

## Tooth Supported Prosthetic Rehabilitation in a 5-year-old Child with Early Childhood Caries

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*This paper reports the case of a 5-year-old patient with early childhood caries (ECC) and presents an alternative prosthetic treatment with a tooth-supported overdenture. Primary canines were endodontically treated and received intraradicular posts with ball-type attachments to attach a tooth-supported overdenture. The patient was followed for 18 months both clinically and radiographically. In addition to esthetic and functional oral rehabilitation, the prosthetic treatment had an important psychological impact on recovery of patient's self-esteem*

**Key words:** primary teeth, intraradicular posts, dental caries, overdentures, rehabilitation.

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### INTRODUCTION

In pediatric patients, tooth integrity is intimately related to the preservation of occlusion, esthetics, phonetics and psychoemotional well-being.<sup>1,2</sup> Early loss of anterior maxillary primary teeth may lead to psychological problems and negatively affect the child's self-esteem and socialization in a very important phase of development<sup>3,4</sup>. The child may present behavioral and relationship disturbances, compromising his/her school performance.<sup>4,5</sup>

Considerable attention has been placed on the role of the nursing bottle in ECC.<sup>6</sup> The American Academy of Pediatric Dentistry (AAPD) recognizes this distinctive pattern of caries associated with frequent or prolonged consumption of liquids containing fermentable carbohydrates.<sup>7</sup> Early pulp involvement is also commonly observed.<sup>8</sup> All teeth in the dental arch are gradually affected, following the eruption sequence.<sup>9</sup> In a previous study<sup>10</sup>, 126 children aged 3 to 5 years with ECC were evaluated with respect to the height,

weight and head circumference. The authors concluded that, compared to the control group, the children with ECC showed significantly lower weight and height. Of the nursing or rampant caries children, 7.1% weighed less than 80% of their ideal weight, compared to only 0.7% of the control group children. However, no statistically significant difference was observed between the groups regarding head circumference.

Prosthetic procedures are an option for esthetic and functional rehabilitation of severely damaged decayed teeth. Nevertheless, in Pediatric Dentistry, successful prosthetic rehabilitations demand both patient and parents' compliance with the treatment. The dentist must explain to the parents the importance of preserving the primary teeth and the potential problems arising from their early loss, as well as the need for oral rehabilitation, its limitations and implications.<sup>11,12</sup>

Regardless of the prosthetic resources used for restoration of primary teeth, the integrity of the dental arch and tooth shape should be preserved not to interfere with the correct transition from primary to permanent dentition.<sup>13</sup> Due to extensive crown destruction, the use of intracanal posts is required, which will demand previous endodontic treatment.<sup>14</sup> The length of intracanal posts should not extend approximately 5 mm beyond the cemento-enamel junction or should be limited to 1/3 of the canal length not to interfere with the physiological tooth exfoliation.<sup>2,14</sup> Endodontically treated primary teeth with intraradicular retainers should be periodically examined.<sup>15</sup>

Placement of complete dentures or overdentures may be alternatives for rehabilitation of patients with ECC. However, the approach to patients with such profile cannot be restricted to dental treatment or controlling of caries activity, but should also comprehend esthetic and functional rehabilitation as well as follow-up along the child's growth and development, in such a way that the treatment performed may have a positive impact on the permanent dentition.<sup>16</sup>

The purpose of this paper is to report the case of a child with ECC and present an alternative prosthetic treatment with maxillary tooth-supported overdenture to provide esthetic and functional oral rehabilitation as well as restore the patient's self-esteem.

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**CASE REPORT**

A 5-year-old Caucasian male child was brought to the Pediatric Dentistry Clinic of the School of Dentistry of the Federal University of Rio Grande do Sul (UFRGS), Brazil for general dental care. The mother reported that she sought treatment at our outpatient service because the dentists of her city did not accept her son as a patient alleging lack of experience and complexity of the case. The patient's general health status and past medical history were noncontributory. The mother reported that bottle-feeding was the child's major source of nutrition and that he was bottle-fed sugar-sweetened milk and beverages throughout the day. All primary teeth were present, except for the left mandibular first primary molar which had been previously extracted. All teeth had extensive active carious lesions in dentin and severely damaged crowns. Most of them presented irreversible pulpal involvement, such as extensive internal/external dentin resorptions and rupture of pulp chamber floor, and had therefore indication for extraction (Figure 1).



