

## Prosthetic Rehabilitation in a Four-year-old Child with Severe Early Childhood Caries: A Case Report

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### Abstract

**Aim:** The purpose of this case report was to describe the oral rehabilitation of a 4-year-old girl presenting early childhood caries (ECC).

**Background:** ECC is highly prevalent in developing countries and its severity increases with age. This disease implies serious consequences for the development of the stomatognathic system and for the child's quality of life. As young children are usually anxious about dental treatment, their level of co-operation is limited, leading to a challenging situation.

**Case Report:** A 4-year-old girl was brought by her mother for dental treatment with the complaint of pain. The clinical examination revealed extensive carious coronary destructions. After preventive and curative measures, the oral rehabilitation was performed; it included the use of stainless steel crowns, resin filled celluloid crowns with previous cementation of glass post pins when necessary, an amalgam restoration, orthodontic treatment, and a partial removable prosthesis. The child has been monitored in the Pediatric Dentistry Clinic at 4-monthly intervals.

**Summary:** The oral rehabilitation was able to reestablish the oral health in the primary arches mutilated by early childhood caries. This is important for the establishment of an adequate mixed and permanent dentition, for proper facial and maxillary growth, and to the child's psychological and social development.

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**Clinical Significance:** The full management, including preventive, psychological, and curative measures of a young child with severe ECC was found successful after 8 months of follow up. This result can encourage the clinicians to seek a cost-effective technique such as stainless steel crowns, resin filled celluloid crowns, and partial removable prosthesis to reestablish the oral functions and improve the child's psycho-social development.

**Keywords:** Dental caries, primary dentition, mouth rehabilitation, case reports

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## Introduction

Surgical endodontic therapy, performed as an Early childhood caries (ECC) encompasses all dental caries including non-cavitated lesions that occur in the primary dentition of children younger than 6 years of age. When this disease achieves atypical, progressive, acute, or rampant patterns, it is referred to as severe ECC.<sup>1</sup>

In young infants this multi-factorial disease is especially associated with the frequent use of sweetened fluids and fermentable carbohydrates over extended periods, poor oral hygiene as well as high level of mutans streptococci infection.<sup>2</sup> Furthermore, a study by Hallonsten et al.<sup>3</sup> has indicated children whose breast feeding was prolonged have a tendency to establish unsuitable dietary habits which also constitutes a risk situation for developing caries at an early age.

The prevalence of ECC attains high levels in developing countries<sup>4</sup> and its severity increases with age.<sup>5</sup> Primary teeth in good condition are extremely important for the child's well-being and adequate development of the stomatognathic system. A healthy primary dentition is essential for speech, mastication, prevention of incorrect oral habits, and serves as guidance for permanent tooth eruption.<sup>6</sup> Additionally, in early childhood, the esthetic appearance of anterior teeth contributes to normal personality development and, thus, for the improvement of self confidence<sup>7</sup> positively influencing the child's quality of life.<sup>8,9</sup>

Moreover, the consequences of this disease can include: a higher risk for the development of new carious lesions,<sup>10</sup> increased treatment cost and time,<sup>11</sup> reduced percentile category for height

and weight,<sup>12</sup> and loss of school days which contributes negatively to the learning process.<sup>13</sup>

The disease control and restoration of severely decayed primary teeth in children with ECC are challenging procedures in pediatric dentistry.<sup>1,9,14</sup> Thus, the purpose of this case report was to describe the oral rehabilitation of a 4-year-old girl presenting with ECC.

## Case Report

### Diagnosis

A 4-year-old girl was brought to the Department of Pediatric Dentistry at the Piracicaba Dental School at the University of Campinas, Piracicaba, SP, Brazil, by her mother. The child's main complaint was masticatory difficulties and pain during meals. A careful anamnesis was undertaken to obtain information about the child's oral healthcare as well as her behavior and physiological characteristics. It was apparent the child was very shy, had problems pronouncing some words, and also had a very limited relationship with other children. In addition, she did not attend kindergarten and presented extremely poor oral hygiene. Otherwise, the child was in good health and her medical history was unremarkable.

The mother was asked to fill out the child's diet chart for three consecutive days to obtain information about dietary habits. The diet chart showed a high frequency of soft drink consumption, soft foods with low nutritional content, high sugar content, and prolonged breast feeding. No mention of fruit or vegetable consumption was found in the diet chart analysis.

	Right					Left				
Maxilla	55	54	53	52	51	61	62	63	64	65
Mandible	85	84	83	82	81	71	72	73	74	75

**Figure 1.** Primary teeth numeric identification.



**Figure 2.** **A:** maxillary occlusal view of the mutilated primary dentition due to ECC in a 4-year-old child; **B:** frontal view; **C:** right lateral view, **D:** left lateral view.

The clinical examination revealed many white chalky spot lesions and extensive coronary destruction due to caries. All four mandibular incisors numbers 71, 72, 81, and 82 (Figure 1) were sound.

