with a brother or sister, about one third of siblings had also received a GA in the past. Interestingly, this figure was twice as high for GA subjects as IS subjects. In view of the known family pattern of dental caries, one may hypothesise that, in the GA group, the reason for a sibling's GA was very likely to have also been for dental extractions of carious teeth. Inhalation sedation subjects were more likely to have experienced IS previously than was the case for GA subjects. This finding could be explained by the fact that

multiple extractions under IS require at least two visits. Furthermore, it is likely that patients who had previously experienced IS would be confident to opt for the same form of treatment again.

Prior to treatment, operator-assessed behaviour of IS subjects was similar to that recorded for GA subjects. This finding is in agreement with those of previous investigators [Arch et al., 2001; Carson and Freeman, 2001]. However, the behaviour of the IS children was significantly more positive than that of the GA children, both during treatment and the recovery stage, confirming the results of ¹⁰. It is hypothesised that this shift towards negative behaviour in GA patients, particularly during the recovery stage, may be due to the fact that GA subjects had undergone a higher number of extractions (mean=6.0) than had the IS patients (mean=1.5). Thus GA patients would have experienced considerable more oral bleeding and discomfort, as well as some disorientation following the GA, which could have led to more negative behaviour patterns.

Parental assessment of their child, and their own, anxiety on the day of the appointment and during treatment showed a wide range of responses. Of particular interest was the finding that GA parents were reportedly significantly more anxious than IS parents both before and during their child's treatment, which is in agreement with data from previous studies ^{11, 12}. What is not clear, however, is whether the higher anxiety in GA parents was attributable to the GA itself, or rather reflected an overall higher degree of general dental anxiety in this group. Certainly, the parents of children requiring multiple

carious extractions under GA are likely to have different socio-economic backgrounds and dental experiences than the parents of IS patients, who are more likely to be undergoing extractions for orthodontic reasons.

Few studies have specifically looked into what aspects of treatment cause the greatest amount of parental anxiety. The present study, however, found that 27.1% of GA parents were most anxious about the risks of GA or were afraid of "something going wrong". With the recent deaths of 5 children within the last decade [Donaldson and Wild, 2001], one may have expected this figure to be even higher. GA parents also found the gas induction period distressing. This could have been attributed to the fact that some subjects refused to have the gas mask and some coercion was necessary, causing emotional upset for both the child and the parent. Having a GA has been reported as being emotionally distressing by a number of children ¹.

Overall, parents in both groups were very positive about the treatment outcome, indicating good parental support for the treatments provided. Indeed, the majority (87.2%) of parents stated that they would make the same treatment choice again if further extractions were required. However, it is notable that 10.4% of the GA parents stated that they would not opt for a GA again if their child required further extractions.

In conclusion, it would seem from this investigation that IS parents were less anxious than GA parents prior to, and during, treatment. However, there was no difference between the anxiety levels of IS and GA children before and during treatment. More effort is needed to decrease the

use of GA, where appropriate, and to more fully address the anxiety of parents and patients pre-operatively. However, clinicians who prescribe a dental GA are faced with the considerable challenge of fully informing parents regarding the risks of a GA, yet ensuring that the information given does not disproportionately alarm the parent or child.

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