Oral Health Education in Children before Dental Treatment under General Anesthesia

Marie-Cécile Valéra */Isabelle Aragon **/ Paul Monsarrat ***/Fréderic Vaysse ****/ Emmanuelle Noirrit-Esclassan *****

Objective: *The aim of this study was to evaluate the attitude of parents towards the oral health of their children before oral rehabilitation under general anesthesia (GA).* ***Study design:*** *Children receiving dental treatment under GA between November 2013 and July 2014 in the Pediatric Dentistry Department (University Hospital Center, Toulouse, France) were enrolled in an oral health preventive program. An anonymous questionnaire was self-administered by the parents during the pre-operative session.* ***Results:*** *The sample comprised 67 children with a mean age of 4.8 years. 48 % of the parents had difficulties in maintaining the oral hygiene of their child. Two thirds of them reported a lack of cooperation. An adult cleaned the child's teeth in 43% of the cases. 14% of the study population brushed their teeth twice a day or more. In addition, half of the parents reported that they modified food consumption or teeth cleaning habits of their children since the initial consultation.* ***Conclusions:*** *This study suggests a low compliance of parents and children with the recommendations on oral hygiene and food consumption given at the initial visit and demonstrates the feasibility of a preventive program in this population.*

Key words: Oral health, children, general anesthesia

INTRODUCTION

Oral health is an important component of general health and can impact well-being, quality of life and health outcomes. *In order to improve the oral* health of young children, the American Academy of Pediatric Dentistry recommended a first dental visit within 6 months of the first erupted tooth and no later than 12 months of age. However, the majority of children in many countries do not receive dental visit until the age of three or later [1] and dental caries remains one of the most prevalent chronic diseases in children all over the world. In addition, about 80% of dental diseases are concentrated in 20 to 25% of children [2] and those at highest risk are those experiencing the major obstacles to accessing dental care [3]. In this population concerned by early childhood caries (ECC), extensive dental treatment is frequently required. For some of these pediatric patients, routine dental procedures cannot be performed with conscious sedation and they commonly receive comprehensive oral rehabilitation under general anesthesia (GA).

Dental treatment under GA is indicated i) in healthy child who cannot cooperate or communicate due to limited cognitive function, mental disability or very young age, ii) in child with complex medical conditions like congenital disease and bleeding tendencies, iii) in those requiring extensive treatment or significant oral surgical procedures [4]. Dental treatment under GA results in an immediate improvement in oral health and quality of life for both children and their parents or caregivers [5]. However, the maintenance of oral health is a challenging problem because this population is associated with a poor follow-up compliance [6] and a highly susceptibility to the development of new caries. Relapse has been previously reported in half of the children treated under GA within 6 month or 2 years [7-9]. While children failing to attend their immediate follow-up appointment were more likely to relapse [8], frequency and number of recall appointments might improve compliance with dental preventive measures and decrease the relapse rate [9, 10].

Parents play a central role in the health behavior of their children by transferring health-related information and supporting accepted behavior [11]. Thus, an oral health preventive program intended for children receiving dental treatment under GA and their family has been developed *in the Pediatric Dentistry Department,* University *Hospital* Center, *Toulouse, France.* Thanks to an anonymous questionnaire self-administered by the parents or caregivers, the purpose of this study was i) to investigate the attitude of parents and caregivers towards oral health and to assess their motivation to modify

From Paul Sabatier University,Toulouse, France.
*Marie-Cécile Valéra, DDS, University Hospital of Toulouse, Department of pediatric dentistry, INSERM U1048, I2MC.
**Isabelle Aragon, DDS, University Hospital of Toulouse, Department of Pediatric Dentistry.
***Paul Monsarrat, DDS, University Hospital of Toulouse, Department of Anatomy and Radiology.
****Fréderic Vaysse, DDS, University Hospital of Toulouse, Department of Pediatric Dentistry.
*****Emmanuelle Noirrit-Esclassan, DDS, University Hospital of Toulouse, Department of Pediatric Dentistry.

