CASE REPORT

Esthetic and Functional Rehabilitation of a Child with Complete Anodontia in Primary and Mixed Dentition Stage: A Case Report with 4-year Follow-up

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Abstract

Background: Pediatric dentists face significant challenges when treating a child with anodontia. Early intervention is essential to ensure the normal physiological and psychological development while also promoting normal jaw development.

Case Report: This report describes a 4-year follow-up case of a child with complete anodontia. Prosthetic rehabilitation during the primary and mixed dentition period improved the facial esthetics, self-esteem, speech, and masticatory function of the child.

Conclusion: This case report summarizes the treatment procedure, challenges faced in clinical management and the various prosthetic options with its advantages and disadvantages for a child with anodontia.

Keywords: Anodontia, Case report, Complete dentures, Prosthetic rehabilitation.

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Introduction

Odontogenesis is a multi-step, overlapping molecular process that occurs in the signaling pathways between the epithelium and neural crest-derived mesenchyme. Tooth agenesis is characterized by abnormal changes in the number of teeth, form, structure, and size caused either by a gene mutation during any stage of the development process or environment-related factors like chemotherapy, irradiation, medications, etc.[1]

The subdivisions of tooth agenesis include hypodontia, oligodontia, and anodontia.[2] Although hypodontia and oligodontia occur in different types of ectodermal dysplasia, anodontia is unusual.

Anodontia does not have a single explanation for its etiology. An established proposal states that partial or complete anodontia is part of the stages of evolution and can result in humans not having teeth (Herbst and Apfelstaedt 1930; Sperber 1963).[3]

The manifestation of anodontia presents itself as a deficiency of alveolar ridge growth which further results in the reduction of lower face length with regard to its vertical dimensions and the disappearance of the vermilion border of the lips, creating the impression of aging.[4]

Anodontia is usually encountered as part of a syndrome or a nonsyndromic trait.[5]

Although oral health is extremely significant in one's life and barely represents a serious health problem, tooth agenesis can contribute to poor masticatory function, speech impairments, and esthetic problems.[6]

The main objectives of oral rehabilitation in children at an early age, syndromic or nonsyndromic, are the early development of correct patterns of chewing, preservation of bone, speaking, and swallowing, as well as the restoration of characteristics that contribute to normal facial appearance. Hence, it makes way for the formation of the normal emotional and psychological profile of a child.[7]

These children need close attention to their treatment as it is associated with self-esteem. Several studies have reported the essential need for prosthetic rehabilitation in edentulous patients for psychological and physiologic reasons.[8]

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Prosthetic treatment includes removable, fixed, or prostheses that require placement of implants for support, and these can be implemented in combination or individually to ensure excellent results. The most implemented treatment plan for this condition includes the use of removable prostheses (complete or partial dentures and overdentures) as it necessitates the modification of intraoral prosthesis during the period of rapid growth. Additionally, using removable rehabilitation is easy, reversible, and affordable.[9]

This case report presents the early prosthetic rehabilitation of a young child suffering from anodontia involving primary and mixed dentition.

Case Description

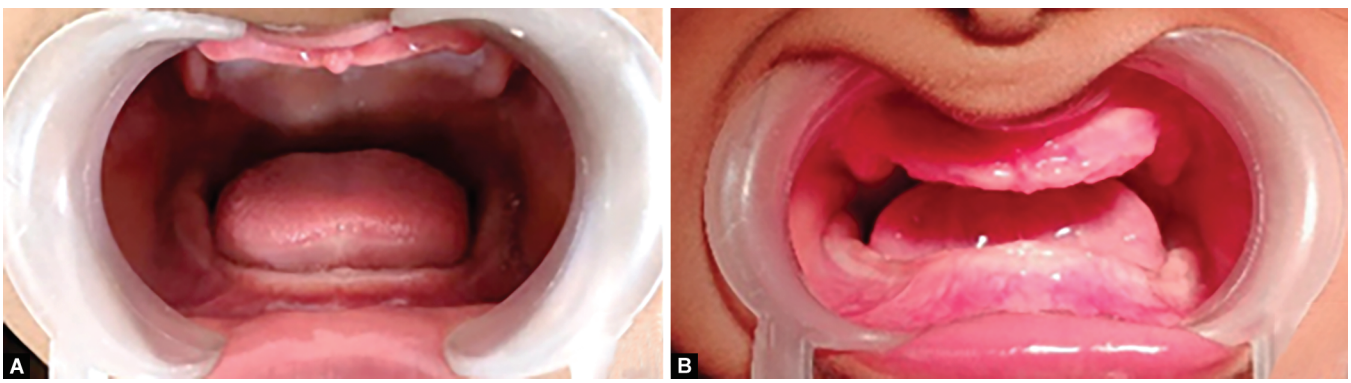
The Department of Pediatric and Preventive Dentistry, present at AJ Institute of Dental Sciences, Mangaluru, was visited by a female patient aged 4 years with a chief complaint of missing teeth in the mouth since infancy. She complained of difficulty in speech and mastication. When asked, the parents gave no relevant family history and were not willing to do any tests to confirm whether the anodontia was syndromic or nonsyndromic. She had an additional appendage on the right foot, which was surgically removed 1 year back. Other than this, no other medical history was reported. The patient was aware of her appearance, which resulted in her being shy and timid.

