

Early childhood caries (ECC): a preventive-conservative treatment mode during a 12-month period.

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Purpose: to evaluate a preventive treatment mode for early childhood caries (ECC).

Population and methods: The population to be studied included 30 children who, over a 12-month period, presented with ECC to a private dental clinic. Parents preferred non-invasive, preventive treatment over restorations. Parents were given hygiene and proper feeding instructions. Mesial slicing was performed where proximal caries was observed. Children were examined once every two months. They received supervised professional topical fluoride treatment. Plaque level, brushing, stopping the bottle, eating sweets, appearance of new lesions or exacerbation of existing condition were observed and recorded.

Results: in the vast majority of patients, the progression of ECC was arrested after the preventive regimen. Three children required restorations. They had failed to limit sugar consumption and to comply with brushing instruction. General improvement was observed in plaque control, brushing habits and sweets consumption.

Conclusion: preventive measures may successfully arrest ECC and thereby avoid invasive procedures as well as the need of anesthesia.

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Introduction

Early Childhood Caries (ECC) is a unique virulent form of rampant caries that develops in the primary dentition soon after the eruption of the first teeth.

Clinically, caries is first found in the maxillary primary incisors; later it spreads to the maxillary molars, mandibular molars, and rarely, the mandibular incisors.¹

A variety of factors have been suggested to be associated with ECC. Biological factors such as high counts of *Mutans streptococci* (MS) or hypoplasia, as well as social/demographical/behavioral. Other factors such as lack of access to dental care, lack of dental insurance of the children, low family income, low educational level

achieved by the mothers, and lack of proper hygiene and dietary habits.^{2*} Investigators have reported that the condition is initiated and exacerbated by prolonged use of sweet drinks in a nursing bottle, particularly during night feeding or during day naps.³

Treatment

The management of ECC has been focused on the dental manifestations of ECC.

Dental restorative care of ECC often requires general anesthesia (GA) or sedation because the very young are often unable to cope with the procedures. However, a sedated child is not always cooperative enough to ensure optimal conditions to perform the restorative procedures, particularly bonded composite restorations that are extremely technique-sensitive.^{4,5}

It is believed that extensive operative and restorative dental care effectively reduces the levels of caries associated with microorganisms during a period of at least 6 months.¹¹

Non invasive treatment approach

Preventive strategies to limit ECC have attempted to modify the dental, infectious, and behavioral determinants of the disease⁶. Efforts have been made to reduce the frequency of exposure to bacterial substrates and to control the growth of oral bacteria. Such approaches however, have had only limited success. One study

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showed that among parents of children with ECC, 68% did not substitute water for cariogenic drinks in the nursing bottle.¹² Another study reported little influence of parental counseling in weaning their children from the night-time bottle and in brushing fluoride gel on their children's teeth.¹³

Antimicrobial approaches have been proposed in an effort to reduce colonization and transmission of MS and thereby diminish dental caries incidence.^{14,15} Topical antibacterials such as 10% povidone iodine has shown promise in the inhibition of ECC in young children.^{16,17}

Thus, the rational paradigm in managing ECC include the following:

Regular check-ups with the semiannual fluoride application (such as fluoride varnishes); removal of plaque and MS counts at home and in dental office and dental restorative care either with or without sedation.⁸

Despite the fact that the use of fluoride and antibacterial agents is a promising and often effective mode for the prevention of ECC, three cases of failure have been reported after intense and conventional methods of prevention were used.¹⁸ These cases included children under age three who, despite preventive treatments, developed frank carious lesions.

The aim of the present study is to evaluate a preventive treatment mode for ECC.

MATERIALS AND METHODS

The population to be studied included 30 children who, over a 12-month period, presented with ECC to a private dental clinic. Diagnosis of ECC was confirmed when at least two upper primary incisors were affected with frank cavities, irrespective of severity of the lesions.¹⁹ All patients were clinically examined, and radiographs of the maxillary anterior region were taken.

The accompanying parents averaged over 12 years of formal schooling, and thus, were categorized as medium to high socio-economic class. Parents were asked to indicate whether the patient brushed by responding to a yes or no questionnaire. They also described the patient's consumption of sugar by indicating one of the following: a little; moderate; much; very much.

Parents were presented with the treatment option of restorations (fillings or composite strip crowns depending on the size of the lesions). During the discussion on treatment options, success rates of composite crowns were discussed. All parents were interested in non-invasive, preventive mode of treatment and preferred this mode over restorations.

Carious lesions of all children in the study were measured and described in millimeters: on the buccal or palatal surfaces, only the largest dimension was recorded clinically. On the proximal surfaces, the size of lesions was measured on radiographs. When more than one tooth was affected, the largest dimension was

recorded. All calculations were therefore made *per* child. Loe's plaque Index was used to measure plaque on the maxillary incisors.²⁰

The following non-invasive preventive protocol was presented to the parents:

Home care protocol: All parents were familiarized with the potential harm of frequent and prolonged feeding with a nursing bottle. They also were given instructions on how to brush their children's teeth daily with a 'pea sized' amount of fluoridated toothpaste.

Dental office protocol: Mesial slicing when and where proximal caries was observed to allow saliva to wash the areas, and frequent professional fluoride treatments.

Over a 12-month period, all children were examined once every two months.¹⁹ In each visit they received supervised professional topical fluoride treatment of approximately 0.1 gram of 2% NaF topical foam that was 'brushed-on' for one minute.¹⁹

Baseline and subsequent dental examinations were conducted by the same dentist (BP). Clinical detection of caries was determined by visual and tactile examinations.

Plaque level, brushing, stopping the bottle, eating sweets, appearance of new lesions (including white spot lesions) or exacerbation of existing condition were also observed and recorded at each visit. Chi-square test was used to analyze the data.

