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Behavioural Changes of Young Uncooperative Children Undergoing Dental Treatment in the Clinic versus Under General Anaesthesia

SUMMARY

***Aim*:** *This study compared the levels of dental anxiety experienced by young uncooperative children having dental rehabilitation using general anaesthesia (GA) with those who had their dental treatments by "Tell-Show-Do" technique in the dental clinic.*

***Methods*:** *Out of 54 children, 26 had been treated under GA and 28 had been treated with the use of "Tell-Show-Do" behavioural approach method. At the initial examination, Frankl's Behaviour Rating Scale, sitting patterns, Venham Picture Test (VPT) and Children's Fear Survey Schedule-Dental Subscale (CFSS-DS) of the children were recorded and compared with scores after 1 year. The accompanying parents were asked to complete Corah's dental anxiety scale (DAS). For statistical analysis, chi-square test, t-test, Mann-Whitney test and repeated measure Anova were used.*

***Results*:** *The children in both groups showed similar behaviours with a reduction in their anxiety level after 1 year as measured by the Frankl's Behaviour Rating Scale, VPT and the sitting pattern. The decrease in the CFSS-DS scores of the children in the clinic group was statistically significant ($p<0.05$). There was also a decrease in the children of GA group, but not statistically significant ($p>0.05$). Parents of both groups showed similar scores in the total DAS.*

***Conclusion*:** *Although, the children whose treatments were performed in the dental clinic with "Tell-Show-Do" technique became more familiar with the dental environment and procedures, GA also could be a suitable alternative for treating young uncooperative children with rampant caries.*

Keywords: Dental Anxiety, General Anaesthesia, Children, uncooperative

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Introduction

Anxiety and fear of dental treatment in children have been recognized as a source of problems in patient management for many years[1]. Dentists treating anxious, uncooperative children with extensive dental disease have relied on a variety of patient management strategies, including behavioural non-pharmacologic techniques, or sedation and general anaesthesia (GA)[2,3].

One of the non-pharmacologic techniques used in behavioural management is "Tell-Show-Do" technique, first described by Addelston in 1959[4]. It provides to give the child a very careful explanation of a procedure and equipment before the procedure is done[5]. Hoist et al[6] reported that the use of this method throughout dental treatment for children resulted in an increase in positive acceptance of all treatment steps encountered.

Sedation and GA are the other alternatives for treating children who are uncooperative and fearful of the dental environment. The ideal goal of sedation is to relax the patient, allowing completion of the dental treatment, while maintaining communication and responsiveness. GA may be the preferred method and the most common modality for treating young uncooperative children with extensive caries, rather than subjecting them to numerous sedation visits[7], because an increased sensitization of children to repeated stressful procedures with accompanying decreased cooperative behaviour has been found[8]. An important goal is to complete all necessary treatment in 1 appointment for these children.

Dental anxiety is most commonly measured using rating scales. To assess dental anxiety in children, many measurement techniques have been proposed. For example Children' s Fear Survey Schedule-Dental Subscale (CFSS-DS) is a well-known instrument for assessing dental fear in children. The scale consists of 15 items related to various aspects of dental treatment. (Fig. 1). Scale scores are calculated by summing item scores; the total score can range from 15 to 75. Scores above 38 indicate significant dental fear[9].

The Venham Picture Test (VPT) is a self-report instrument using a picture technique for answering and consists of eight items measuring situational or state of anxiety. The child is presented 8 pairs of pictures of children exhibiting various emotions and is asked to choose the child that best reflects his own emotions. Scores are determined by summing the number of instances in which the child selects the high-fear stimulus. This scale has a range of "0", meaning no fear, to "8", meaning high fear (Fig. 2)[10].

Corah' s Dental Anxiety Scale (DAS) consists of 4 questions to assess anticipatory dental anxiety. Each question has 5 possible responses which correspond to feeling "relaxed'' (scoring 1) to "so anxious'' (scoring 5). This gives a possible range from 4 to 20 (Fig. 3)[11].

Another method, which has been used in behavioural research, is referred to as the Frankl's Behavioural Rating Scale. The scale divides observed behaviour into 4 categories, ranging from definitely positive to definitely negative (Fig. 4)[12].

The future behaviour of child in the dental environment had also attracted attention of researchers. Most of the previous reports have been focused on the behavioural changes of the children who received dental treatment under GA and under sedation[13-15], but little is known about the behavioural changes or anxiety of children who underwent dental treatment in a clinic with children whose dental treatments were performed under GA. The **aim** of the present study was to compare the expected future dental behaviour or anxiety after 1 year of a group of children who experienced dental treatment by the use of "Tell-Show-Do" technique with children who underwent GA.