On general examination, the patient was ill-built and poorly nourished. Hair and skin were normal. On extraoral examination, the facial form was oval along with reduced lower facial height, and due to the presence of a retrognathic mandible, the facial profile was convex (Figs 1 and 2).

Clinical examination revealed a completely edentulous maxilla and mandible (Fig. 3). The alveolar ridges were poorly developed, with normally appearing alveolar mucosa. An intraoral examination also showed a shallow palate with healthy oral mucosa. The tongue appeared normal, and a panoramic radiograph reported the complete absence of primary as well as permanent tooth germs (Fig. 4).

Figs 1A to C: Pretreatment extraoral profile (primary dentition period): (A) Lateral view (left); (B) Frontal view; (C) Lateral view (right)

Figs 2A to C: Pretreatment extraoral profile (mixed dentition period): (A) Lateral view (left); (B) Frontal view; (C) Lateral view (right)



Figs 3A and B: Intraoral view revealed edentulous ridges; (A) Primary dentition period; (B) Mixed dentition period

For the purpose of improving speech, mastication, and appearance, as well as enhancing the psychosocial outlook, a treatment plan which included the use of removable complete dentures for both upper and lower arches was implemented. The concerned parents were provided with informed about the treatment plan and procedures involving the complete denture fabrication. They were also educated on periodic checkups and refabrication of oral prostheses at regular intervals as the oral environment and alveolar ridges increased in size due to child growth.

Throughout the procedures, the tell-show-do technique was used. Primary impressions of the upper and lower arches were made with putty impression material, and primary casts were made. Special trays were fabricated on the casts. Border molding was then done with putty impression material and light-body impression material as used to obtain the final impression. The master cast was prepared using the final impression. Acrylic base plates were adapted on the casts of both arches, and occlusal rims were fabricated using wax.