Furthermore, the occlusion examination showed a functional posterior crossbite with median line deviation (Figure 2).

With these data, the diagnosis of severe ECC was confirmed.

### Treatment

Initial procedures for improving the oral environment consisted of professional biofilm removal followed by four consecutive weekly fluoride varnish applications (Duraphat® - Wöel & Pharma, CO, Germany). Provisional restorations were placed on teeth numbers 63, 64, 65, 74, and 75 with glass ionomer cement (Ketac Molar - 3M/ESPE, St. Paul, MN, USA). Endodontic treatments were performed in teeth numbers 52, 54, 55, 62, 84, and 85. The maxillary central incisors (#51 and #61) were extracted. Oral



**Figure 3.** Appliance with helical springs.

hygiene instructions were given and supervised tooth brushing was conducted at every clinical appointment. Changes in the dietary habits, including interruption of breast feeding, were also encouraged and reinforced weekly.

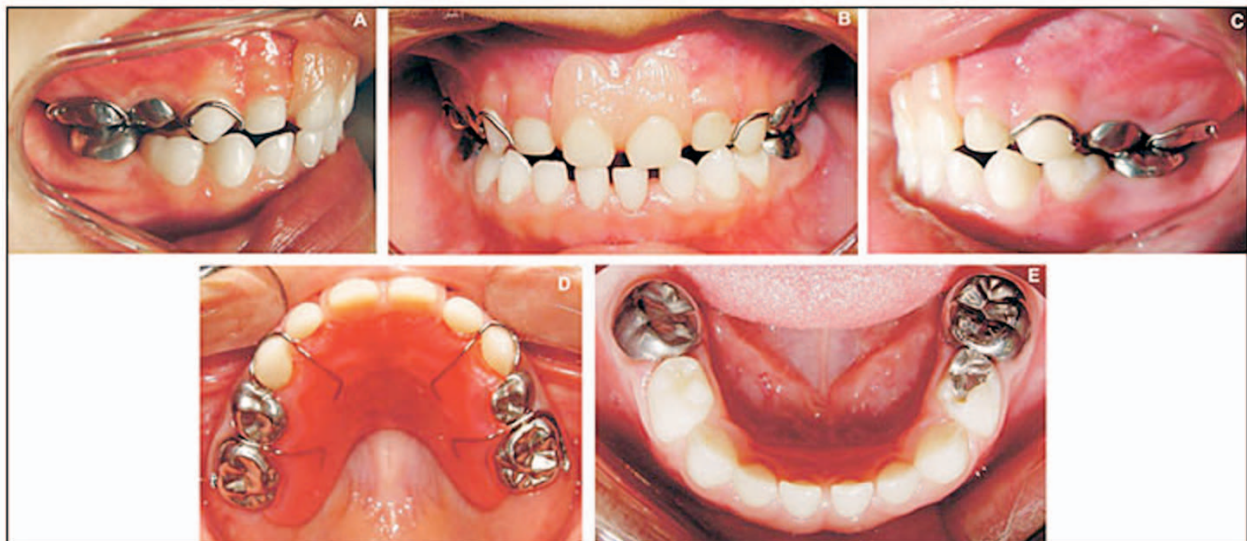
These initial procedures were followed for 3 months at which time definitive treatment began. The mandibular left first molar #74 was restored with amalgam. The other molars, except for the sound mandibular right first molar #84, were restored with stainless steel crowns, whose sizes were determined in cast models, where the first adjustments were performed. During the next clinical session, the respective teeth were prepared in the conventional way and the crowns were definitively adjusted and cemented using ionomeric cement (Fuji IX - GC America Inc., Alsip, IL, USA) under finger pressure. The

posterior rehabilitation reestablished the loss of occlusal vertical dimension, providing appropriate space for the prosthetic rehabilitation of the anterior teeth.

Teeth numbers 52, 62, and 63 were restored with resin filled celluloid forms (TPH®-Dentsply, Rio de Janeiro, Brazil) in accordance with the manufacturer's instructions. Glass post pins (RelyX™ Fiber Post - 3M/ESPE, St. Paul, MN, USA) were adapted to the first third of the root canals in the maxillary lateral incisors #52 and #62, before placement of the resin filled celluloid forms to reinforce the remaining structure and provide adequate retention. In order to promote buccal tipping of teeth #52 and #63 an appliance with helical springs was placed on their palatine surfaces (Figure 3).

The springs were activated three times, once a week. Retention was obtained with circumferential clasps on the maxillary canines #53 and #63 and second molars #55 and #65. After concluding the restorative procedures, a removable prosthesis was inserted to replace the maxillary central incisors #51 and #61 (Figure 4).

The child has been monitored every 4 months at the Pediatric Dentistry Clinic. In the follow up at 4 and 8 months the child and her family strictly followed instructions with regards to



**Figure 4.** A. right lateral view of the completed treatment with stainless steel crowns and resin filled celluloid crowns in a 4-year-old child; B. Frontal view; C. left lateral view; D. maxillary occlusal view; E. mandibular occlusal view.





