CASE REPORT

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Case study: caries in young children

Abstract: This article describes the aetiology and specific diagnoses of two different children that presented to the dental surgery with a form of dental caries. The management of both cases is being discussed as well as the differences in the prevention of early childhood caries.

Key words: care; caries; dental hygiene counseling; dental therapy; diagnosis; knowledge; oral health; prevention individual; problems; status

Case description

Two children have presented to the dental surgery with their parents (mothers). Both mothers are concerned about the appearance of the children's teeth. Child A is 22 months old, and child B has just turned 7 years of age. It is obvious that both children have experienced dental caries to the point of cavitation. Both children have a form of dental caries (Figs 1–4); however, the diagnosis and therefore management of



Fig 1. Clinical situation child A.



Fig 2. Clinical situation child A.

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Fig 3. Clinical situation child B.



Fig 4. Clinical situation child B.

each of the cases is different. Table 1 provides an overview of both cases.

Questions

- 1 What are the diagnoses for each of the children?
- 2 Describe the aetiology of the specific diagnoses.
- 3 What are the differences in management for each of these children?
- 4 Which approach is suitable in the management of the prevention of early childhood caries?

Answers and rationale

Answer to question 1

Dental caries in deciduous teeth is now referred to as early childhood caries (ECC). In the past, terms such as baby bottle tooth decay, nursing caries and nursing bottle mouth were used however; these terms infer that the baby bottle or breast feeding is the primary cause of the condition although epidemiological data to support this idea are difficult to find (1).

T	able	1.	Overview	cases

	Child A	Child B
Medical	Mild seasonal asthma	Allergy to penicillin
Dental history	No previous dental visits	Previous dental visits General anaesthesia for treatment Restoration of deciduous molars Extraction of lower deciduous molars Fissure protection of upper right first permanent molar that was partially erupted at last visit
Main complaint	Mother concerned about discoloured teeth	Mother concerned regarding spacing
Clinical examination	Severe decay of all teeth present with the exception of the upper canines and the lower anterior teeth	Arrested/arresting cavitated lesions upper deciduous molars Active carious lesions of varying degrees lower deciduous molar teeth Several GIC restorations occlusal of deciduous molars Two extracted primary molars Partially lost sealants upper first permanent
Additional investigation	Saliva testing reveals > 500,000 cfu/ml of <i>S. mutans</i>	Saliva testing reveals < 500,000 cfu/ml of <i>S. mutans</i>

This may erroneously lead to advice to parents based exclusively on bottle use and ignores other important contributing factors. For this reason, the National Institute of Craniofacial and Dental Research (NICDR) consensus conference developed a case definition for dental caries in children aged less than six with two categories:

• ECC defined as any caries in the deciduous dentition;

• Severe ECC, which is stratified by age. Severe ECC is any smooth surface anterior maxillary caries in children less than 36 months or any decayed, missing or filled surfaces (dmfs) score of 4, 5 and 6 for ages 3, 4 or 5 years, respectively (2). Given this case definition, child A (Fig. 1) has severe early childhood caries. Child B has had early childhood caries, and dental records would need to be consulted to determine the age at which the caries manifested and therefore which severity category.

Answer to question 2

In order for caries to be initiated and progress to cavitation, a combination of substrate, cariogenic bacteria and susceptible host/tooth is required. It appears that ECC is a distinct and particularly virulent form of the disease and is related to dietary factors and to the early infection of the oral cavity by mutans streptococci (MS). The primary source of infection is usually the primary caregiver, and it appears that the level of MS in the primary caregiver's oral cavity is related to increased risk of transmission to their children. Earlier infection and high amounts of MS in the mouth predispose to higher caries experience and greater severity. Enamel is most susceptible to caries as teeth erupt into the mouth, and at this stage, frequent availability of sucrose favours the establishment of a dominant cariogenic oral flora.

Contemporary evidence suggests that ECC has its aetiological roots in the first year of a child's life, and therefore, efforts to prevent the development of cavities needs to commence much earlier than in the past. Once the disease has progressed to the point of enamel breakdown, simply restoring the teeth damaged by the process will not eliminate the disease process. Intensive preventive management is required, and this must be based on a careful assessment of each patient's risk and protective factors.

Answer to question 3

Modern caries management is focused on careful risk assessment, which then guides clinical decision-making. Interventions should involve minimal intervention principles coupled with maximum prevention. A number of caries risk and/or management systems have been developed in different countries for different settings [see for examples, Evans & Dennison 2009 (3) and Ekstrand & Christiansen 2005 (4)].

