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Case Study

Total Piezo Prosthesis in a Child with a Anhidrotic Ectodermal Dysplasia

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Abstract

More commonly known as the Christ-Siemens-Touraine syndrome, anhidrotic ectodermal dysplasia is caused by an X-linked gene mutation. It is the most common type of ectodermal dysplasia.

This syndrome is characterized by the total or partial absence of teeth, hair, and hair associated with the absence of perspiration [1-3]. Anodonty or total dental agenesis remains a rare entity that may affect the first and/or second dentition and affect the maxillary and/or mandible [4-6].

The state of generalized bone atrophy that accompanies anodontia offers thin mandibular alveolar ridges, hypo developed as a knife blade, which poses a problem for early prosthetic rehabilitation in children.

Through a clinical case, we will see the possibility of making a piezo record of the prosthetic corridor to the mandibular arch in a child of 4 years. This technique could allow a better functional integration to the total dental assistant bi-maxillary prosthesis thus conceived.

Keywords: Anhidrotic Ectodermal Dysplasia; Anodontia; Total Piezo Mandibular Prosthesis

Introduction

Early prosthetic rehabilitation in a child with ectodermal dysplasia with anodontia consists of performing removable prostheses. Faced with the hypo development of the mandibular crest which will doubtless jeopardize the retention, as well as the stability of the conventional mandibular total prosthesis, we wondered about the possibility of making a piezographic recording of the prosthetic corridor, involving the musculature of the Oral sphere (technique reserved for elderly patients with negative crests), in a child even if its psychomotor development seems normal reinforced by a psychological approach based on the "show and do" method, show the child then perform the step.

Clinical Observation

A 4-year-old boy presented himself at our consultation accompanied by his father, who was guided by the dentist of the local public health institution for a total bi-maxillary prosthetic restoration. The latter performed the extraction of the two unique mandibular lacteal teeth present in the oral cavity.

The anamnesis reveals that the discovery of the disease was fortuitous during an episode of fever where the child had convulsed several times in a hospital environment. Being still an infant the pediatrician pushes his investigations. The diagnosis of Christ-Siemens-Touraine syndrome has been made.

The extra oral exam emphasizes a senile facies, a bulging forehead, rare (hypotrichosis) hair, and brittle, absent eyelashes, sparse eyebrows and detached ears.

The height of the lower floor of the face is reduced and the lips are dumped giving the child the expression of an old man (Figure 1).

The endobuccal examination reveals perfect healing of the post-eccentric fibromucosa (2 months later), resorbed crests in the maxillary and mandible similar to those of the infant, hypo-developed tuberosities, and saliva of quantity and quality more or less favorable for the retention of the total prosthesis (Figure 2).

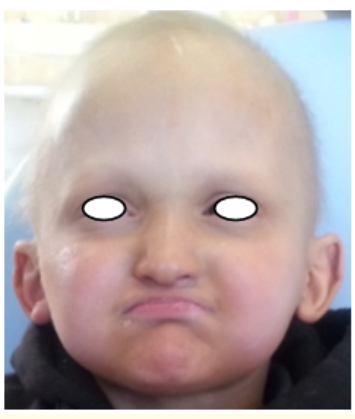

Figure 1: *Front photo.*

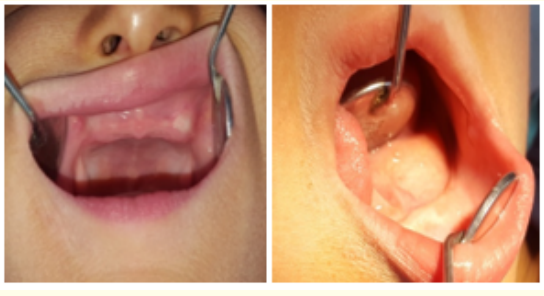

Figure 2: *Endoral views.*

The radiograph of the maxillae in panoramic incidence shows the anodontia of the maxillary temporary and definitive teeth, as well as the total agenesis of the mandibular final teeth and the subtotal agenesis of the temporary mandibular teeth only two mandibular anterior temporal teeth were present on the lower arch. We also note the hypo development of the mandibular crest (Figure 3).