Items	not at all afraid	a little afraid	somewhat afraid	fairly much afraid	very much afraid
1.Dentists					
2.Doctors					
3.Injections					
4.Having somebody examine your mouth					
5.Having to open your mouth					
6.Having a stranger touch you					
7.Having somebody look at you					
8.The dentist drilling					
9.The sight of the dentist drilling					
10.The noise of the dentist drilling					
11.Having somebody put instruments in your mouth					
12.Choking					
13.Having to go to the hospital					
14.People in white uniforms					
15.Having the nurse clean your teeth					

Figure 1. Children's Fear Survey Schedule-Dental Subscale (CFSS-DS)



Figure 2. Venham Picture Test (VPT)

1. If you had to go to the dentist tomorrow for a check-up, how would you feel about it?
   a. I would look forward to it as a reasonably enjoyable experience
   b. I wouldn't care one way or the other
   c. I would be a little uneasy about it
   d. I would be afraid that it would be unpleasant and painful
   e. I would be very frightened of what the dentist would do
2. When you are waiting in the dentist's office for your turn in the chair, how do you feel?
   a. Relaxed
   b. A little uneasy
   c. Tense
   d. Anxious
   e. So anxious that I sometimes break out in a sweat or almost feel physically sick
3. When you are in the dentist's chair waiting while the dentist gets the drill ready to begin working on your teeth, how do you feel?
   a. Relaxed
   b. A little uneasy
   c. Tense
   d. Anxious
   e. So anxious that I sometimes break out in a sweat or almost feel physically sick
4. Imagine you are in the dentist's chair to have your teeth cleaned. While you are waiting and the dentist or hygienist is getting out the instruments which will be used to scrape your teeth around the gums, how do you feel?
   a. Relaxed
   b. A little uneasy
   a. Tense
   b. Anxious
   c. So anxious that I sometimes break out in a sweat or almost feel physically sick.

Figure 3. Corah's Dental Anxiety Scale (Corah's DAS)

Rating 1: Definitely negative (refusal of treatment, crying forcefully, fearful, or any other overt evidence of extreme negativism)

Rating 2: Negative (reluctant to accept treatment, uncooperative attitude, but not pronounced)

Rating 3: Positive (acceptance of treatment; at times cautious; willingness to comply with the dentist; at times with reservation, but patient follows the dentist's directions cooperatively)

Rating 4: Definitely positive (good rapport with the dentist, interested in the dental procedures, laughing and enjoying)

Figure 4. Frankl Behavioural Scale

Material and Methods

Study Population

The study population consisted of 54 (39 male, 15 female) young uncooperative healthy children, aged between 4-6 years, being referred for their dental problems to the Paediatric Dentistry Clinic of Ege University, Turkey.

Clinical Examination

The children were examined in the Paediatric Dentistry Clinic by an experienced dentist (Ö.Ö) with a mirror and a probe. The caries status was recorded using the criteria of DFS scores (D: decay, F: filling, S: surface).

Questionnaire

After obtaining the written consent of the informed parents, a standard questionnaire was also answered by

mothers, which included the general history of their children and their socio-demographic information (age and education). They were also asked to complete Corah's DAS[11] to assess their dental anxiety status.

The Criteria in Choosing the Treatment Modality

The parameters in the decision to offer treatment under GA or in the dental clinic included the amount and complexity of the dental treatment, the expected quality of treatment, children and parents' behaviour and social competence as determined during the consultation appointment. Home distance was also a criterion that determined the treatment of choice: children living 50 km. far from our clinic were offered GA.

One experienced dentist (Ö.Ö) carried out the dental rehabilitation of children who were treated in the dental clinic by "Tell-Show-Do" technique with sessions of lasting maximum 20 minutes. Completion of the dental treatment generally took 5 sessions. The accompanying parent was allowed to enter the clinic during the treatment.

From 54 children, 26 were treated under GA in the operating room of the Paediatric Surgery Clinic of Ege University, and 28 children were treated with the use of ″Tell-Show-Do″ behavioural approach method in the Paediatric Dentistry Clinic of the same university.

In GA procedure, the children received premedication (Dormicum®, Roche, 0.5-0.75 mg/kg) 30 minutes before GA. Inhalation induction was employed using nitrous oxide (50%)-oxygen (50%) and sevofluorane (8 %) (Sevorane®, Abbott). Halothane 1-1.5% (Halothan®, Hoeschst Marion Roussel) and Sevofluorane (2-3%) were anaesthetics for the maintenance of anaesthesia. The mean duration of treatment was 60 minutes. Parents were allowed to enter the operating room at the induction of anaesthesia. No overnight postoperative hospital admission was found to be necessary, and children were discharged from the hospital approximately 4 hours after the operation. None of the children suffered adverse events postoperatively. Children who undergone GA were routinely given a follow-up appointment after 1 week and every 3 months.

