

## Management of Neglected Severe Early Childhood Caries in a Six Year Old Female Child: A Three Year Follow Up

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### Abstract

Early childhood caries is a virulent form of dental caries, characterized by an overwhelming infectious challenge associated with unusual dietary practices. This case report is of a child with severely mutilated deciduous teeth and carious lesion affecting smooth surfaces of permanent teeth. Following caries risk assessment; the patient was educated in relation to oral hygiene practices and treated with latest techniques to facilitate eruption guidance for permanent teeth. So this paper emphasizes on multidisciplinary management and treatment of severe Early Childhood Caries (S-ECC).

**Keywords:** Early childhood caries; Oral hygiene; Eruption guidance

### Introduction

Early childhood caries (ECC) is a virulent form of dental caries characterized by an overwhelming infectious challenge associated with unusual dietary practices [1]. ECC is defined as presence of one or more decayed (non-cavitated or cavitated smooth surface lesions), missing (due to caries) or filled tooth surface in any primary tooth between birth and 71 months of age [2]. Factors such as improper feeding practices, familial socioeconomic background as well as lack of parental education, dental knowledge and access to dental care contribute to development of this devastating condition [3].

Decay in the primary dentition is the best predictor for decay in the secondary dentition; poor dental health and disease often persist to adulthood, affecting speech articulation, growth, and dietary practices [4]. At the most extreme of cases, ECC can also lead to rampant decay, infection, pain, abscesses, chewing problems, malnutrition, gastrointestinal disorders, and low self-esteem [3]. Additionally, children with ECC are shown to have an elevated risk for new lesions as they get older, both in the primary and permanent dentitions [5].

### Case Report

A 6 year old female patient reported to the department of pediatric and preventive dentistry with chief complaint of pain and swelling in upper front teeth from last one month. The child used to suffer from recurrent fever and pain because of the presence of chronic sinus and pus discharge from the decayed teeth. Parental history consisted of multiple restorations and missing teeth which suggested they were among high risk group. History revealed presence of improper night feeding habits.

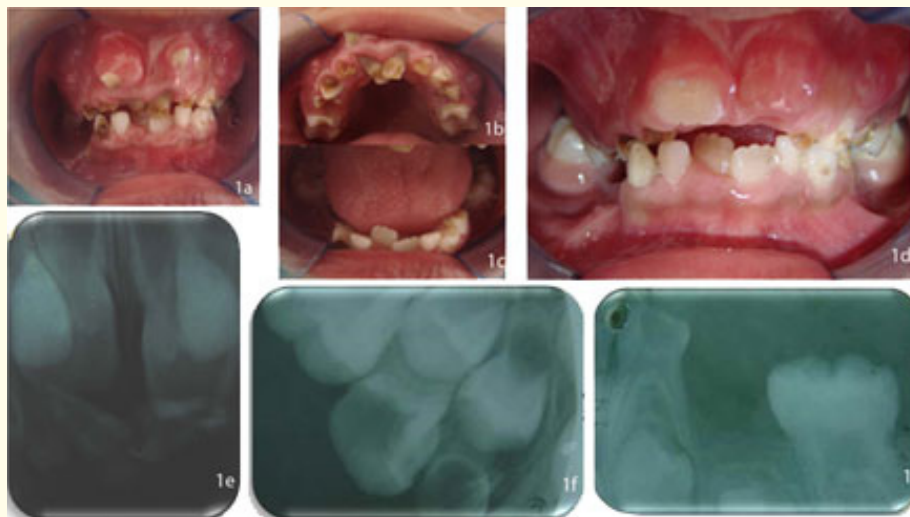
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Oral examination revealed severely mutilated deciduous dentitions and initial carious lesion with white chalky surface and increased porosity affecting the erupting permanent tooth. Fenestration was observed i.r.t maxillary deciduous central incisors which were interfering with the eruption of permanent central incisors whose bulge was visible (Figure 1a). Grossly decayed teeth along with sinus were observed i.r.t. maxillary deciduous molars and right maxillary deciduous canine. The maxillary arch was constricted with deep palate. Generalized swollen and spongy gums were present which bleed easily on probing (Figure 1b).

In the mandibular arch the root stumps of right first deciduous molar was present whereas the second deciduous molars on both sides were missing. Deciduous canines and left first deciduous molar were also decayed with gross loss of the tooth structure (Figure 1c). Pit and fissure caries affecting newly erupted permanent first molars was observed thereby suggesting that the patient was among a high risk group (Figure 1d). The PUFA score was 14. It was elicited from the patient that she rarely brushed at night and there was frequent intake of sweets in her regular diet.

