

## The use of overdentures in the management of severe hypodontia associated with microdontia: a case report

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*Dental anomalies may compromise both esthetics and function in the pediatric patient. The present paper reports a rare case associated with both microdontia and severe hypodontia in a 13 year-old girl. The treatment was accomplished through the use of overdentures, which also served as a bite plane to increase vertical dimension of occlusion and as a potential space maintainer.*

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### INTRODUCTION

Abnormalities in tooth number, form or size are challenging cases in the clinical practice of pediatric dentistry, affecting esthetics and function. Abnormally small teeth are termed microdontia<sup>1</sup> and the condition is relatively common (1.5%-2%) when a single tooth, generally the maxillary lateral incisor or the third molar is involved.<sup>2</sup> On the other hand, the entire dentition may be affected as well. In this case, the condition is termed "generalized microdontia", which may appear in two types: 1. relative generalized microdontia, in which there are relatively small teeth in large jaws, and 2. true generalized microdontia, a rarely occurring type with abnormally small teeth in the jaws. The latter type may be seen commonly in conjunction with some systemic manifestations, such as pituitary dwarfism or amelogenesis imperfecta.<sup>3</sup>

Besides the alterations in tooth shape, the anomalies in the number of erupted teeth is another major consideration. Among these, hypodontia is referred to as the developmental absence of one or more teeth, often seen with a higher incidence in the permanent dentition (3.5 to 6.5%), compared to that of the primary one (0.1 to 0.9%).<sup>4</sup> A proposed classification of hypodontia has been made by Dhanrajani<sup>5</sup> according to the severity of condition.

Accordingly, "mild-to-moderate hypodontia" is

considered the agenesis of two to five teeth, while the absence of six or more teeth, excluding the third molars indicates "severe hypodontia". When there is absence of multiple teeth with entities of systemic disorders, the condition is named "oligodontia". Down syndrome and ectodermal dysplasia are the most common systemic conditions accompanying oligodontia.

Restorative and prosthetic treatment in cases of microdontia or oligodontia include: overdentures, stainless-steel crowns (also with acrylic facings for anterior teeth), simple removable appliances, cast metal-ceramic restorations, jacket crowns and adhesive castings, used either solely or in combinations.<sup>6-9</sup> Although overdentures have been used for over a century, it has become more accepted in the recent years for the treatment of many patients.<sup>10-12</sup> They are used for congenital defects, acquired defects and to prolong the life of remaining teeth, when retention would otherwise be doubtful.<sup>11</sup> Overdentures have also been used for restoring vertical dimension of occlusion.<sup>13</sup>

The present paper reports a rare case associated with both microdontia and severe hypodontia, and the esthetic and functional rehabilitation provided with overdentures to overcome problems caused by both dental anomalies.

### CASE REPORT

A 13 year-old girl referred to the pediatric dentistry clinic because of an esthetic concern related to her extraordinary small teeth. She was an operated patent ductus arteriosus. The patient has with no other contributory history of medical or dental problems and parental consanguinity.

Her mother and cousin were reported to have missing teeth.

The initial appointment consisted of clinical and radiographic examinations. Clinically, the present permanent teeth in the oral cavity were maxillary and mandibular central incisors, maxillary and mandibular

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Figure 1. General view of teeth at first visit. The teeth were remarkably small which resulted in a generalized spacing of teeth.



Figure 2. Panoramic radiograph taken at the initial visit. The patient had a total of 12 congenitally missing permanent teeth except the third molars.

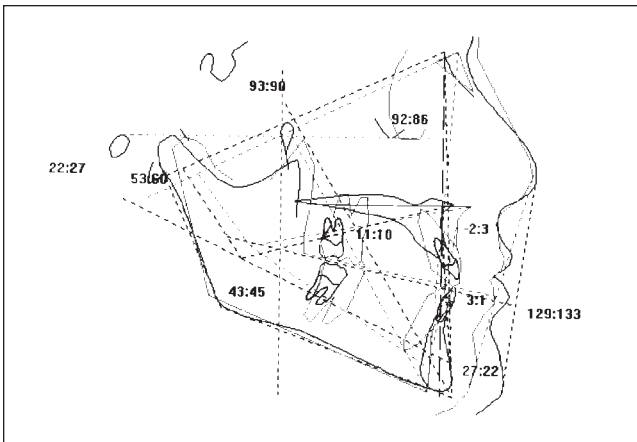


Figure 3. Superimposition with visual norm on fh (Frankfurt horizontal) at ptv (pterygoid vertical).

first and second molars, maxillary second premolars and maxillary lateral incisors (Figure 1). The remaining teeth included primary teeth with a missing right maxillary second molar. An orthopantomograph revealed that permanent successors of those primary teeth were not present (Figure 2). The patient had a total of 12 congenitally missing permanent teeth except the third molars. Clinically, teeth present in the oral cavity were remarkably small in all dimensions, yet free of cavities and restorations. An overdenture was indicated to be the treatment of choice for the esthetic rehabilitation and as a potential space maintainer, following the exfoliation of the primary teeth.