Send all correspondence to
Marie-Cécile Valéra, Faculté de chirurgie dentaire, 3, chemin des Maraîchers, 31059 Toulouse, France
Phone: 05 34 55 86 58
Fax: 05 34 55 85 92
E-mail: marie_c_tlse@yahoo.fr

their behavior and ii) to evaluate the quality of information given to parents about dental treatment under GA.

MATERIALS AND METHODS

*A*ll patients referred for the first time at *the Pediatric Dentistry Department* (University *Hospital Center*, *Toulouse, France)* received a full consultation and examination by a pediatric dentist who provided *information about* the *etiology of the disease* and the best *preventive measures* that might be taken. Oral hygiene instructions were given. *If general anesthesia was indicated,* parents were informed of the detailed procedure and proposed treatment plan. Parents or legal guardians signed a treatment consent form on arrival at the department**.** A pre-anesthesia assessment with an *anesthesiologist* prior to day of surgery *was required.*

The study included patients who received dental treatment under GA during a nine-month period from November 2013 to July 2014 *in the Pediatric Dentistry Department.* Procedures of the study received ethics approval from the research *ethics committee* of Toulouse (France) (N°: 01-0815). Parents or caregivers who were unable to communicate in French, families who had no telephone access and children with major handicap or special medical needs were excluded from the study. The oral health preventive program was delivered by first author (MCV), a dental resident (IA) and a dental student. The program consisted of two individual sessions:

1. Over the last few years, average waiting time before receiving dental rehabilitation under GA in this pediatric dentistry department has substantially increased, reaching more than 5 months. This period has been employed to propose a preventive program. Three months before the GA date, the objective of the study was explained by phone to the parents and those who gave their verbal consent had an appointment 2-3 weeks later. This pre-operative session was divided in 2 steps: the first part was dedicated to provide oral hygiene instructions adapted to the age of the child (as a supplement to the information given at the initial visit in the department) while the second part consisted of an anonymous questionnaire self-administered by the parents or caregivers during this session. The questionnaire was designed to evaluate the behavior of parents regarding the oral health of their children and their motivation to modify their behavior. The questions on oral hygiene practice included duration, moment and frequency of tooth brushing, use of *plaque-disclosing solution and compliance of the child.* In addition, the questionnaire contained items on the dietary practices and on the *motivation* of parents and caregivers for *change* in *oral hygiene* behavior and eating habits. For some questions, subjects had the opportunity to choose one or more responses from a provided list of options.
2. Approximately one month post-intervention, parents were re-contacted by phone and the date for the second session was determined. An oral examination was carried out to control the dental treatment performed under GA. *R*einforcement of oral health education was provided.

Descriptive statistics were provided as means ± standard deviation for continuous variables and n (%) for categorical variables. The sample size was specified for each outcome. The effect of categorical data on quantitative variables was tested by analysis of variance (ANOVA). Chi² tests were performed to investigate potential dependency between two categorical variables. STATA® 13.1 (StataCorp, College Station, Texas, USA) was used. Statistical level of significance was set at 0.05.

RESULTS

Over a nine-month period, a total of 67 children, 28 boys (41.8%) and 39 girls (58.2%), were enrolled in the study. Patient ages ranged from 2.0 years to 9.5 years (mean age: 4.8±1.9) (Table 1), 51 (76.1%) patients being between 2 years and 6 years (Figure 1). Questionnaires were completed by mothers (71.6%), fathers (14.9%), mother and father (4.5%), other family members (4.5%) or host family (3%).