**Figure 5.** A. Frontal view of the completed treatment in a 4-year-old child after 8 months. B. Left lateral view; C. Right lateral view.

oral hygiene as well as dietary habits, and the oral rehabilitation procedures were found to be successful (Figure 5).

### Discussion

Although teeth might be lost due to trauma, ectopic eruption, and congenital disorders, dental caries is the most common cause of premature loss of primary teeth.<sup>15</sup> In the present case report, the aim of first clinical intervention was to reduce caries activity, especially by remineralization of white chalky spot lesions. Therefore, detailed parental education, appropriate dietary behavior instructions, changes in oral hygiene, and topical fluoride application were provided. Fluoride varnish was chosen for topical application because it covers the teeth with an adherent film, enhancing the uptake of slowly released fluoride ions into the tooth structure<sup>16</sup> and providing a protective effect against caries incidence.<sup>17</sup> Furthermore, extractions, pulpectomies, and conventional glass ionomer restorations were also performed to improve the oral health conditions.

Stainless steel crowns were chosen due to their ability to accurately resemble the anatomy of primary molars, to successfully restore occlusion, and to provide adequate food grinding.<sup>18</sup> Due to the patient's high caries risk, the smoothness of the crown contributes to reduction in bacterial biofilm accumulation, favoring better

oral hygiene.<sup>19</sup> Nowadays, snap fit and good retention are not difficult to obtain as the crowns have pretrimmed, prefestooned, and precrimped margins. Additionally, stainless steel crowns are not expensive, have satisfactory longevity,<sup>19,20</sup> and are compatible with the vital cycle of primary teeth.

A class II amalgam restoration was performed in the primary mandibular left first molar, as the remaining tooth structure after caries removal allowed a direct restoration. Although composite resin has been looked upon as a promising alternative to posterior restorations,<sup>21</sup> Östlund et al.<sup>22</sup> showed the failure rate of amalgam class II was only 8%, compared with 16% for the composite resin restoration after a 3-year follow up period. Moreover, amalgam requires a less sensitive technique during placement than composite resin and is more tolerant to moisture or bleeding. Thus, this material was chosen due to its good performance for class II restorations in primary molars, the patient's age, and high caries risk.

The esthetic appearance of anterior teeth is of great importance for a young child's psychological and social development.<sup>7</sup> Many novel techniques are available for rehabilitating primary anterior teeth, and the most popular option is the bonded strip crown (composite resin crowns)<sup>23</sup> which is the first choice of many clinicians due to the superior esthetics, lower price, and easiness to repair in cases of crown chipping or fractures.<sup>14</sup> However,

this procedure should be performed very carefully due to technique sensitivity. For these reasons, resin composite crowns using celluloid forms were chosen for restoring the primary maxillary lateral incisors and primary maxillary left canine. These teeth were extensively decayed and required glass fiber post pins to ensure retention since they were endodontically treated.

The severity of functional cross bite, evidenced in the initial clinical examination, was minimized by placement of the stainless steel crowns which reestablished the occlusal vertical dimension. However, the maxillary and mandibular right canines and lateral incisors assumed a top position, and an appliance with helical springs on the palatine surface of the primary maxillary right lateral incisor and canine was used to promote buccal tipping, thus, improving the positions of these teeth as observed three weeks later.

Finally, a maxillary removable prosthesis was inserted to replace the two primary maxillary central incisors. This type of prosthesis can improve phonetics and mastication as well as avoid incorrect oral habits in young children. If not corrected, the loss of the anterior guidance can cause problems in swallowing, in tongue posture, in sagittal underdevelopment of the maxilla, and in functional dislocation of the mandible.<sup>24</sup>

In follow up, the child has periodically been monitored at the Pediatric Dentistry Clinic

because preschool children with high caries risk, who have received dental and prosthetic treatment, must be checked regularly for intensive instructions on oral hygiene, periodontal health, prosthesis control, and to follow up the eruption of permanent teeth. After 8 months of follow up, the oral rehabilitation treatment was still a success. It is also important to highlight the family was strongly encouraged to seek orthodontic treatment in order to assess a hereditary Class III tendency (Figures 4 and 5).

### Summary

The oral rehabilitation with low cost options led to the reestablishment of the oral health condition in the primary arches mutilated by severe ECC. The appropriate conditions achieved in the primary teeth are of great importance for establishing adequate mixed and permanent dentition and will also contribute to proper facial and maxillary growth and to the child's psychological and social development.

### Clinical Significance

The full management including preventive, psychological, and curative measures of a young child with severe ECC was found successful after 8 months of follow up. This result can encourage clinicians to seek a cost-effective technique such as stainless steel crowns, resin filled celluloid crowns, and partial removable prosthesis to reestablish the oral functions and improve the child's psycho-social development.

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