**Figure 1:** Pretreatment panoramic radiograph

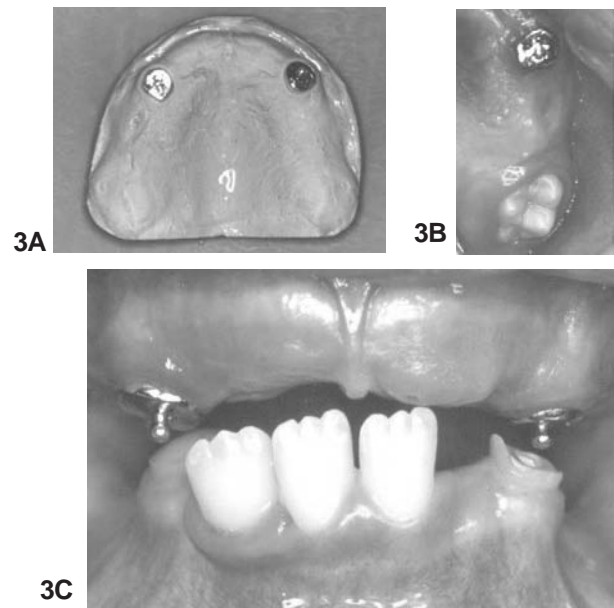
The treatment plan was settled and explained to the mother, who signed an approved informed consent form authorizing the treatment as well as disclosure and publishing of case report. Initial dental care consisted of removal of hopeless teeth and root remnants (Figure 2) and intervention in the etiologic factors of caries disease (plaque control, diet and rational use of fluoride) as the foremost steps. The primary maxillary canines had outer dentin carious



**Figure 2:** Close-up intraoral frontal view after initial dental care (removal of hopeless teeth or root remnants and intervention in the etiologic factors of caries disease).

lesions without pulpal involvement and were the only teeth that remained in the maxillary dental arch. The maxillary canines were endodontically treated (i.e., filled with calcium hydroxide-based paste up to 2/3 of canal length and sealed with gutta-percha) for placement of intracanal retainers, which were designed to support an overdenture that would provide functional and esthetic rehabilitation. No prosthetic treatment was planned for the mandibular arch because three permanent incisors had already erupted completely and the right and left mandibular first permanent molars were partially erupted.

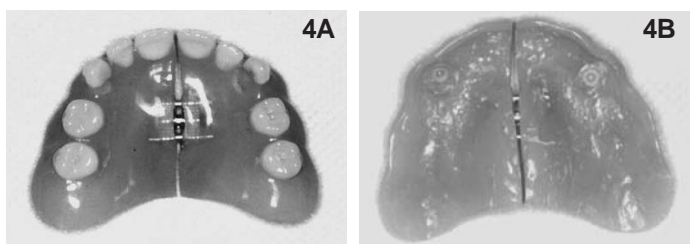
Maxillary and mandibular alginate impressions were taken (Avagel,; Dentsply Indústria e Comércio Ltda, Rio de Janeiro, RJ, Brazil) and study models were obtained. Thereafter, the root canal space of the right and left maxillary canines was lubricated and filled with autopolymerizing acrylic resin (Duralay; Polidental, São Paulo, SP, Brazil) for preparation of intraradicular posts with attachments. Ball-type attachments were adjusted to root canals and a new impression was taken using and custom-made acrylic resin impression tray and a polysulfide, condensation-cured, elastomeric impression material (Permlastic, Kerr Corp., Orange, CA, USA) (Figures 3a-3c).



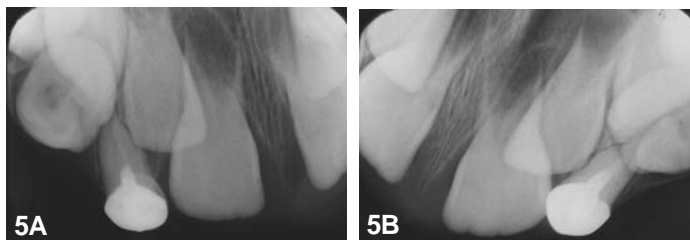
**Figure 3:** a: Adaptation of the attachments to the cast model. b and c: Attachment cemented to teeth 53 and 63 respectively. c: Intraoral frontal view of the patient showing the attachments cemented into the maxillary canines.

In a subsequent visit, the acrylic plate was checked with wax rims. The midline and smile line were demarcated as guides for tooth assembly. The acrylic plate with assembled stock teeth of size compatible with that of primary teeth was checked clinically. After evaluation of phonetics and esthetics, denture acrylization was performed.<sup>11</sup>

When the overdenture was finished, the attachments were cemented with Enforce, dual-cure resin cement (Dentsply, Milford, DE, USA) and the prosthesis was seated in place. An expanding screw was attached to denture midline (Figure 4a and 4b) to allow its adjustment. A radiograph was taken to check the adaptation of the intraradicular posts with the attachments inside the root canals



**Figure 4:** a and b: External and internal view of the overdenture, respectively.



**Figure 5:** a and b: Periapical radiographs showing complete root canal filling and adaptation of the posts and attachments in teeth 53 and 63, respectively.