Oral hygiene

Half of the parents (48.5%) indicated that they had difficulties in maintaining the oral hygiene of their child. A lack of cooperation was reported by 62.5% of them and 12.5 % were afraid of hurting their child. Nine children (13.4%) cleaned their teeth alone and 43.3% of the parents reported that an adult cleaned the child's teeth. An adult provided help in 47.8% of the cases (Table 2). The parents who indicated difficulties in maintaining oral hygiene allowed their children to brush their teeth by themselves more frequently than parents who reported no difficulty (21.8% (7/32) versus 5.9% (2/34) respectively, p=0.06). In addition, no association was seen between the gender of the child and difficulties in teeth brushing.

According to the questionnaire, the mean age of first brushing was 2.6±1.2 years. No difference was seen between the age of first brushing and gender or difficulties in maintaining oral hygiene or frequency or duration of teeth brushing. 73.8% of the children started brushing their teeth before 3 years of age. 58.1% of the study population brushed their teeth between once and twice a day, while only 14.5% reported brushing teeth twice a day or more. Only one child did not brush it at all. The majority of children brushed their teeth in the evening and 54.1% *brushed their teeth rapidly (Table 3).* An association between difficulties in maintaining oral hygiene and short brushing duration was detected (p<0.001). In addition, only 11.1% used an hourglass to time the cleaning and checking for dental plaque with disclosing tablets or solution was reported only by 2 parents (3.4%).

Half of the parents (46.2%) mentioned that, following the initial consultation in the *Pediatric Dentistry* Department, there was change in the teeth cleaning habits of their child. 28.3% mentioned that there was no change and 17 (25.4%) parents have not answered to this question. However, 92.5% felt that they are able to modify their brushing habits. 79.1% of the parents mentioned that somebody already explained them how to brush their own teeth and 41.5% would like to learn more about it. Surprisingly, despite the oral hygiene instructions consistently received at the initial consultation, only 58.2% of the parents remembered receiving any advice on the dental health of their children and 48.5% were willing to learn more about the topic. No association was seen between difficulties in maintaining oral hygiene and previous dental health education.

Frequency of food consumption

Drinking between meals once or twice a day was reported by 52% of participants. Eating between meals once a day was reported by a third of the parents (36%). But only 3 children snacked more

than 3 times a day (6%) (Table 4). Half of the parents (47.7%) reported that they had modified food consumption habits of their children since the initial consultation in the department. Only 21 families (31.4%) modified both food consumption and oral hygiene habits. Ten families (17.7%) changed neither food consumption nor teeth cleaning habits. There is a significant association between children who drank between meals more than once a day and those who snacked more than 1 time a day (p=0.001). We found no difference in food consumption related to gender or duration or frequency of teeth brushing.

Information about dental care under GA

The great majority of the parents (83.8%) was satisfied with the information on the different appointments (*pre-anesthetic consultation, pre and post operative visits*) received before the treatment under GA. 58.2% of them received enough information and 34.3% found the information easy to understand. Only one parent found this information not clear enough. Concerning the information on the detailed procedure of dental treatment under GA, 76.1% of parents reported satisfaction. 53.7% of them received enough information and 32.8% found the information easy to understand. 68.6% of children treated under GA had returned for the post operative follow-up

Figure 1: Age distribution of the patients (in years) N=62

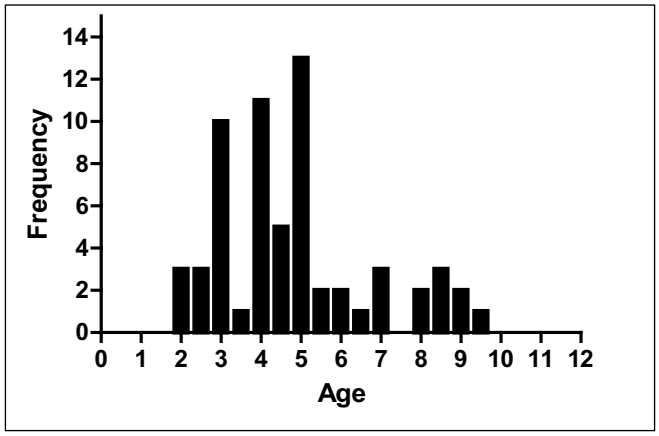

Table 1: Age and sex of the studied population

	Mean ± SD or N (%)
Age	4.8 ± 1.9 (N=62)
Sex	N= 67
Girls	39 (58.2%)
Boys	28 (41.8%)