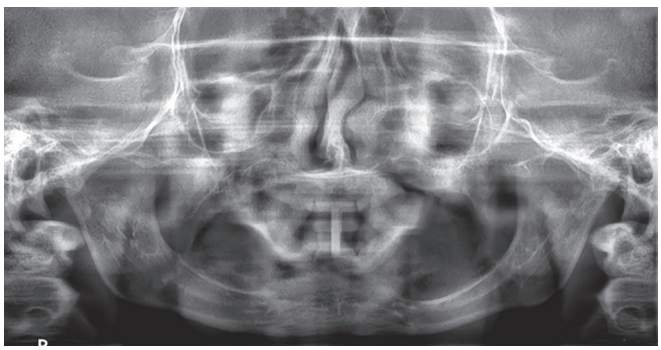


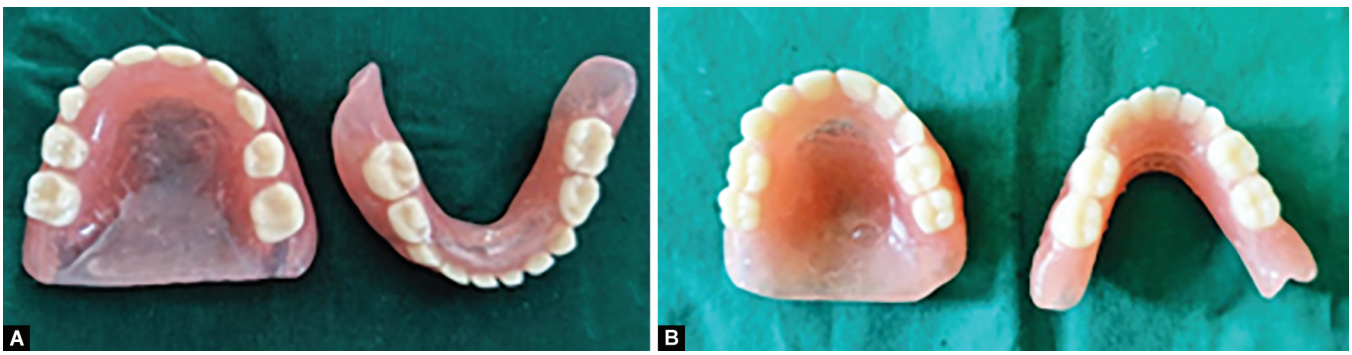
Fig. 4: A panoramic radiograph confirming the complete absence of teeth

Jaw relation was ascertained by the placement of the occlusal rims using the base plates in the oral cavity. Working casts were mounted onto a simple articulator after obtaining interocclusal records. Since the patient was just 4 years old, deciduous dentition was decided for the dentures. The artificial teeth were fabricated in the lab using heat cure acrylic resin of suitable shade, and they were then positioned onto the wax occlusal rim along with necessary spacing as per the patient's age. A trial insertion was done, and the necessary alternations were made.

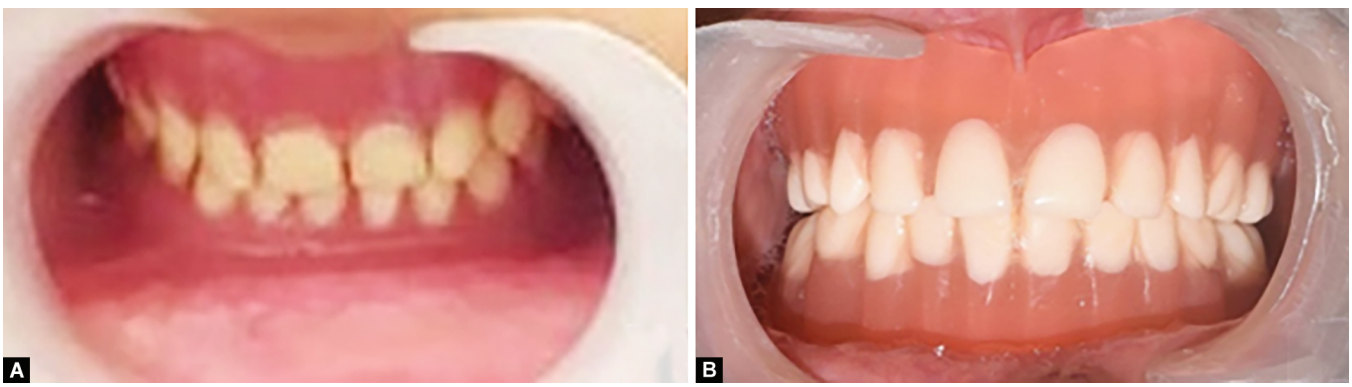
The dentures were then processed with heat-cure acrylic resin (Fig. 5A). After the final insertion, necessary instructions about routine oral hygiene measures for the dentures were imparted to the patient and parents. No pressure spots or ulcers were noticed during recall appointments. The patient's self-esteem also improved, thus resulting in improved socialization skills.

As few clinicians recommend relining or rebasing prostheses every 2–4 years and remaking them every 4–6 years, this patient was recalled after 4 years when she attained the age of 8 years for remaking the complete denture with respect to the mixed dentition period. The new dentures will simulate the dentition the patient should normally have for her age.

During the mixed dentition period, the patient was recalled, and all the steps were repeated, that is, impression making, pouring casts, fabricating denture bases and occlusal rims, followed by jaw relation, teeth arrangement, and acrylization (Fig. 5B). The prosthetic teeth used were modified in width and height to minimize alveolar resorption-causing eccentric forces directed to the compromised ridges. Occlusal interferences were eliminated after insertion of the denture, and post that, finishing and polishing of the final dentures was done (Fig. 6). Lateral cephalograms before and after insertion



Figs 5A and B: Maxillary and mandibular complete dentures: (A) Primary dentition period; (B) Mixed dentition period



Figs 6A and B: Intraoral view of maxillary and mandibular complete dentures: (A) Primary dentition period; (B) Mixed dentition period

of the complete dentures were taken (Fig. 7), and cephalometric analysis revealed an increase in the vertical dimension.

