Anxiety related to dental general anaesthesia: changes in anxiety in children and their parents

R. BALMER, E.A. O’SULLIVAN, M.A. POLLARD, M.E.J. CURZON

ABSTRACT. Aim To examine the anxiety levels of children referred for dental general anaesthesia and their parents at various key points of the referral and anaesthetic procedure. Methods Structured interviews and anxiety measures were conducted with 50 children attending the Department of Paediatric Dentistry, Leeds Dental Institute, and progressing to general anaesthetic (GA) and their parents. Interviews were conducted with parents and children prior to initial assessment, following assessment and prior to a GA. Anxiety was measured at each interview, using the Visual Analogue Scale for parents and the Venham’s Picture test for children. A fourth telephone interview was conducted with parents one week after the GA when the degree of upset caused to parents and children by the procedure was evaluated. Results Anxiety of children remained constant at each interview. Parent and child anxiety were not related. There was a rise in parent anxiety following initial assessment in those families attending in response to a routine referral and progressing to GA (p<0.05). There was a further rise in parent anxiety in these families immediately prior to the GA itself (p<0.001). Parent upset was strongly related to their anxiety at each of the three interviews prior to the GA (p<0.01, 0.05 and 0.001 respectively) and to the distress of their child (p<0.02). Child distress was strongly related to anxiety at each of the three interviews prior to the GA. Conclusion The anxiety levels of children did not appear to change throughout the whole GA assessment and treatment process. Parent anxiety rose significantly following assessment and again just prior to the GA. Factors contributing to parent upset post treatment were child upset and pre treatment parent anxiety levels. Children who were most anxious prior to GA found the procedure most distressing.

KEYWORDS: Anxiety, Children, General anaesthesia.

Introduction
Despite the decline in dental caries in the Western world there remain certain populations with high treatment needs. Such groups include some very young children for whom routine dental care is difficult, and these are often most appropriately treated under general anaesthetic (GA). Whilst GA is an opportunity to provide complete dental treatment at one visit, it is expensive, not only in terms of time and money, but also emotionally for patients, parents and providers alike.

Removal of teeth under GA can be a significant event in the dental history of a child or adult. The Adult Dental Health Survey of the UK [Todd and Lader, 1988] found that nearly half of all adults recalled a vividly disturbing dental experience and, of these, 17% cited the experience as GA related. However, if the age of occurrence was examined, the majority of these experiences occurring below the age of 10 years were GA related (39%).

The possible contribution of GA related experiences to long term fear and anxieties has been further shown in studies on adults [Berggren and Meynert, 1984]. Traumatic events leave residual fears, especially if these events occurred in childhood. Further experiences are preceded by significant anxiety as a result of these traumatic events [Freeman, 1985]. This in itself leads to more negative experiences of dentistry and may even prevent patients seeking care altogether [Kent and Blinkhorn, 1991]. These fears can also be passed on to others, especially children; indeed, maternal anxiety may be one of the most significant determinants of a child’s anxiety [Hawley et al., 1974; Shaw, 1975; Corkey and Freeman, 1994].

Many parents who had experienced GA in the past had recollections that were generally vivid and unpleasant [Hastings et al., 1994], and their experiences of taking their children for a GA seemed just as bad. They were very anxious prior to the GA, especially about their child’s overall reaction and whether their child would wake up from the anaesthetic. Other stressful factors included starving their child, guilt feelings, the sight of blood and seeing (and hearing) other children who had just recovered from a GA. In spite of all of this, many
parents felt that it was still the best treatment option because it was painless, quick and avoided the use of an injection [Hastings et al., 1994]. The aims of this research were, therefore, to examine the anxiety levels of children and parents referred for GA at various key points of the referral and anaesthetic procedure.