RESULTS

The study included 30 children, 19 boys, 11 girls. The age range was 2 to 4 years of age (mean age was 3.1 ± 0.7 years). Seven children were 2 years old, 13 were 3 years old, and 10 were 4 years old.

Most lesions were found on the buccal surface, followed by the buccal and proximal surfaces. No lesions were found on the palatal surfaces. Table 1 summarizes the age distribution and the distribution of the caries sites.

The mean diameter of the buccal lesions was 2.07 ± 0.88 millimeters. The mean depth of the proximal lesions was 1.27 ± 0.47 millimeters.

Table 2 demonstrates the distributions of plaque level, brushing and eating sweets at the initial visit (baseline), at the 6-month visit (T1) and the 12-month visit (T2). No child had been found totally plaque free. A significant increase in the number of children presenting with a little amount of plaque was observed at

Table 1. Distribution of age and location of caries on the PMI's at time of first examination:

Age	2 years 7 (23%)	3 years 13 (43%)	4 years 10 (33%)
Caries	Buccal 19 (63%)	Proximal 2 (7%)	Buccal & proximal 9 (30%)

Table 2. The distributions of plaque level, brushing and eating sweets at baseline, T1 and T2.

	Baseline	T1	T2	p*
Loe's Plaque Index				
1	8 (27%)	25 (83%)	13 (43%)	
2	11 (37%)	3 (10%)	14 (47%)	
3	11 (37%)	2 (7%)	3 (10%)	0.0001
Brushing				
Yes	7 (23%)	23 (77%)	25 (83%)	
No	23 (77%)	7 (23%)	5 (17%)	0.0001
Eating sweets				
A little	11 (37%)	13 (43%)	19 (63%)	
Moderate	7 (23%)	12 (40%)	11 (37%)	
Much	9 (30%)	5 (17%)	0	
Very much	3 (10%)	0	0	0.005

T1 = six-month examination, T2 = 12-month examination, * Chi-square.

T1 compared to baseline: 25 (83%) and 8 (27%) respectively. However, at T2, the number of children with minimal plaque increased again, although not to the levels of the baseline: 13 (43%) and 8 (27%) respectively.

The number of children who were brushing their teeth constantly (at least once a day) increased at T1 and T2, so was the number of children who reduced their consumption of sweets.

At baseline, 19 children had unlimited access to a bottle containing sweet liquids. After 12 months, this habit was found only among one child aged 3 years.

After 12 months, 27 children presented with the teeth unrestored. Composite crowns on two maxillary central incisors were performed on three children at the six-month visit due to lack of proper oral hygiene and sugar restrictions, and the clinical signs of caries progression. These children continued to receive the preventive regimen with the rest of the group, and improved their brushing and eating habits after 12 months.

DISCUSSION

Our findings demonstrate that in the vast majority of patients, the progression of ECC was arrested after a preventive regimen was implemented. Only three children required restorative treatment. All three children had failed to limit high frequency sugar consumption and failed to comply with brushing instruction and behavior, but still continued to receive the preventive regimen. General improvement was observed in plaque control, brushing habits and sweets consumption.

The ability of the preventive regimen to arrest ECC would suggest that this approach should be considered in accordance with and congruent with the goals of the proposed preventive paradigm.^{6,17} Our findings are also supported by those of Tinanoff et al.¹⁸ As in that study, caretakers in our study received education on decreasing frequent and prolonged feeding with a nursing bot-

tle and other sugar containing foods. These children were instructed also to brush daily. However, Tinanoff et al. did conclude that some children possess risk factors that overwhelm even extraordinary preventive efforts. This might be the case in the three children who ended up with restorative treatment in our study.

The nature of ECC in children must be studied biologically and within the context of their environment. Social factors to be considered are the following: caregivers and families, neighborhoods and communities and the nature of dental care in society. Biologically, ECC is attributed to early infection with *MS*. Hypoplastic defects on the enamel of the primary teeth may also be substantial contributions to the development of the disease.²¹ Behavior thought to increase the risk of ECC includes high sugar consumption and lack of proper brushing.

The treatment protocol espoused in this trial depended primarily on the motivation of the parents to imply the conservative preventive mode of treatment, and on the compliance of parents in their roles as monitors and teachers of their children's behavior. The variables associated with parental compliance, oral hygiene and plaque control, were satisfactory in all successful children. Compliance at all levels of personal hygiene have been correlated with levels of education achieved. The high parental compliance in this study could be attributed to the fact that all the parents in this study had achieved more than 12 years of education. This notion has been found in previous studies, which demonstrated that children of parents with university educations had half the average number of mean dmfs scores,²² and that parents with university education were more likely to be aware of feeding practices and oral hygiene behavior that is related to ECC.^{4,12}

In this context, the parents in this study strongly preferred that their children receive non-invasive care of their dental health and that their treatment not include sedation or general anesthesia.

The three cases of caries progression in our study have been linked with poor oral hygiene and lack of sugar restriction. However, this is not to dismiss the possibility of enamel deficiency that compromises the ability of the host to resist the caries attack or challenge, or high *MS* counts. This would relate to the suggestion that preventive measures may be overwhelmed in some individuals.^{13,18}

The findings of this study must be applied cautiously. The patient universe in this study did not represent the general population. The parents in this study were in the medium to high socio-economic class. An advantage of treating this group was the confidence of the investigators that the parents would follow-up for reevaluation and treatment. Another limitation is the use of the same person for treatment and caries examination due to the nature of the study that is being conducted in a private practice.

Despite limitations, this study contributes to the growing support and validation of the notion that preventive measures may successfully arrest ECC and thereby avoid invasive procedures as well as measures of anesthesia. Early identification, prevention and intervention are critically important to avoid the costly treatment of children with ECC in hospital operating rooms.²³

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