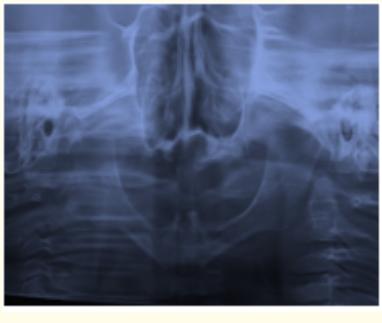

Figure 3: *Panoramic radiography.*

The post-extracellular retro-alveolar radiograph at the lower anterior sector confirms the absence of any root.

Prosthetic treatment

The techniques for producing the total bi-maxillary prosthesis are the same as those recommended in the adult, the materials as well as the instruments are modified and adapted to the oral cavity of the child.

Preliminary impressions

The first obstacle to overcome, fingerprints may be the object of a therapeutic failure, generally generating anxiety when the child is not properly prepared, and especially when he is not accompanied by one of his parents.

The impressions are made with alginate; they will be used to make individual impression doors (PEI).

The use of warm water will significantly reduce the time taken in the mouth of the alginate [7].

One of the difficulties encountered at this stage is the lack of a specific commercialized impression tray adapted to the young child's arches. We used a perforated resin upper individual impression portal made on a plaster model of another 6-year-old child, which was shortened afterwards.

We began by taking the impression at the lower arch with a standard imprinted door.

Number 00 issue to familiarize the child with the material in his or her oral cavity and to avoid an important nauseated reflex (Figure 4).

Figure 4: *Preliminary impressions.*

The registration of the peripheral seal to the thermoplastic paste on the individual fingerprint doors (PEI) adjusted

This recording follows the fitting in the patient's oral cavity of the PEIs from the plaster primary models. We asked the child to perform mimicry with his face [7] (Figure 5 and 6); according to Desplats., *et al.* this step remains optional in young children [8].

Figure 5: *Registration of the peripheral joint to the maxillary arch.*

Figure 6: *Peripheral joint of the mandibular arch.*

The anatomic functional secondary impression

They are taken with a eugenol zinc oxide impression paste after taking care of Vaseline all the lower floor of the face (lips, cheeks).

Easy to handle, fluid, stable, pleasant taste, eugenol zinc oxide paste found its indication in total prosthesis allowing a faithful recording of the bearing surface as well as that of the game of all the prosthetic organs thus the retention of future prosthetic bases (Figure 7).

Piezographic recording of the mandibular prosthetic space

It consists of a modeling of a suitable material by pressures initiated by the oral phonation and/or swallowing functions associated with suction or chewing [9].

Figure 7: *Anatomical functional secondary impression.*

According to NABID, piezography allows three-dimensional reproduction of the prosthetic space in the total toothless; This makes it possible to design a stable and functional mandibular prosthesis, adapted to the muscle dynamics specific to the individual (adult) [10].

The material (high viscosity silicone) is deposited as a bead on the lower rigid base, secured by the retention stops (Figure 8a); then it is introduced into the oral cavity which receives every 20 seconds, for at least 8 minutes, a measurement of 3 milliliters of water swallowed each time, this is how the material is sculpted by the peripheral musculature (Figure 8b). Once hardened, the prosthetic anterior and posterior occlusal plane is oriented (Figure 8c and 8d).