Parents of both groups were instructed to return after 1 year. In addition to a routine full dental examination, the teeth of the children were cleaned with pumice with a slow-rotating bur, and chlorhexidine varnish (Vivadent, Schaan, Liechtenstein) was applied for prevention. The scores recorded after the use of a slow rotating bur were then compared to the scores recorded at the initial examination visit. The mothers were also asked whether or not they would be willing to have their children undergo GA again if necessary.

Dental anxiety of children were assessed by Frankl's behavioural rating scale[12], Children Fear Survey Schedule Dental Subscale (CFSS-DS)[9] and Venham Picture test[10]. The mothers of all children were asked to participate by completing the CFSS-DS on behalf of their children. In addition, the sitting pattern of child (climbing on the chair by himself or placed on the chair by the parent) was also observed.

The examiners were calibrated before the study and at the end of 1 year. Inter- and intra-reproducibility were calculated using the Cohen-Kappa scores.

For statistical analysis, SPSS software 10.0 was used. Chi-square analysis was performed for the comparisons of the present and previous sitting patterns, and to compare the education levels of the parents. T-test was used to compare the dental anxiety of the parents (DAS) and to evaluate the difference between the scores of CFSS-DS among groups. Mann- Whitney U-test was used to evaluate the differences of VPT and Frankl's Behavioural Scale among groups. Repeated measured ANOVA was used and the ages of the children and DAS scores of the parents were co-varied. Statistical significance was determined at $p<0.05$.

Results

The results of the calibration were good and Kappa values were 0.92 for intra-examiner reality and 0.88 for the inter-examiner assessment.

The ages of the children in both groups were similar with a mean age of 4.8±0.6. (4.7±0.4 and 4.9±0.8 in the GA and clinical groups, respectively). The ages of the parents in both groups were also similar. The mean ages of mothers in GA group and clinical group were 30.46±5.8 and 31.07±4.37, respectively. The mean age of fathers in GA group and clinical group were 34.15±5.91 and 35.67±5.11, respectively. There were no statistically significant differences in ages of mothers as well as fathers between the groups. There was no statistical difference in education levels of the parents and their socio-demographic status.

The children in the GA group had significantly greater mean numbers of teeth with dentinal decay compared with children treated in the clinic (DFS score in GA group: 24.7±20.9, DFS score in clinic group: 14.2±14.5).

46 (46.2%) percent of the parents whose children were treated under GA preferred their children to be treated under GA again if required. 14 (14.3%) percent of the parents whose children were treated in the dental clinic preferred GA if needed.

The behaviour of children in the GA and clinical groups at the first visit and after 1 year, according to Frankl's behavioural rating scale, was demonstrated in table 1. In the GA group, 10 children out of 26 who were described as Frankl 1 or 2 (negative) became positive. In the clinic group, 18 children out of 27 who were described as Frankl 1 or 2 became positive. "Positive" behaviours (Frankl 3 and 4) were found more prevalent in both groups after 1 year, but without statistical significance.

Table 1. Children's behaviour at initial and follow-up examinations by Frankl's scales

		Initial visit				Follow-up visit			
	n	Frankl 1	Frankl 2	Frankl 3	Frankl 4	Frankl 1	Frankl 2	Frankl 3	Frankl 4
GA	26	17 (65.4%)	9 (34.6%)	0	0	0	16 (61.5%)	9 (34.6%)	1 (3.9%)
Clinic	28	12 (42.8%)	15 (53.6%)	1 (3.6%)	0	0	10 (35.7%)	11 (39.3%)	7 (25.0%)
Total	54	29 (53.7%)	24 (44.4%)	1 (1.9%)	0	0	26 (48.2%)	20 (37.0%)	8 (14.8%)

Table 2. The sitting patterns at initial and follow-up visits

		Initial visit		Follow-up visit	
	n	Sitting alone	Seated by parent	Sitting alone	Seated by parent
G.A	26	14 (53.8%)	12 (46.2%)	23* (88.5%)	3 (11.5%)
Clinic	28	17 (60.7%)	11 (39.3%)	28* (100.0%)	-
Total	54	31 (57.4%)	23 (42.6%)	51* (94.4%)	3 (5.6%)

* - statistically significant ($p<0.05$)

Table 2 demonstrates the "sitting pattern" of children in both groups. More children sat alone on the dental chair without the assistance of their parents at the end of 1 year and the difference between the initial period and 1 year was statistically significant ($p<0.05$). There were no statistical differences between the groups both at the initial period and after 1 year.