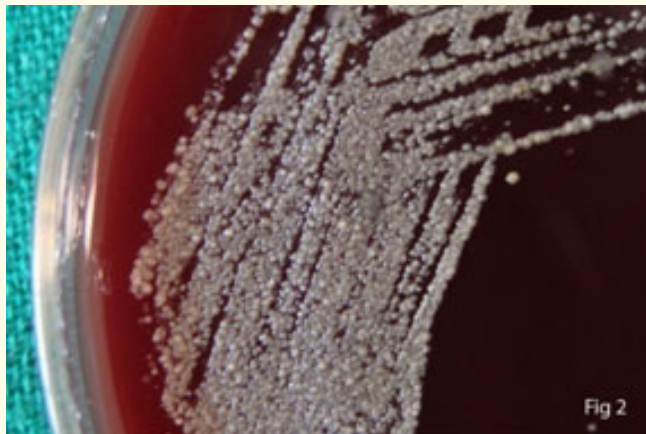
Radiological examination revealed retained pathologically migrated deciduous central incisors with displaced roots and Periapical radiolucency involving the permanent tooth bud (Figure 1e). Caries extending to pulp chamber i.r.t. maxillary second deciduous molars (Figure 1f), deciduous canines and mandibular left deciduous first molar (Figure 1g) with internal root resorption affecting maxillary first deciduous molars was also revealed from radiographs. Alveolar bone destruction was present in this area. The culture media revealed a high mutans *streptococci* count, in the order of  $6.3 \times 10^6$  CFU/ml.



**Figure 1:** a. Pre-operative clinical photograph in occlusion. b & c. Pre-operative clinical photograph showing upper and lower arch individually. d. Clinical photograph of the patient after initial extraction. e. Pre-operative Intra-oral Peri-apical radiograph of Maxillary Incisors. f. Pre-operative Intra-oral Peri-apical radiograph of Maxillary Molars. g. Pre-operative Intra-oral Peri-apical radiograph of Mandibular Molars.

\*PUFA score was 14.

Before executing treatment, Caries risk assessment was done using Caries Risk Assessment Tool (CAT) given by American Academy of Pediatric Dentistry in 2006. Colony forming units count for mutans *streptococci* was carried out which confirmed the child a high risk patient (Figure 2).



**Figure 2:** Estimation of *Mutans Streptococci* by using colony counter.

The treatment options for established ECC vary depending on how far the disease has progressed. Parental counseling was done for ensuring proper diet and establishing good oral hygiene practices. Emergency extraction of maxillary deciduous central incisors was done in order to facilitate the eruption of permanent incisors (Figure 1e). Extraction of indicated mandibular deciduous second molars was carried out in subsequent visit in order to reduce the bacterial count as they were non-restorable. Liptrap was seen in the patient in association with constricted Maxillary arch upon eruption of permanent incisors (Figure 3a).

Arch analyses revealed arch length deficiency of 4 mm. Other cephalometric observations such as SNA - 82.5°, SNB - 79°, ANB - 3.5°, and Inter-incisal angle - 122° revealed that the malocclusion present was of dentolaveolar not skeletal thereby confirming the findings that early loss of tooth due to severe caries has resulted in such a devastating condition (Figure 3b).

Pulpectomy was considered for carious exposed deciduous teeth using endoflas as an obturating material because it has additional antibacterial action due to presence of iodoform. Pulpectomized teeth were followed by the placement of stainless steel crowns for occlusal rehabilitation (Figure 3c).

Preventive resin restoration regime was followed for all the permanent molars which have erupted. Following extraction of maxillary first Primary molars premature eruption of first premolars was observed at 6 1/2 years of age. These teeth when observed on radiograph were in stage D according to the Demerjian Classification.

In mandibular arch reverse crown and loop was placed on left side whereas on right side a new space maintainer i.e. banded and bonded space maintainer was cemented. A post-operative Panoramic Radiograph was taken for the assessment of Endodontic and space maintenance phase of therapy (Figure 3d). Cross bite was also observed on right side affecting the deciduous canines and permanent first molars (Figure 3e). Healing in cases of periapical pathology, bone resorption in un-attended cases of ECC leads to delayed and secondary healing formation of scar tissue causing constriction of affected area.

Occlusal interferences i.r.t deciduous canines were removed in order to allow proper path of closure. As patient was too young so for correction of cross bite quad helix was planned (Figure 3f). The initial 8mm expansion before cementing the bands was carried out. Patient was re-called every three weeks for regular activation of the appliance; this resulted in a well aligned arch-form with optimal amount of expansion seen in the Maxillary arch (Figure 3g & 3h).