**Materials and methods**

*Sample selection.* Children and their parents attending the Leeds Dental Institute (United Kingdom) were selected for inclusion in the study. The majority (n = 39) attended in response to a referral letter from their own dentist indicating a need for a GA (group A). These children initially attended an assessment clinic for detailed treatment planning. A further group B was made up of children (n = 11) who arrived at the clinic as dental emergencies and proceeded to have treatment under GA. Finally 20 children (control group) were selected, who were given an appointment in response to a referral letter from their own dentist. This letter gave no indication of a need for a GA (group A). These children proceeded to have treatment under GA. Finally 20 children (control group) were selected who were given an appointment in response to a referral letter from their own dentist. This letter gave no indication of a need for a GA (group A). The children did not, ultimately, progress to have one.

*Exclusion criteria.* Children who were not accompanied by at least one of their parents and less then three years old were excluded, as well as those children who were not able to understand the Venham Picture Test. Finally families who did not progress to a GA in spite of their own dentist’s request (as an alternative treatment was offered) were excluded.

*Questionnaires.* Initially, parents were asked to complete a questionnaire which gathered basic information such as age, sex and reason for referral. Suitability for inclusion in the study was checked in the Leeds Dental Institute (United Kingdom) were selected for inclusion in the study. The majority (n = 39) attended in response to a referral letter from their own dentist indicating a need for a GA (group A). These children initially attended an assessment clinic for detailed treatment planning. A further group B was made up of children (n = 11) who arrived at the clinic as dental emergencies and proceeded to have treatment under GA. Finally 20 children (control group) were selected, who were given an appointment in response to a referral letter from their own dentist. This letter gave no indication of a need for a GA (group A). These children proceeded to have treatment under GA. Finally 20 children (control group) were selected who were given an appointment in response to a referral letter from their own dentist. This letter gave no indication of a need for a GA (group A). The children did not, ultimately, progress to have one.

*Parent anxiety.* The VAS was explained carefully to each parent. This consisted of a 10 cm line in which the far left hand point of the line indicated no anxiety at all. The far right hand point indicated the most anxiety that could possibly be felt or thought of. Each parent was asked to place a mark on two VASs in response to the following questions:

- How anxious are you right now?
- How anxious do you think your child is at the moment?

The questions were asked by the investigator but the mark was placed by the parent.

*Child anxiety.* The VPT [Venham and Gaulin-Kremer, 1979] was used to measure the anxiety of each child. The test was composed of a series of 8 cards (7x8 cm). Each card showed a picture of a boy in two different poses. One pose was positive (e.g. happy or content) and the other was negative (e.g. sad or frightened). The poses of the boy depicted differed on all 8 cards. Each card was presented in a random order and for each card the child was asked to choose the picture of the boy who they felt most represented how they felt at the time. Each card on which the negative cartoon was chosen was placed to one side. These cards were totalled at the end of the test to give a VPT score of 0 to 8.

On completion of the initial assessment, consent for a GA was obtained and an appointment plus pre GA instructions were given. At this point parents were asked again to record their anxiety level on the VAS. The VPT was then reapplied for each child. The cards were presented in random fashion, i.e. the order was different to the previous test. This gave a second (post assessment) anxiety score for the parent and for the child. Families in the control group took no further part in the study as they were not progressing to have a GA.

Children who were scheduled for a GA were met again on the day of their appointment, normally 1-2 weeks after initial assessment. In the waiting room immediately prior to the GA, further anxiety scores for child and parent were taken. This gave a third (pre GA) anxiety score for each parent and child.

Parents were contacted again one week after the GA by telephone. At this final contact parents were asked to rate on a scale of 1 to 10 how upsetting the GA visit had been for them and for their child, where a score of 1 was the least upsetting and 10 the most upsetting. A summary of the timing of the different investigations is shown in Table 1.