The mean values of VPT at the initial and at the end of one year were 2.69±1.4 and 2.12±1.1 in the GA group, 2.79±1.8 and 2.01±1.7 in the clinic group, respectively. This reduction was not statistically significant. There was no statistical difference between the groups.

The mean scores of CFSS-DS of the children in the GA group and in the clinic group were 36.58±9.5 and 37.0±10.3, respectively at the initial visit. The mean scores of CFSS-DS of the children in the GA group and in the clinic group were 32.62±7.7 and 28.86±8.9, respectively after 1 year. The decrease in the level of anxiety of the children in the clinic group was statistically significant ($p<0.05$), but although there was a decrease in the anxiety level of the children in the GA group, this decrease was not statistically significant.

The dental anxiety levels of parents were similar in both groups (total DAS 9.45 and 9.10 in the GA and clinic groups, respectively).

It was found that ages of the children and the anxiety scores of the parents (DAS) had no significant main effects and no interactions on the differences of the CFSS-DS scores among the groups.

Discussion

The results of the present study demonstrated that young uncooperative children who had the dental treatment under GA or in the clinic, showed similar behaviour in 1 year routine follow-up examination, as measured by the Frankl's behaviour rating scale, VPT and by the "sitting pattern". The explanation for the similar dental behaviour in the follow-up examination between the GA and clinic groups could be the natural maturation of the children in the follow-up examination. Curry et al[16] also suggested that children were more capable of repressing previous traumatic experience and better coping with the dental situation than adults. Furthermore, half of these children (57.5% in the GA, 42.9% in the clinic group) had suffered from pain before the treatment and after the treatment they could feel more comfortable in the clinic because of the release of pain. In addition, Huq et al[17]

also suggested that children experienced less discomfort during treatment than they or the operators had expected. Furthermore, in the present study, the period that had passed after the completion of treatments was 1 year and this period could be faded the memory. On the other hand, Veerkamp et al[18] found that fearful behaviour in children was still clearly present 1.5 years after the first treatment phase. Venham et al[10] found that children's response to dental treatment became more positive when they had 5 or 6 restorative visits. Berge et al[19] found that the level of fear in the children of their study group decreased after several sessions. We also suggest that increasing the number of treatment sessions (5 sessions in the clinic group) could decrease the level of dental anxiety. Varpio et al[13] also stated that children who had conventional treatment more often show a lasting positive acceptance than do children who had received GA. They postulated that children undergoing GA probably did not experience the positive feeling of having coped with a difficult situation by their own efforts and thus were not given the possibility of changing their negative attitude toward the dental situation. In the present study, the children in the GA group had a positive change in their negative attitude toward the dental situation due to the frequent visits to our clinic during 1 year. It could be suggested that they might became more familiar to our clinic, instruments and dentists.

Although, the reliability scores of behavioural ratings (Frankl Scale and VPT) were frequently high (20), validity could be more problematic and there are reports of weak correlation between behavioural ratings and psychometric methods (CFSS-DS)[21]. The CFSS-DS appeared to be preferable over the VPT and Frankl Behaviour Rating Scale as a self-report measurement of dental anxiety in children. Moreover, the CFSS-DS covered more aspects of the dental situation than the others[22]. In the present study, the only statistically significant difference between the 2 groups determining the anxiety level of children was the scores of CFSS-DS test. It could be suggested that GA and operating room could lead a distressing atmosphere because the risk of GA both for the child and parents results in negative behaviour in the future. In addition, not all of the parents (46.2%) whose children were treated under GA preferred their children to be treated under GA again if required. In the present study, the amount of dental caries was the most important factor in the decision to offer GA. The authors considered that completing the comprehensive dental treatments in 1 appointment under GA was more suitable for the anxious children who had more than 6 caries rather than subjecting them to numerous clinic visits.

In this study, the parents' ages, which could affect their anxiety, were similar in both groups. The mothers' DAS scores were also similar in both groups and did not correlate to child dental fear in the present study.

In the present study, although the reduction in dental anxiety achieved after using "Tell-Show-Do" technique was more permanent than the reduction in anxiety achieved by GA, there was also a noticeable positive behaviour after 1 year in comparison with the initial examination in the GA group. The authors suggested that GA could be a suitable alternative for treating young uncooperative children with rampant caries. Further research is needed to assess the long-term behaviours of these children with enlarged sample size in school age, or in adolescence.

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