(Figures 5a and 5b) and the denture was inserted. Both mother and child received instructions regarding overdenture wearing, cleaning and maintenance.

Subsequently, when the permanent maxillary central incisors started erupting, the anterior region of the denture was sectioned to provide space for eruption of these teeth (Figure 6).



**Figure 6:** Sectioning of the anterior region of the denture to provide space for eruption of the maxillary permanent central incisors.

The patient has been followed for 18 months and comes to the clinic every 2 months.<sup>11</sup> In each visit, intraoral clinical examination checked the status of primary teeth exfoliation, eruption of permanent teeth, aspect of the soft tissues underneath the denture, health status of the periodontal tissues, quality of tooth remnants and compliance with caries disease control measures (plaque control, diet and rational use of fluoride). In addition, the need for denture replacement or repair, as well as the existence of worn areas in the prosthesis was checked.<sup>5</sup>

**DISCUSSION**

In cases of teeth with extensively destroyed crowns to which direct restorative procedures are not an option, construction of dentures might be required to rehabilitate the child both esthetically and functionally.<sup>17,18</sup> Before any restorative/prosthetic treatment is done, caries activity must be controlled. This requires technical and scien-

tific background knowledge of the dynamic nature of health/disease processes, taking into account their biologic, social, economic and cultural aspects.

The use of overdentures is a viable option for treatment of patients with ECC. Denture retention is increased by the cementation of intracanal posts with attachments in endodontically treated teeth. The length of the post should not exceed the first third of the root or around 5 mm beyond the cemento-enamel junction<sup>2,14</sup> not to interfere with the physiological resorption patterns of the primary teeth.<sup>14</sup> Post cementation with dual-cure resin cement is important to prevent fracture of the root remnant, which is more frequently observed with use of threaded posts.<sup>15</sup>

When a denture is placed in a child, the first point of possible discrepancy to be checked is whether the posterior region of the denture is well adapted and maintains a good adaptation as the child grows.<sup>11</sup> The attachment of an expanding screw to the denture midline allows a longer use of the denture because it can be activated as required by the child's maxillofacial development.<sup>19</sup> There is also the possibility of "perforating or sectioning" the denture base to allow eruption of the permanent teeth. Therefore, the overdenture will also act as a functional space maintainer although it might have an unavoidable esthetic interference.<sup>4,11</sup> In the case reported in this paper, no alteration was noticed in denture adaptation.

Pediatric patients undergoing treatment with overdentures, especially those in the 5-6-year-old age group, should be followed-up regularly. Visits to the dental office every 2 months at least are strongly advisable. At each appointment, the patient should be examined for exfoliation of primary teeth and eruption of permanent dentition, health status of periodontal tissues and denture-supporting primary teeth. The need for denture replacement or repair should also be checked.<sup>5</sup>

Prosthetic resources allow functional rehabilitation of both dental arches of a child with early tooth loss. However, planning is of paramount importance to assess the viability of constructing the dentures, in view of the teeth remaining in the arches and the eruption of the succeeding permanent teeth. In the case reported in this paper, no prosthetic treatment was planned for the mandibular arch because three mandibular incisors had already erupted and the right and left mandibular first permanent molars were partially erupted. Kotsiomi *et al.* (2000)<sup>5</sup> described the removable prosthodontic treatment performed for children in the primary/mixed dentition and reported that one of the children discontinued the use of the mandibular denture right after the fifth mandibular permanent tooth erupted because the child felt that the teeth provided sufficient comfort for mastication.

Children usually wear and accept very well the prostheses and are better adapted to them than adult patients. The good muscular tonus facilitates denture retention and the small distance between the maxilla and the mandible enhances stability.<sup>5</sup> A partnership approach among the child, the parents and the dentist increases the likelihood of treatment success. Time and effort must be invested in highlighting that oral homecare should be supportive to the professional care provided at the clinic and that family commitment with the control of the etiologic factors of caries disease is primordial for achieving and maintaining an adequate oral health status in the permanent dentition.<sup>3,11</sup>

In addition to functional and esthetic oral rehabilitation, the prosthetic treatment performed in this case also had an important psy-

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chological impact as it restored the patient's self-esteem. The child became much happier, confident and outgoing and was integrated back to school and to his normal activities.

## CONCLUSIONS

The treatment of a patient with ECC should not be restricted to esthetic and functional oral rehabilitation, but instead must also comprehend effective measures to control of caries activity, in such a way that the treatment may provide a caries-free permanent dentition. Parental compliance with the treatment and child's cooperation should be taken into account while making a decision for the best treatment option. In cases like this, patient follow-up, especially regarding eruption of permanent teeth and maxillofacial growth and development, is of paramount importance for treatment long-term success.

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