*Reproducibility.* Reproducibility testing was carried out on 20 patients and parents over four clinical sessions. Families were selected at random and an informed consent obtained. Brief details were recorded. Initially, the parent was asked to complete the VAS pertaining to anxiety about dentists generally, anxiety felt at that moment and what they thought their child was feeling. After this the VPT was conducted with the child. Upon completion, the cards were immediately shuffled and the test reapplied to the child. Finally, anxiety measurements were repeated for the parent in exactly the same way as in the initial test.

*Analysis of the data.* The data collected from all of the questionnaires were entered onto a Microsoft Works spread sheet which was then used to carry out the data analysis. The data were not normally distributed and non-parametric statistical tests were, therefore, used. These were Mann Whitney U test, Spearmans rank correlation test and Wilcoxon matched pairs test. Chi square test was used for comparing the different compositions of the groups.

**Results**

Fifty children and their parents were included in the study. Of these 39 attended the GA assessment clinic
(group A) whilst 11 attended as dental emergencies (group B). A further 20 patients who were referred for reasons unrelated to GA assessment were also included (control group). The median age of all children was 7.2 years (range 3.2 to 14.00). There was no significant difference between median ages of the different groups or between sex distributions. The median time interval between assessment and GA was 9 days for the group A (routine) and 7 days for the group B (emergency).

Parent anxiety. VAS scores were recorded for parent anxiety at three different time points in the study (initial assessment, post assessment and pre GA). These scores are illustrated in Figure 1. For the group A (routine), parent anxiety had risen significantly following assessment (p<0.05) and had risen significantly again on the day of the GA (p<0.01). For the group B (emergency) there had actually been a drop in parent anxiety following assessment although this change did not prove to be statistically significant. Anxiety had, however, risen significantly on the day of the GA (p<0.01).

There was a slight rise in anxiety of the control group after assessment which was not significant. There was no significant difference between groups A (routine) and B (emergency) at any given time point or between any of the pre assessment groups. However, post assessment scores of the control group were significantly lower (p<0.05) than the scores in the other two groups.

Parent assessment of child’s anxiety (PCA). PCA score was a good indicator of anxiety of the child in all three groups. Comparison of these scores to child anxiety scores demonstrated a strong correlation (p<0.01).

Child anxiety. The Venham Picture Test measured anxiety of the child at three different points in the study (pre assessment, post assessment and pre GA). These scores are illustrated in Figure 2. Anxiety of the children in the control group was consistently lower than in the other groups. Children who had been referred for reasons not related to GA were less anxious than those proceeding to GA.

Relationship of parent and child anxiety. There was no relationship between the anxiety of the child and that of the parents.

Parent and child distress. This was assessed by telephone one week after the GA. Spearmans rank

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![Table 1 - Summary of the timing of the different investigations used in the study on changes in child and parental anxiety when attending for a dental general anaesthetic.](image)

![Fig. 1 - Changes in parent anxiety during the study on children referred for dental treatment under general anaesthetic.](image)

![Fig. 2 - Changes in child anxiety during the study on children referred for dental treatment under general anaesthetic.](image)
correlation was used to correlate parent upset (PU) and child anxiety scores. There was a strong correlation between PU and CU (p<0.02); in addition PU was significantly associated with parent anxiety scores, whilst CU was significantly associated with anxiety scores.

Discussion

Anxiety may be defined as a state of uneasiness or tension caused by apprehension of possible misfortune or danger [Kent and Blinkhorn, 1991]. It is difficult to measure and quantify due to its very subjective nature. The difficulty is compounded further in children, who may have limited understanding of the investigations and who may even have their anxieties heightened by these investigations.

Aitken [1969] proposed that the VAS was an effective measure of emotions and demonstrated its use in the evaluation of mood in 13 chronically depressed subjects. A follow-up study [Bond and Lader, 1974] demonstrated good correlations between expected, drug induced, alteration of mood and subjects assessment of that mood using the VAS. One of the most extensive uses of the VAS is in measurement of pain. In his review of pain scales, Seymour [1983] concluded that it was a reliable, sensitive and reproducible measure. The VAS has also been used to measure patient satisfaction with dentures [Baer, 1992] and, extensively, to evaluate the effects of drugs [Nicholson, 1978]. It has also been validated as a measure of general anxiety [Hornblow and Kidson, 1976] and dental anxiety [Hosey and Blinkhorn, 1995].