The recently developed Caries Management by Risk Assessment (CaMBRA) is a useful tool for identifying caries risk indicators: caries risk factors and also protective factors (5). It is predicated on the idea that caries progression towards cavitation is largely due to an imbalance within the mouth, which favours pathological over protective factors (6) and was recently validated as an accurate and useful caries risk assessment tool for daily practice (7). The original CaMBRA system was developed after a consensus conference in 2002, and the CaMBRA 0-5 tool published in 2007 is a modification for very young children. It recognizes the intimate child-parent relationship in ECC. The one-page form follows the usual parent interview-clinical examination process and allows collection of information in five areas. Information for four of the five areas is collected during the parent interview with the final area involving information from clinical examination of the child's mouth. A positive response to a number of key questions in the risk areas prompts the clinician to consider bacterial testing on the mother/caregiver and child. The clinician then weighs the relative risk and protective factors and determines low, medium, high or extreme risk status.

Once risk status is determined, the CaMBRA tool provides guidelines for the therapeutic options the clinician with parental consent can then use, including antibacterials, fluorides, frequency of radiographs and periodic oral examinations, xylitol and/or baking soda and dental sealants. CaMBRA 0-5 supports the use of motivational interviewing (MI) with parents to help them make behavioural changes (see also Answer to question 4). In addition, the management of existing lesions (both cavitated and non-cavitated) is indicated following MI guidelines. These recommendations embrace the concept that the primary focus in caries management should be 'on control of the infection, plaque control and reduced carbohydrate intake' (8). In very young children, clinicians should consider the temporization of cavities with glass ionomer cements to reduce areas of plaque stagnation ('holding care') using the atraumatic restorative treatment (ART) technique while the infection is being managed. Alternatively, where possible, cavitated areas of plaque stagnation can be eliminated with judicious slicing of tooth tissue. If temporization or slicing is undertaken, parent must understand that this treatment is not the solution to the disease but merely part of the overall plaque control strategy (9). Where parental plaque control is possible, cavities may be left as they are. However, more inaccessible areas may need to be modified or eliminated.

Preventive management for both cases according to the CaMBRA tool is presented in the Table 2.

Answer to question 4

Given that young children do not make independent decisions about the diet, fluoride or oral hygiene, the prevention of ECC must target the parents of the child. The risk factors for ECC include special healthcare needs, low socioeconomic background, suboptimal exposure to topical or systemic fluoride, poor dietary and feeding habits, presence of caregivers and/or siblings with caries or presence of visible caries, white spots, plaque or decay. The risk factors for ECC are determined by family values, traditions and lifestyle, which in turn are related to culture and social class. Gaining more insight into the socio-economic and cultural background and family circumstances of young children is needed to develop a strategy for prevention of caries in the deciduous dentition.

The attitude of parents and their perceived ability to maintain their children's oral hygiene are extensively investigated (10, 11). Research shows that the oral health behaviour of both parents affects the oral health of the child (12). Mothers particularly play a vital role in raising very young children. A higher frequency of mother's own tooth brushing has an impact on higher frequency of oral cleaning for the child. The same applies to the mother's positive perception of her ability to maintain the child's oral hygiene (13). In the prevention of ECC, the role of the mother's own oral hygiene behaviour should therefore not be underestimated. New mothers who themselves present with dental caries may inadvertently put their infants and other children at risk of ECC (14-16). As mentioned before, babies mostly acquire MS from their mother or primary caregiver. Delaying this colonization of cariogenic bacteria lowers the risk of a child developing caries (17). Mothers who chew gum containing xylitol and who use chlorhexidine rinses (which seems to be less effective and has

Knevel and Gussy. Early childhood caries (case study)

Table 2.	Preventive ma	inagement cases accordi	ing CaMBRA tool					
	Saliva test (flow and bacterial culture)	Antibacterials	Fluoride/calcium phosphate	Frequency of radiographs	Frequency of periodic oral exams	Xylitol and/or baking soda	Sealants	Existing lesions
Child A	Required	Chlorhexidine for main caregiver for 1 week each month	Fluoride varnish at all recall visits Fluoride toothpaste and calcium phosphate paste combination twice daily	After age two every 6–12 months until no new lesions detected	Every 3 months	Xylitol gum or lozenges for carer Xylitol spray, food or drinks	N/A	ART with GIC to temporize cavitation Fluoride varnish for penetrate to the
Child B	Required	Chlorhexidine 1,2% for 1 min per day for 1 week each month for child	Increased strength toothpaste twice daily 2× daily fluoride mouth rinse Fluoride varnish 1–3 applications initially and then at 3–4 month recalls	Bitewing radiographs every 6–8 months until no new lesions arte detected	Every 3-4 months	Xylitol gum or lozenges four times daily	All non- cavitated pits and fissures	Temporary GIC restorations until disease controlled

more side effects) reduce the levels of MS in their dental biofilm and saliva, which has shown to lead to reduction in caries in their children and themselves (10-12).

Because the health and welfare of infants and young children are dependent on the practices and beliefs of the primary caregiver, several psychosocial and behavioural factors of ECC differ from factors for dental decay in older children and adults (7). In the prevention of ECC, the mother's diet (prenatal and post-natal) needs to be considered as well as her belief about child feeding, her own dental practices and oral health, and the socioeconomic status of the family.