Table 2: Role of parents in supervision of oral hygiene

	N (%)
Who brushes the child's teeth?	N = 67
No brushing	1 (1.5%)
Child alone	9 (13.4%)
Do by an adult	29 (43.3%)
Supervision of an adult	32 (47.8%)
Other	11 (16.4%)
Is there any problem in cleaning his/her teeth?	N = 66
Yes	32 (48.5%)
No	34 (51.5%)
What kind of problem?	N = 32
Uncooperative child	20 (62.5%)
Gag reflex	2 (6.2%)
Lack of time	3 (9.3%)
Fear of hurting their children	4 (12.5%)
Other	6 (18.7%)

DISCUSSION

Although the *occurrence* of dental *caries* in *children has declined* in the past decades, a minority of children has excessive amount of caries. For many of these children, extensive dental treatment is required. Successful treatment with conventional care is difficult because they often present behavioral issues making the use of GA the preferred approach to provide quality dental care. In addition, this high-risk population seems not to respond to classical preventive program, so there is a need for special preventive care [12, 13]. However, prevention before dental treatment under GA is rare. In a study conducted in South Africa, only 9% of the dentists reported that prevention before GA was provided [14]. Our program aims to improve oral health in children who received dental treatment under GA, by encouraging modification of tooth brushing and dietary habits, by promoting regular dental consultation for preventive measure - and not only in case of pain - and by encouraging parents to be self-confident in their ability to maintain oral health.

There is an increasing number of children receiving treatment under GA in *the Pediatric Dentistry Department* of the University *Hospital Center*, *Toulouse, France* and this finding is in accordance with those reported previously [15, 16]. In agreement with previous

Table 3: Frequency, duration and moment of brushing

	N (%)
Frequency of brushing	N = 62
Strictly less than 7 by week	17 (27.4%)
Between 7 and 14 by week	36 (58.1%)
Greater or equal to 14 by week	9 (14.5%)
Duration of brushing	N = 63
Rapidly	34 (54.1%)
Meticulous	18 (28.5%)
Hourglass	7 (11.1%)
Other	4 (6.3%)
Moment of brushing	N=62
At morning	39 (62.9%)
At midday	10 (16.1%)
At evening	56 (90.3%)

Table 4: Frequency of consumption of food and drinks per day

	N (%)
Frequency of drinks (other than water or milk)	N = 48
Less than once a day	14 (29.2%)
Once a day	16 (33.3%)
Twice a day	9 (18.7%)
3 times a day	4 (8.3%)
More than 3 times a day	5 (10.4%)
Frequency of food intake between meals	N = 50
Less than once a day	15 (30.0%)
Once a day	18 (36.0%)
Twice a day	9 (18.0%)
3 times a day	5 (10%)
More than 3 times a day	3 (6%)

studies [5, 16], the waiting time before receiving dental treatment under GA increased to more than 5 months. The oral health worsened during this time; that is why we used the time until GA to educate children and their families concerning teeth brushing and food consumption. The mean age of the patients who underwent dental treatment under GA was 4.8 years old, with more than two thirds of the children under 6 years of age. This is in accordance with previous studies that have reported the same mean age or distribution [5, 13, 15-19]. In addition, there was no significant difference in the ratio of girls and boys here and in other studies [15, 16].