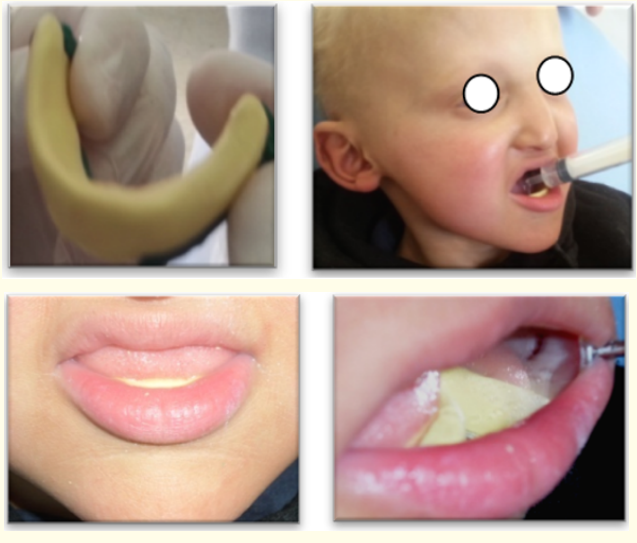

Figure 8: *Piezographic registration.*

Recording and transfer of intermaxillary reports

The transfer of the maxillomandibular relation, the vertical dimension, and the labial support is done from the occlusion models realized on the working models resulting from the casting of the secondary imprints. These models must prefigure the finished prostheses, so in this case the mandibular model is the duplicate of the piezo record by means of silicone formwork keys (Figure 9).

Figure 9: *Lower occlusion model with silicone formwork keys. Duplicate of piezography.*

- The maxillary wax bead by its volume should support the lips and cheeks; and by its lower surface materialized the occlusion plane dictated by the upper face of the lower bead.
- The vertical dimension of occlusion is determined in this case by the swallowing test the two models in the mouth, the child thus placing his tongue in the middle of the palate one seeks a harmonious aspect of the face.
- The maxillary model is transferred using the semi-adaptable articulator's facial bow using the upper model.
- The position of the centered relationship is relatively difficult to record in young children.

The recommendations of Sceffer., *et al.* [7] have been of great use and combining the different techniques namely: swallowing, hyper and extension of the head; we managed to record the maxillary mandibular relation in centered relation.

- Both models were removed from the oral cavity of the child. Thus, they allowed the transfer of the mandibular model on semi-adaptable articulator (Figure 10).

Figure 10: *Recording and transfer of intermaxillary reports on a semi-adaptable articulator Quick master.*

Assembly of artificial teeth

Not having "Bombino Tooth" at our disposal we chose very small commercial teeth that we ground with a very light shade to get closer to the natural temporary teeth.

The latter thus rectified and in order to satisfy the concept of bilaterally balanced occlusion, we mounted the anterior teeth end to end and the posterior teeth in a straight plane (the SPEE curve does not exist in temporary dentition [11]. While respecting the keys of the mandibular piezography guaranteeing a mounting of the teeth in the prosthetic corridor where the stability will be increased.

The fitting of the wax models of the assembly of the teeth

Desplats., *et al.* [8] consider that this step is not necessary because the assembly is performed on a simulator of the mandibular movements of the semi adaptable type, then we proceeded directly to the polymerization of the definitive prostheses. After this step the two prostheses were balanced on the semi adaptable articulator to ensure the harmonious distribution of occlusal loads and especially the presence of bilaterally balanced occlusion (Figure 11).

Figure 11: *Balanced occlusal contacts prosthesis on the semi-adaptable articulator.*

Putting in mouth finite and balanced occlusal prostheses

Parents have been informed of the need to monitor their child's oral mouth, looking for a sign of trauma and to be alert to the child's complaints, as this can compromise the regular wearing of prostheses (Figure 12 and 13).