The VAS can be completed quickly, is easy to learn and use and allows fine, discriminate, quantifiable analysis of subjective feelings. In addition it has a large enough range to accommodate and recognise changes within individuals. A limitation of the VAS when measuring changes, however, is that there is an upper limit beyond which the subject cannot express greater anxiety. This can become important, especially if values are gradually increasing or decreasing.

The Venham Picture Test (VPT) is a measure of situational anxiety developed by Venham and Gaulin-Kremer [1979]. Since then it has been used extensively to measure children’s anxiety. It has been validated on a number of occasions [Klorman et al., 1979; Venham and Gaulin-Kremer, 1979] and, in research using more than one measure of anxiety, it correlates excellently with the other measures [Venham et al., 1977; Sonnenberg and Venham, 1977; Alwin et al., 1991; Alwin et al., 1994].

The pilot study for this present research indicated that some very young children chose the picture, on the VPT, on the same side each time, regardless of what the picture was illustrating. A second set of cards was therefore devised in which some of the pictures were mirror images of their counterparts. These could then be re-presented to children to check the validity of their choices. It is suggested that this approach is necessary for children under the age of four.

Parent anxiety in group A (routine) rose following initial assessment and again immediately pre-operatively and it would seem logical that anxiety should rise as the treatment appointment approaches. Prior to assessment there was no difference between the parent anxiety scores of routine and control groups. Following assessment the anxiety of both groups of parents rose. At this point parent anxiety in the group A (routine) was significantly higher than the anxiety in the control group. In addition the rise in anxiety of the group A (routine) was statistically significant, whereas the rise in anxiety of the control group was not. It may be that the plan for a GA was responsible, as this factor was the obvious difference between the two groups. However, parents were generally aware of the purpose of the assessment visit and that their children did require extractions under GA. It might, therefore, have been expected that a significant difference between these two groups occurred at the initial visit. But it was only after the assessment that a difference became apparent.

One explanation may be that the final treatment plan was very different to the expectations of the parents. Kent and Blinkhorn [1991] have suggested that a major cause of adult anxiety is loss of control. It is easy to see why parents exhibit rises in anxiety if they are confronted with advice and recommendations that are very different from their own expectations. It may be that parent anxiety rose due to a higher number of extractions being needed by the children than parents were expecting.

The median, pre assessment, parent anxiety score of the group B (emergency) parents was much greater than that of the other two groups at the same phase, although the difference was not significant. Following assessment, parent anxiety in this group actually fell. This may reflect the fact that the dental emergency had been temporarily treated. Immediately preoperatively, however, anxiety had risen in a very similar way to the level noted in the routine group. Parents in both groups demonstrated large rises in anxiety levels immediately prior to the GA, probably related to the proximity of the treatment.

Numerous studies have shown parents to be good predictors of both their child’s behaviour [Koenigsberg and Johnson, 1972; Bailey et al., 1973; Pfefferle et al., 1982; Holst et al., 1993] and anxiety levels [Howitt and Stricker, 1970; Klorman et al., 1978] when attending for conventional dental treatment. This was strongly supported in the present study. One of the problems with
assessing children for extractions under GA is in identifying those children who will accept alternatives (i.e. local analgesia with or without sedation), especially in the light of the UK policy document “A conscious decision” [Department of Health, 2000], which stated that GA should be avoided whenever possible. It seems that the advice of the parents is a valid tool in deciding if other forms of treatment would be possible.

