



ORIGINAL ARTICLE

Emotional relationships between child patients and their mothers during dental treatments



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Received 1 December 2015; Final revision received 9 March 2016

Available online 18 April 2016

KEYWORDS

child patient;
emotion;
mother;
pediatric dentistry;
relationship

Abstract *Background/purpose:* The behavioral control of child patients is an important issue in pediatric dentistry. The emotional states of the mothers of patients may influence the attitudes of their children. The aim of this study was to investigate the emotional states estimated from physiological responses of child patients and the subjective anxieties of their mothers during dental treatments and discuss the emotional relationships between children and their mothers.

Materials and methods: To assess physiological responses associated with emotional changes induced by dental treatments in child patients aged 3–6 years, activity in the autonomic nervous were analyzed from variations in inter-beat intervals in electrocardiogram. Anxiety levels of accompanying mothers were examined using the State Trait Anxiety Inventory, which was filled out during the treatment of their child.

Results: Regarding the stress of child patients from the aspect of autonomic nervous activities during dental treatments, comparison between the cooperative and uncooperative patient groups showed that the uncooperative group demonstrated significantly higher sympathetic nervous activity and significantly lower parasympathetic nervous activity relative to the cooperative group, and their accompanying mothers showed significantly higher state anxiety scores relative to the mothers of cooperative children. Moreover, positive correlation between state anxiety scores of mothers and sympathetic nervous activities of their children was observed.

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Conclusion: These results indicated that uncooperative child patients undergo more stress and their mothers feel more anxiety from dental treatments, resulting in an emotional relationship between children and their mothers, which requires dental professionals to make special considerations to calm the anxiety of the mother, as well as the stress of the child patient.

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Introduction

Providing a comfortable and safe clinical environment is essential for pediatric dentistry in order to prevent children from developing dental anxiety and/or phobias and to cultivate desirable oral health habits. Since a pediatric dental practice is generally conducted in the presence of the caregiver in Japan, the triple relationship between dental professionals, child patients, and their caregivers is important. Several studies on anxiety or fear subjectively experienced by child patients during dental treatment were performed.^{1–5} Additional studies investigated the relationship between mother and child in pediatric dentistry, as well as other fields, and reported the deep and strong mental correlation between mother and child.^{6–8} However, most of these studies examined the subjective anxiety assessed by children themselves or by accompanying parents using psychometric scales to evaluate the internal anxiety or stress of children.^{1–5} These reports did not always reflect the internal anxiety states of child patients, because young children have difficulties in verbally expressing their feelings accurately. In order to comprehensively understand the anxiety or stress felt by children, additional objective assessment is required.

For objective assessment of internal emotion of children, several physiological responses induced by dental treatments have been utilized. As physiological responses to anxiety or stress, changes in heart rate, blood pressure, electrodermal activity, autonomic nervous activity, and salivary concentrations of cortisol and α -amylase have been measured in previous studies.^{9–14} Among these factors, sympathetic nervous activities have been reported as valuable in assessing the internal stress of children, even when no expressed signs of anxiety and stress are present during dental treatment.¹⁵ Thus, in the present study, we measured the autonomic nervous activities through power spectrum analysis of the inter-beat (R-R) interval variation from electrocardiogram (ECG) and estimated the internal stress levels of child patients. Additionally, we examined the subjective anxiety levels of mothers accompanying child patients by using the State Trait Anxiety Inventory (STAI). From these objective and subjective measurements, we investigated the emotional relationships between child patients and their mothers.

Materials and methods

Participants

The participants were selected from patients registered for treatment at pediatric dental clinics in the university

dental hospital. The criteria for selection were an age range of 3–6 years old and healthy, without any systemic or psychological problems and medication use. The investigation was performed between October 2013 and June 2014. Twenty-seven patients (15 males and 12 females) and their mothers participated in this study. Treatment for all patients was composite resin restoration. Out of 27 patients, 13 (6 males and 7 females) underwent treatment with restraint (uncooperative group) and 14 (9 males and 5 females) underwent treatment without restraint (cooperative group). When behavioral approaches, such as tell-show-do and distraction, were unsuccessful, passive restraint was considered, since general anesthesia or sedation is not preferred by Japanese parents. Passive restraint describes a treatment using a restraining device to stabilize patient's movement and make the practice safer. Most patients of pediatric dental clinics at our university are referred by their primary dentists and need urgent treatment, because they have strongly refused treatment and remained untreated. Therefore, the use of passive restraint is often chosen in our clinic in cases where usual behavioral control ends unsuccessfully. [Table 1](#) summarizes the number of patients by age and two types of attitude toward treatment (cooperative and uncooperative).

Measurement of autonomic nervous activity

ECG of patients was recorded throughout the treatment to analyze the autonomic nervous response to anxiety and stress conditions. Patients were equipped with a portable ECG monitor (Active Tracer AC-301A; GMS Co., Tokyo, Japan) immediately after lying on the dental chair for treatment. The ECG of the patient was recorded once in the early stage of treatment. The variations of separate R-R intervals in ECG were analyzed with the software MemCalc/Win version 2 (Tarawa; GMS Co.), which outputs the power of two specific bands through power-spectral analysis. One is a high-frequency band (HF; 0.15–0.4 Hz), which signifies parasympathetic nervous activity, and the other is a low-frequency band (LF; 0.04–0.15 Hz), which reflects both

Table 1 Number of patients in each age group and in two types of attitudes toward treatment (cooperative and uncooperative).

	3-y	4-y	5-y	6-y	Total
Cooperative	4	3	3	4	14
Uncooperative	11	2	0	0	13
Total	15	5	3	4	27

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