Oral hygiene instructions were given *to both children and parents during the initial visit in the Pediatric Dentistry Department.* Instructions included brushing techniques, frequency and duration of brushing and use of mouth rinse *and plaque disclosing solution. In addition, we informed all parents that children under* 3 years of age *should* have their *teeth* cleaned by an *adult and* that they *should* supervise *brushing* in *children under 6.* Nevertheless*,* a few months later, only 43.3% of the parents cleaned the child's teeth and 47.8% provided help. These results are consistent with those reported in a similar population in which 44% of the parents brushed their child's teeth [6]. In the general population of children of the same age, two recent studies [20, 21] reported that 28% and 34% of the parents brushed their child's teeth and 55% and 56% supervised, respectively. Anderson and al. reported that 60% of parents provided help [5] and, in the study of Franzman *et al*, half of the children less than 5 years of age brushed on their own, without adult participation [22]. *These data taken together* show that many parents do not recognize that tooth brushing *needs* their *help or supervision* before the child can do it autonomously. Interestingly, in the present study, there is an association between parents who reported difficulties in maintaining oral hygiene and those who allowed their children to brush their teeth by themselves. This is in accordance with the study of Arnrup *et al*, who reported that the levels of responsibility-taking and motivation for dental care differ between parents of uncooperative children and parents of ordinary child dental patients [23].

Approximately 85% of the parents reported that their children brushed their teeth less than twice a day. This is below the recommended frequency of twice daily. This finding does not agree with the results of previous studies in the general population which reported higher percentage of children brushing their teeth twice a day or more (55% in [20] and 50% in [24]). Furthermore, in spite of the information given at the initial visit, 54.1% of the children *brushed their teeth "rapidly" and only two families used* plaque disclosing solution. Parents claimed that the inability *to maintain oral hygiene* was linked to the *uncooperative* behavior of the children in half of the cases. The only partial compliance of children and the *low involvement of parents* with the teeth brushing of their children had already been shown in this specific population [5, 9].

Previous studies have shown how difficult it is to change dietary and brushing habits and to improve the effectiveness of tooth brushing practices [6, 12, 21, 25]. In the current study, one third of the parents reported changes both in eating and tooth brushing habits since the initial visit in the *Pediatric Dentistry* Department. This result was consistent with previous study in which, following dental treatment of the child under GA, there was change in the child's frequency of sugar consumption only in the half of the cases [6]. In addition, only 58.2% of the parents remembered that they had previously received any advice on the teeth brushing of their children but there was no association between previous dental health education and difficulties in maintaining oral hygiene. In a positive way, our study revealed willingness to obtain more information on the dental health of the children, *similarly* to *previous studies [19, 26],* and the majority of families reported a high degree of satisfaction concerning the information about dental care under GA. We provided sufficient information on the different appointments (*pre-anesthetic consultation, pre and post operative visits)* and on the detailed procedure of dental treatment under GA.

Peerbhay *et al* reported that 63% of children treated under GA had returned for the one-week follow-up and only 22% of children returned for the three-month follow up appointment [6]. Another study revealed that only 39% of the children had returned for their immediate follow-up appointment [8]. In the current study, 68.6% returned for the post operative control (one month after GA). This could be explained by the fact that the parents received a *phone call by the dentist the day before the dental visit.*

Some study limitations warrant discussion. Research with a self-administered questionnaire has some typical limitations, such an over-reporting "good" behavior or under-reporting undesirable behavior due to social desirability response bias. In this study, this is minimized by the anonymous character. There is no assessment done regarding the socioeconomic status of the families and a long-term follow-up is lacking but seems necessary because the positive effects of educational programs on oral health are thought to be transient over time. In France, the cost of most *dental treatment is reimbursed* and does not limit access to care, opposite to prevention. Further studies should also investigate the reasons for the poor follow-up compliance. Within these limits, the experience gained from this study may be useful in future oral health educational programs for children receiving dental treatment under GA and their family. The current study involved children who need dental rehabilitation under GA but these preventive measures may be valid in children with less severe oral diseases.

CONCLUSION

Our findings suggest a low rate of compliance of parents and children with the recommendations given at the initial visit but the oral health promotion program is welcomed by parents. In addition, this study demonstrates the feasibility of a preventive program in a 9-month period.

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