While delivering the complete dentures, the patient was advised to remove the dentures at night to relieve the daily stresses on the oral tissues. Pressure areas were identified during recall appointments and relieved accordingly. Excellent retention was obtained, and significant improvement in mastication and speech was reported by the parents.

Discussion

Pediatric dentists are uniquely qualified specialists, and as stated by the American Academy of Pediatric Dentistry, pediatric dentistry provides primary and comprehensive preventive as well as therapeutic oral health care encompassing a range of disciplines, skills, procedures, and techniques with an identical basis to other specialties, but are adapted and modified to the unique requirements posed by children, adolescents, infants, and those with special healthcare needs. Pediatric dentists are trained to address heritable dental developmental anomalies that affect both form and function, as these children have multiple complex problems that can have a significant psychological impact.[8,10]

Oral rehabilitation for children with anodontia (syndromic or nonsyndromic) is required to enhance sagittal and vertical skeletal relationships, as well as speech, esthetics, and masticatory efficiency, during craniofacial growth and development.[11]

Although there is an ongoing debate over the best time to start treatment, various pieces of evidence suggest that early prosthetic intervention should start by the age of 4–5 years. However, according to a few authors, the initial prosthesis can be delivered as early as 2–3 years so that the child can adjust to the prosthesis and, most significantly, have a better appearance.[12–15] In our case, the patient was 4 years old when she reported to our department.

Apart from the dental benefits, intervention at an early age has psychosocial benefits as well. This condition is typically accompanied by an unpleasant look, a low self-image, and prejudice at school or at work, all of which have a detrimental psychological impact on the individual. As a result, treating the orofacial deformity gives the patient a sense of security.[16]

Long-term treatment is an ongoing process that has to be constantly adapted to the child's growth and development.[17]

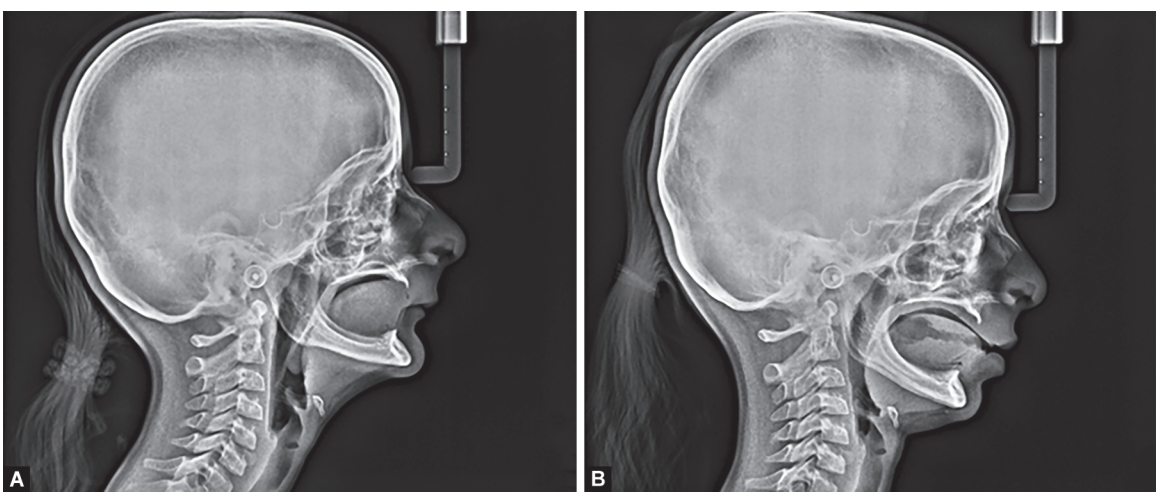
The treatment options generally include a fixed partial denture and/or removable complete denture prosthesis or an implant-supported prosthesis, and in our case, we preferred the treatment option, which included a removable complete denture keeping her present age in mind.