Preliminary impressions were taken with metal trays and irreversible hydrocolloid impression material (Kromopan, Lascod, Italy). Then, custom self-cured acrylic resin trays were fabricated to take final impressions. Maxillary and mandibular resin trays were border-molded with green stick (Kerr/Sybron, U.K.) in order to enhance compatibility to the mucosa. Final impressions were taken with eugenol-free impression

paste (Cavex, Holland) and working casts were obtained using dental stone on which maxillary and mandibular occlusion rims were fabricated.

In order to determine the proper vertical dimension for the prostheses, a lateral cephalogram was taken from the patient with the Frankfurt horizontal plane parallel to the floor and the teeth in centric occlusion. The cephalogram was then digitized by using an orthodontic evaluation program (JOE/Jiffy Orthodontic Evaluation Program, Rocky Mountain Orthodontics, U.S.A.). Results of the JOE analysis showed that the girl was a low-angle patient (Figure 3).

In accordance with this finding, her bite was raised 1.5mm when taking the occlusal relation records with occlusion rims. The casts were, then, mounted on a semi-adjustable articulator with the pin adjusted to the new vertical dimension. Occlusion was created with acrylic teeth according to the habitual relationship. Following a final satisfactory try-in with the teeth set-up, dentures were processed in heat-polymerizing resin (Meliodent, Bayer A.G., Germany).

The acrylic portion overlaying the second permanent molars were removed as openings to allow over-eruption of these teeth to the desired vertical height, while other teeth were left overlaid by the prostheses (Figure 4). Final adjustments of the overdentures were made in the mouth. The dentures were delivered to the patient following storage and hygiene instructions. First recall was scheduled one week later (Figure 5).

The use of overdentures apparently caused no discomfort and the patient enjoyed her new esthetics as well as improved ease of biting and chewing. The patient is still attending regular monitoring visits.

## DISCUSSION

Severe hypodontia may not be an isolated condition, but associated with reduction of crown size in teeth.<sup>14-16</sup>



Figure 4. Overdenture with windows created on the acrylic portion overlaying the second permanent molars.



Figure 5. Protheses in mouth, one week after delivery. There appeared to be no problem related with the overlaid teeth and gingiva.

An epidemiologic study<sup>17</sup> has revealed that reduction in the crown size is more severe when the number of the missing teeth increases.

When coexistence of dental anomalies occur, the clinician needs to overcome the combined problems with a complete and rational treatment plan. Using dental implants, succesful esthetic and functional reconstruction of the occlusion can be achieved in partially or totally edentulous adult patients.

However, the use of dental implants is a controversial issue in pediatric dentistry, due to the ongoing dental and skeletal growth in a child.<sup>18</sup> Although, some benefits to stimulate bone development have been reported,<sup>19</sup> osseointegrated implants tend to behave like ankylosed teeth when placed prematurely<sup>20</sup> and do not adapt to the skeletal changes. Thus growth contraindicates the use of dental implants until the completion of dental and skeletal growth.

On the other hand, for children with agenesis of multiple teeth, overdentures are well documented treatments of choice, which are reversible, economic and simple alternatives to surgical interventions and they preserve the present structures. The use of overdentures are commonly reported in the patients with ectodermal dysplasia, since oligodontia is the clinical feature of the syndrome. Additionally, in special cases such as dentinogenesis imperfecta and amelogenesis imperfecta, overdentures have been reported to be the choice of treatment<sup>13,21</sup> where the primary or permanent teeth may present with unacceptable esthetics and loss of the vertical dimension.

In the present case, the overdentures not only provided better esthetics, but also constructed the suitable vertical dimension, which was pre-evaluated by orthodontic analysis. A recent study on pediatric patients, who functioned with overdentures for 2 to 25 years,<sup>22</sup> reported no TMJ complications although the bites had

been raised intentionally in accordance with standard esthetic and phonetic criteria. Considered to be of great importance in dentistry, vertical dimension records for complete denture prostheses still remain one of the more variable measurements in clinical practice, especially in the child patient.

The traditional concept of a set vertical dimension was challenged by the studies of Dahl and Krogstad.<sup>23,24</sup> They described the use of supra-occluding appliances to create sufficient vertical space for the restoration of worn or abraded teeth. In their studies, the nature of movement, which took place was described as an over-eruption of the teeth, that were out of contact with the appliance. Similarly, in the present case, openings were prepared on the overdenture to allow overeruption of second the permanent molars so that these teeth could further occlude in the desired vertical height as determined by orthodontic analysis. Following the overeruption of the second permanent molars, the treatment plan includes overeruption of first the permanent molars and permanent incisors, consecutively.

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