Surprisingly, this present study did not confirm a relationship between parent and child anxiety. There is disagreement in the literature as to the relationship between the anxiety of parents and children. The study reported here used a Visual Analogue Scale (VAS) and the Venham Picture Test (VPT) to measure the anxiety of parent and child on three separate occasions and found that the two were not related. Other studies on both dentally experienced children and those with no prior experience have also failed to demonstrate a relationship when using VPT as a measure of anxiety and comparing it with maternal dental anxiety [Michael et al., 1979; Klorman et al., 1978]. Alwin et al. [1994] also compared VPT in children with maternal response to Corah’s dental anxiety scale and found no relationship. Corkey and Freeman [1994], using exactly the same measures, did identify a relationship although their study was completed away from the dental environment.

Most of the studies which have reported a relationship have examined parent anxiety with child behaviour [Koenigsberg and Johnson, 1972; Bailey et al., 1973; Wright et al., 1973; Johnson and Baldwin, 1968; Johnson and Baldwin, 1969; Wright and Alpern, 1971]. Behaviour is generally poorly related to anxiety [Klingberg et al., 1995; Raadal et al., 1995] and may reflect a number of other emotional states [Corkey and Freeman, 1994; Pinkham, 1993]. This present study did not examine behaviour but used the VPT, and the findings are generally consistent with other studies which used the same measure. It is possible that other factors such as the pleasant environment and good rapport with the clinician had more effect on the child than the parent. This would have had the effect of negating any relationship of anxiety between parents and child.

The very little change in anxiety of the children during the study may have been the result of the initial assessment. At this stage the GA was carefully explained to the child in terms that he/she would understand and not be frightened by. If possible, the experience was also described in terms that a child would find interesting and positive. Although this did not reduce the anxiety in the children, it may well have prevented anxiety rising further (as seen in the parent anxiety scores).

Parent upset at the GA procedure was determined by telephone interview one week after the GA and correlated strongly with parent anxiety at all phases. This is not surprising as it has been shown that highly anxious adults find the dental experience particularly distressing [Pinkham, 1993]. In addition child upset correlated strongly with child anxiety.

It is interesting that there was a very strong correlation between anxiety and upset throughout the study and that this did not seem to be affected by any variable. It is suggested that it may be possible to reduce the overall distress caused by the experience of a GA by reducing anxiety prior to the operation or even prior to assessment.

Parent and child upsets were strongly related. One of the limitations of the telephone interview was the inability to interview the child directly. Hence, child distress scores were actually the parents’ assessment of it. Parents may, therefore, have allowed the degree of upset that they had experienced to influence the score that they ascribed to their child. It seems more likely, however, that child distress caused parent upset. Therefore, parent upset was influenced by two factors: a) parent anxiety at each stage prior to the operation; b) the degree of upset experienced by their child. Child upset, on the other hand, seemed to be solely influenced by his/her anxiety prior to the operation.

High anxiety had precluded conventional treatment for many of the children in the sample. However, extractions under GA are highly interventionist and, for children who remain anxious in spite of the knowledge that they are going to sleep for their treatment, probably very distressing. Unfortunately, unlike conventional treatment, GA is often considered the final option and there is considerable pressure to complete treatment. This, combined with a highly reluctant child, may cause considerable distress to children and operators alike. There is, therefore, an argument for avoiding GA in anxious children and attempting to manage them with conventional behaviour management or sedative techniques which are also considered to be safer and are associated with lower morbidity. Varpio and Wellfelt [1991] showed that children with dental fear treated conventionally showed better acceptance of dental treatment five years later than similar children treated under GA.

Conclusions

Parental anxiety of children attending for non-emergency general anaesthetic rose significantly following assessment and again just prior to a GA. Factors contributing to parent upset post treatment were child upset and pre treatment parent anxiety levels. The anxiety levels of children did not appear to change throughout the whole assessment and treatment process. However, children not referred for GA had significantly
lower anxiety levels than those who required a GA. Those children who were most anxious found the experience of the GA most distressing. Parents were good predictors of the degree of anxiety of their child. No relationship was found between parent and child anxiety.

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References