Initiating prosthodontic treatment at an early age delays the resorption of the alveolar bone, which is associated with the absence of teeth, enhances masticatory muscles tonicity, prevents angular cheilitis, and compensates for the decrease in the vertical dimension.[18]

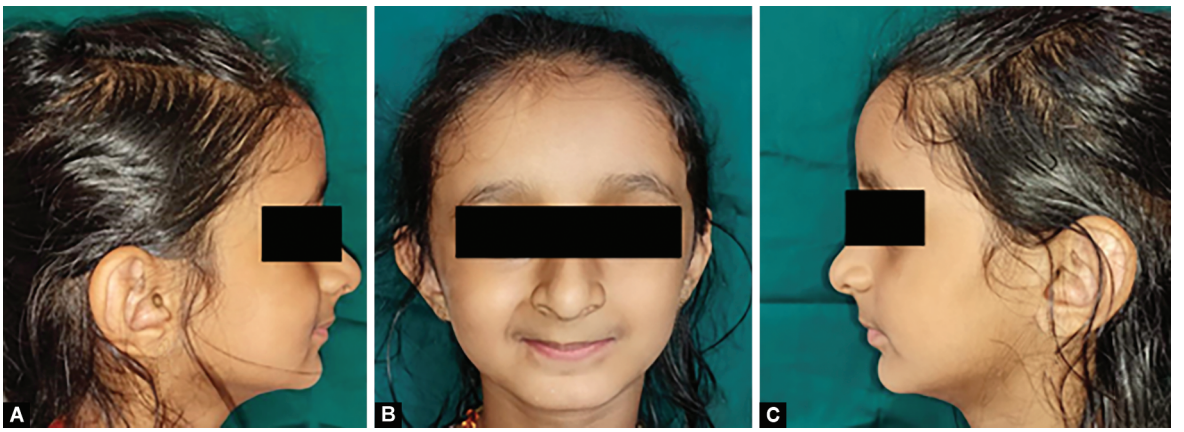
Removable complete dentures have a few disadvantages, including the fact that they are relatively bulky, especially upper dentures that encapsulate the roof of the mouth. Because of several muscles like the tongue, which can dislodge or shift the denture, lower dentures are usually not as stable as upper dentures. It also necessitates thorough cleaning and maintenance on a regular basis. When it comes to denture retention, not all oral cavities are created equally. As a result, due to the anatomy of their jaws, certain patients may never be able to have a comfortable and stable denture, no matter how well a denture is fabricated.

Cooperation and compliance of the patient with the new prosthesis have to be considered. It is essential that parents participate actively in the treatment phase to ensure the correct usage of the prosthesis,[18] while also being mindful that younger patients will usually refuse therapy and refuse to wear the treatment dentures.[19] In our case, the child's father undoubtedly had a significant role to play, considering the immense amount of support provided and his active involvement during the treatment process, which motivated the child and helped in cooperation and behavior management.

In our case, it was evident that the intervention of early prosthetic therapy improved the speech, masticatory function, and speech significantly in both the primary dentition phase (Fig. 8) and in the mixed dentition phase (Fig. 9). During the initial month, following initiation of the prosthetic treatment, it was difficult for the young patient to adapt to the complete dentures; however, within a few months, she had become accustomed to wearing dentures and was capable of eating normally. Dentures are not a good substitute for normal dentition, but they do help the child maintain a healthy weight, height, body mass index, and a regular balanced diet. In our case, the child had a significant catch-up growth posttreatment.



Figs 7A and B: Lateral cephalogram: (A) Preoperative; (B) Postoperative



Figs 8A to C: Posttreatment extraoral profile (primary dentition period): (A) Lateral view (left); (B) Frontal view; (C) Lateral view (right)

Figs 9A to C: Posttreatment extraoral profile (mixed dentition period): (A) Lateral view (left); (B) Frontal view; (C) Lateral view (right)

Figs 10A and B: Frontal smiling view: (A) Primary dentition period; (B) Mixed dentition period

For young patients, especially during the growing period, complete dentures need to be adjusted on a regular basis and must be replaced if the vertical dimension of the occlusion has decreased and an aberrant mandibular posture has developed as a result of growth. Antero-rotation of the mandible without dentures can cause the upward and forward displacement of the chin, as well as a reduction in the height of the lower third of the face with a predisposition for class III malocclusion. Dentures allow the mandible to rotate backward and downwards, allowing the chin to be properly positioned in space.[20]