The prevention of ECC relies on the parent's knowledge of the aetiology of ECC, correct dental hygiene behaviour, the need for regular dental visits and the knowledge and the ability to introduce a low cariogenic diet. Knowledge is a necessary prerequisite for behaviour change, however; research shows that traditional health education is insufficient to change parent's behaviour in relation to their at-risk children (18, 19). Interventions that aim to improve the oral health of the parents are likely to have beneficial effects on the oral health of their offspring (20). Owing to the fact that ECC has many recognized psychosocial risk factors, the oral healthcare professional needs to understand the risk factors and barriers for implementing behavioural changes. It is important for the oral healthcare professional to alter the thinking and behaviour of the parents and more particularly the mother. Some more limited research has indicated that the oral health of the father may also be important in later life (5 years of age) (21).

It may also be that dental health interventions can be more successful when delivered outside traditional dental settings such as the homes of young families. Once-yearly home visits, for 3 years, in which diet and oral hygiene instructions were provided to mothers in disadvantaged suburbs of Leeds in the United Kingdom were effective in significantly reducing the prevalence of ECC (22). In another randomized controlled field trial in Brazil, mothers received regularly home visits and were provided with information about healthy breastfeeding, weaning and infant diet. This advice was designed to deter cariogenic-feeding practices, but the information was not specifically delivered as oral health advice. The intervention group had less dental caries (significant) and was exposed to sugar-containing foods and drinks later than the control group (23). This result suggests that dental health can be enhanced through interventions that incorporate dental health advice as part of general nutritional advice for infants and toddlers.

Another novel approach to the reducing the prevalence of ECC seems to be very promising. This approach might also be more cost-effective compared with the home visits methods. Motivational interviewing (MI) techniques can be utilized to assess the parent's knowledge and to attempt to change their behaviour. An important characteristic of MI is building a relationship in which the client's thoughts, beliefs and feelings are respected, before providing any advice. Patients (or parents of patients) are reluctant about 'being told what to do'. When patients are not ready for behaviour change, the health educa-

tion advice not only will fail to motivate, but might create defensiveness. Behaviour change is encouraged instead of being challenged. The client will self-identify goals to work towards, by being aware of potential negative health outcomes and behaviours. An important principle of MI is rolling with resistance, allowing new thoughts from the client, but not imposing current or new ideas. Self-efficacy is supported, while the biggest motivator for change is the client's belief in their ability for change (24). It is important to provide the individual a sense of ownership with respect to their behaviour. Extrinsic motivation only temporarily affects behaviour. Evidence shows that intrinsically regulated health behaviours are more stable and result in better health outcomes (25).

Beliefs about health, diet, disease, hygiene and the importance of primary teeth in different cultures may create additional ECC. Culturally tailored dental health education is needed to promote more positive attitudes to oral health. MI allows dental health information to be adjusted for cultural diversity. For example, information about dietary choices need to be adapted to the parent's and the child's own traditional diet and lifestyle.

A motivational interviewing approach amongst immigrant children in Canada showed that a 46% lower rate of dmft was noted by using MI as a technique for preventing caries compared with children whose parents did not have MI as a preventive measure (26, 27). If there is more follow-up and interaction between the oral healthcare professional and the parents, the chance increases that positive behaviour change will take place. Intensive patient counselling or motivational interviews with parents to change specific behaviours may reduce the caries prevalence in their children (28, 29).

The prevention of ECC should take place preferably prior or very shortly after the teeth begin to erupt. Only this way optimal preventive outcomes can be achieved (30). The American Academy of Pediatric Dentistry recommends inclusion of the first caries risk assessment at age 6 months (31). The role of the oral healthcare professional should be to guide a child's caries balance in favour of protective factors and caries resistance by involving the management of pathological factors through education and oral health of the child's primary caregiver. The dental office is a suitable place to achieve this; however, the parents of these high-risk children often wait until caries in the primary teeth is advanced or the child is suffering from pain.

The dental hygienist or oral health therapist could be introduced outside the dental setting into the well-child health supervision. This is important to reach all parents who otherwise would not visit the dental office owing to limited opportunity to access dental care or a lack of knowledge and/or limited interest in oral hygiene behaviour. The intervention could be performed by a dental hygienist or oral health therapist or could be provided within existing services by other (healthcare) professionals or community members that can function as a role model. Any ECC preventive programme that is developed should incorporate significant community involvement (11). Programmes that provide one-on-one education and support to mothers are likely to have significant benefits, particularly where they also involve outreach into family homes, incorporating the oral health messages into general health promotion (11).

The use of fluoride varnishes at least twice per year to reduce ECC is also supported by research (32, 33). The use of MI for the prevention of ECC in any setting (dental or non-dental by dental hygienists, oral health therapists or other trained personnel), in combination with the use of fluoride varnishes, shows promising results. To enable oral healthcare professionals to practise MI in different settings and situations, it is important that teaching of MI techniques is incorporated in the curriculum of any dental hygiene or oral health therapy programme.

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