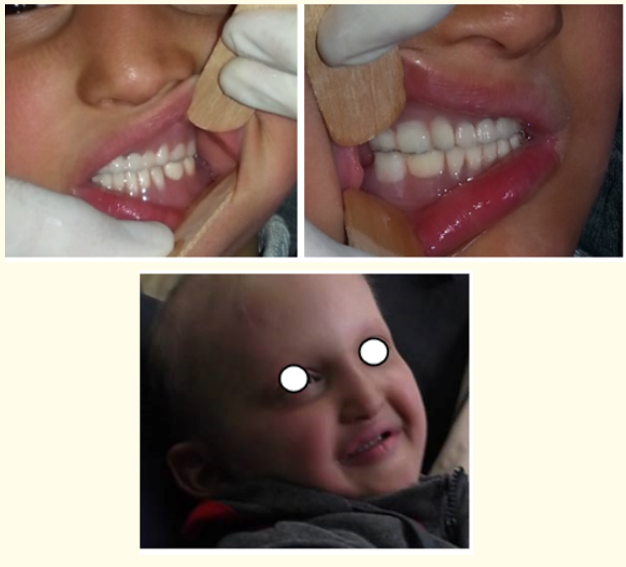

Figure 11: *Balanced occlusal contacts prosthesis on the semi-adaptable articulator.*

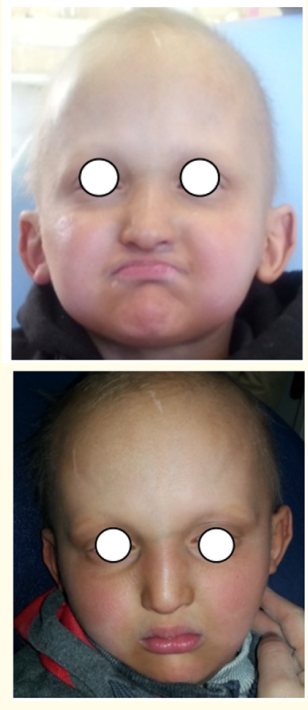

Figure 13: *A: Before restoration. B: Prosthesis in the oral mouth.*

The follow-up

Checks on the 3rd day, 1 week, 1 month, and 3 months were made without major details to report; however, the parents have been instructed when the transitional nature of these prostheses must be redone at the slightest sign of loss of stability, the child being in full growth.

Discussion

The need for early prosthetic management of the child suffering from anodontia is essential; the major consequences due to the lack of occlusal references on the physiological evolution prove it. The sagging of the vertical dimension must be prevented as soon as possible; according to Desplats from 30 months and before 6 years [8].

According to the literature review carried out by Bidra AS and all in 2010 [12], all the techniques that make it possible to perform complete, removable, functional and aesthetic prosthetic rehabilitations for children with ectodermal dysplasia can be used, it is sufficient to simplify technically. These conclusions support our prosthetic approach.

The possibility of recording the volume of the prosthetic space of the mandibular arch at the age of 4 by piezography considerably improves the prosthetic stability; it turns out that it is possible to instruct the child in the technical methodology piezography which will allow a functional integration of prostheses encouraging the child to frequent port.

According to Beyaert., *et al.* [6] the frequent wearing of prostheses will allow the child suffering from this syndrome to have a normal masticatory function, and an improvement of the muscular tone (of the masseter and especially of the temporal), thus a reeducation of the peri-oral musculature is put in place; this being our main therapeutic goal.

Adjunct prosthetic restorations must accompany the growth of the child, always in collaboration with the orthodontist, orthopedic devices (verins) can be included in the prosthetic bases if necessary [7].

Regular checks are necessary for rebasings with silicones should be considered to remedy the minimal changes prosthetic bearing surfaces, total restoration of prostheses should be considered from the age of 6 years since growth between 30 months and 6 years is experiencing a real slowdown. Prostheses are remodeled every two to four years on average until the end of growth [13].

Conclusion

Prosthetic rehabilitation with mandibular piezography in children with anodontia aims to restore the various functions (phonation, chewing, swallowing), to restore a neuromuscular balance, and an acceptable facial esthetics thus allowing the child a psycho-emotional development and correct weight-correctness. These prostheses need to be changed regularly to support growth. The final prosthetic rehabilitation will intervene only at the end of growth and will most often require implants and in most cases with bone grafts.

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