The stability and retention of the prosthesis are extremely tricky to achieve. Denture stability and resistance are compromised in edentulous patients due to dry mouth mucosa, undeveloped maxillary tuberosities, and alveolar ridges. While fabricating dentures for these specific patients, one should make sure to get a wide occlusal load distribution by fully extending the denture base.[21]

The impression technique was given special attention in this case. Because of its biocompatibility, nice odor, and easy handling, polyvinyl siloxane impression material was chosen for the young patient. It reduces the chances of gagging, which could possibly lead to choking and be fatal. It's also fast setting, highly elastic, and hydrophobic, which helps it imitate the appearance of dry mucosa. The width and height of the prosthetic teeth were altered to lessen eccentric stresses directed at the compromised ridges, which can promote alveolar resorption. The teeth used for denture fabrication should be age-appropriate to provide the best cosmetic effects, as seen in our case (Fig. 10).

Also, the support for complete dentures should not be confined just to the denture base area but also include the entire vestibular sulcus reflection for a retentive base construction with a border seal, as done in this case.

Patients with complete dentures should have periodic dental recalls at regular intervals so that the prosthesis can be adjusted or replaced in accordance with the patient's growth and development.

In a study, Vergo stated that depending on the growth rate, if relining/rebasing of an intraoral prosthesis is not done every 2–4 years or remade every 4–6 years, it could result in chronic tissue irritation, papillary hyperplasia, or epulis development under the maxillary denture.[19]

Learning and reinforcing articulation are believed to last until the age of 8.[22] As a result, complete agenesis of primary teeth can cause speech problems. As a result of the treatment provided, it was feasible to enhance speech and communication skills. With the use of complete dentures, a higher sense of social acceptance and self-esteem were promoted.

Although complete dentures are a reversible, inexpensive, and simple prosthodontic alternative, the parents of these patients need to be educated about future options for dental implant placement, with the final goal of acquiring an implant-supported prosthesis.[13]

During a Scandinavian consensus conference in Sonkoping, Sweden, the general agreement was that implant placement should be postponed until the skeletal growth of the patient is complete or near complete in normal adolescents. Individuals with oligodontia or anodontia, on the other hand, may benefit from earlier intervention, especially in the mandible. For children between 7 and 12 years of age, implants can be implemented to replace missing mandibular teeth and are recommended for the anterior region in the mandibular arch. Prior to the cessation of skeletal growth, placement of the implant in the symphyseal region of the anterior mandible could be performed whilst exercising caution.[23]

Under the pressure of the interim prosthesis, early therapy with a removable appliance might result in significant growth stimulation of the alveolar processes, laying a superior foundation for eventual implant insertion.

The long-term success of dental implants in children is well documented in the literature. Overdentures, complete fixed prostheses, and complete fixed prostheses incorporating zygomatic implants are among the implant-based solutions that have proven to be highly successful in adult individuals who are edentulous.

Implant-supported tooth replacement is mainly limited to patients who have completed craniofacial growth. The main hassle with implant therapy is the absence of adequate alveolar bone, and without bone grafting, implant placement may be impossible. As we know, implants act like ankylosed teeth, and early implant placement in patients undergoing growth may result in cosmetic problems. Implant over-structures that do not touch the opposing teeth might produce prosthetic infraocclusion as there is constant vertical development of the jaws. Other significant disadvantages of implants are the time needed and their high cost, which makes them unaffordable for those in low socioeconomic groups. Furthermore, reconstruction surgery and implantation are subject to a greater risk of failure.[24,25]

In the present case, the patient was not close to her growth completion and was skeletally not mature to accept a definitive and long-term treatment plan. Due to the age, insufficient alveolar bone support, and the patient's poor socioeconomic status, an implant-supported denture was ruled out in this case.

This case report highlights the essential need for accurate treatment planning alongside the influence of anodontia on a young patient. Positive behavior was also observed while taking care of the denture, complying with oral hygiene instructions and dietary recommendations, as well as attending the recall visits on a regular basis.

Conclusion

Every opportunity should be given to children to achieve their greatest potential. The importance of early diagnosis and treatment in restoring esthetics, mastication, and speech cannot be emphasized. A pediatric dentist can play a significant role in the general growth and well-being of children afflicted by anodontia. Since there is no evidence reporting the superiority of any technique over others, a simplified approach is required. This can further motivate dental professionals to treat these individuals in their day-to-day practice.

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