**Figure 3:** *a.* Extra-oral facial profile showing lip trap. *b & c.* Intra-oral Post-operative clinical photograph after first phase of treatment. *d.* Panoramic Radiograph showing Stainless Steel crowns and space maintainers given. *e.* Intra-oral Post-operative photograph showing unilateral posterior cross bite and Maxillary arch constriction. *f.* Quad Helix appliance for space maintenance and expansion of Maxillary arch. *g.* Intra-oral post-operative clinical photograph showing erupting pre-molars. *h.* Final Post-operative photograph.

The Quad helix does have orthopedic effect so that in a deciduous or early mixed dentition patient the initial activation of quad helix is capable of orthopedically widening the maxilla and hence correcting the maxilla-mandibular relationship [6].

The patient was kept on regular follow up for every 3 weeks. She was recommended to use fluoridated tooth paste and was demonstrated about proper oral hygiene practices. Use of an antibacterial mouth rinses (chlorhexidine gluconate) was also advised for 15 days every 3 months.

### Discussion

The ECC is one of the most common types of caries in infants and toddlers and its prevalence goes from 3.1% to 53% in some populations. This kind of caries involves especially low socioeconomic groups where the prevalence can reach 90% of children younger than 3 years [2]. Not surprisingly, there is not a statistically significant difference in caries prevalence for children 2-5 years of age between National Health and Nutrition Examination Survey (NHANES) III (1988-1994) and the 1999-2000 NHANES.

The first event in the natural history of the infectious disease ECC is primary infection by mutans *streptococci*. The second is accumulation of mutans *streptococci* to pathogenic levels, secondary to frequent and prolonged dietary exposure to caries promoting sugars. Third event is being rapid demineralization of enamel, which results in cavitation of tooth structure. Therefore ECC can be prevented by breaking the cycle at any of these levels [1].

Ensuring proper diet and establishing good oral hygiene practices is therefore the first step for the management of the early childhood caries. Bacteriologic studies have demonstrated that in children with ECC, mutans *streptococci* regularly exceeded 30% of the cultivable plaque flora [7]. Conversely, mutans *streptococci* typically constitutes less than 0.1% of the plaque flora in children with negligible to no caries activity [8].

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The fact that caries is a transmissible disease involving the cariogenic bacteria mutans *streptococci* has been well-established. The major reservoir from where babies acquire mutans streptococci is their mothers or primary caregivers, though cariogenic bacteria can be transmitted from other caregivers or children in close contact. It was reported that the frequency of infant infection was approximately 9 times greater when maternal salivary levels of the organism exceeded  $10^5$  colony-forming units (CFU)/mL than when maternal salivary reservoirs were less than or equal to  $10^3$  CFU/mL (58% vs. 6%) [9]. Suppression of maternal reservoirs of mutans *streptococci* prevented or delayed infant infection [10]. In our case also the parental dental history of restorations and extractions indicates their high bacterial reservoirs thereby acting as a carrier for the child.

Because of the aggressive nature of ECC, treatment should be definitive and specific for each individual patient. Very early detection of enamel demineralization is detrimental for successful treatment. Chalky white spots may remineralize after fluoride treatment and diet modification [2]. Because the caries process is constantly changing, demineralization can be followed by remineralization; fluoride can remineralize tooth decay at its earliest stages [11]. Preventive resin restorations should therefore be followed for all the erupting permanent teeth in these high risk group patients.

Alternative restorative treatment techniques, using materials such as fluoride releasing glass ionomer cements, hold promise as both preventive and therapeutic approaches [12]. Aggressive therapy, including the placement of stainless steel crowns, was necessary to arrest the carious process. Stainless steel crowns on primary molars decreased the number of tooth surfaces at risk for new or secondary caries [13].

The technological advances in dental materials for use on children that have occurred in the past few decades make constant re-evaluation of our treatment philosophies and techniques a necessity. In view of this a new type of space maintainer that is banded and bonded space maintainer has been tried in this patient with good results.

Child was recommended use of fluoride-containing dentifrice which clears away colonies of micro-organisms and makes fluoride available to the child's salivary mineral solution to facilitate remineralisation of any early lesions.

Caries activity test was repeated after the planned treatment was complete which clearly showed reduced colonies of mutans *streptococci* thereby suggesting the decreased bacterial reservoirs after restorative and therapeutic treatment and ensuring good oral hygiene practices. As such children are at risk of developing caries in future, so the patient was kept on regular follow up.

### Conclusion

ECC is a chronic and infectious, but preventable, disease - both in the behavioral and scientific senses. The treatment of ECC requires special considerations given the pre-cooperative nature of the affected child. Although extensive measures and research have been invested into the prevention of ECC, better ways of implementing preventative methods and programs are needed. Lack of knowledge about ECC and following proper dental practices are things that parents can change - but only if parents or caretakers are willing to make that change.

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