Prosthodontics rehabilitation using palatal expander for a child with ectodermal dysplasia
Ahmad Moutaz Attar¹, Jamal Dabbas², Hamzah Abbas¹

¹Department of Prosthodontics, Faculty of Dentistry, University of Aleppo, Syria, ²Department of Orthodontics, Faculty of Dentistry, University of Aleppo, Syria

Abstract

Background: This clinical report describes the use of the palatal expander which is incorporated into the mid-palatal region of the complete maxillary denture for a 4-year-old complete edentulous patient. Heat polymerized acrylic resin was used to process both maxillary and mandibular denture. The completed dentures were polished and finished. The palatal expander (max: 6 mm and full turn: 0.8 mm) was added to the mid-palatal region of the maxillary denture during waxing and processing the dentures. The design of this expander was invented by Haas (1965) max: 6 mm and full turn: 0.8 mm. Medical grade adhesive was used for prosthesis retention.

Aim: The aim of this case report is to use the palatal expander to simulating the growth and development of mid-palatal suture and helping to normalize the masticatory function and perioral muscles movement, and as a result, the growth pattern of basal bones.

Conclusion: The technique of incorporated palatal expander into the mid-palatal region of the complete removable dental prostheses helped the clinicians and child to get the advantages of this technique by facilitating the clinical and laboratory procedures during follow-up appointments.

Clinical Significance: This technique was used to get benefit from the denture as long as possible before rebasing or remaking a new denture.

Introduction

Ectodermal dysplasia (ED) is congenital disorder that is described as large were initially described by Thurnam in 1848 and then Darwin in 1875.¹²¹/100000 births is characterized by the abnormal development of the ectodermal.² ED appear to be genetici etiology and have two different forms named Clouston syndrome (autosomal inherited form) and Christ-Siemens syndrome (hypohidrotic form).¹¹ The disease affects both males and females.¹¹

The disease affects skin, saliva, hair (atrichiosis or hypotrichosis), sebaceous and sweat glands (anhidrosis or hypohidrosis), nail and teeth (anodontia or hypodontia).¹¹ About 80% of ED patients have been associated with dental abnormalities.¹³ Dental abnormalities were observed in ED such as anodontia, hypodontia, misshapen teeth, taurodontism, supernumerary teeth, neonatal teeth, natal teeth, retained primary teeth, enamel hypoplasia, and resorbed alveolar ridge.¹³

The second most frequently occurring oral symptom is hypodontia of both the primary and permanent dentition associated with hypoplasia of the alveolar bone structures and poorly formed alveolar ridges. The higher number of missing teeth affected from ED is in the mandible. In the primary dentition, the teeth most commonly present are maxillary second molars, canines, central incisors, and mandibular canines.⁴ In the permanent dentition, severe maxillary hypodontia has proven to be related to craniofacial dysmorphology that affected on the cranial base and mandibular length in the male ED population.⁴ According to Guckes et al.,⁴ the maxillary central incisors (42%) followed by the maxillary first molars (41%), Moreover, mandibular first molars (39%) were the most permanent teeth to be present in ED patients.⁴ Mandibular anterior teeth were the least likely to be present.⁴ In addition to the absence of teeth, ED can also lead to underdevelopment of the jaws.⁴ With little or no dental support, hypoplastic maxilla and mandible result in bite collapse and narrowing of the alveolar ridges. This condition affects on the facial esthetics by producing a collapsed appearance of the lower third of the face.⁵ According to Enlow,⁵ mid-palatal suture contributes only a meager amount to increase in width.⁵ The intermaxillary suture, according to Melson,⁵ is smooth and open in children (6-8 years), in early adolescence (10-12 years)
the sutural edges are overlapping, but in late adolescence (14-16 years) the sutures become interdigitated and fused.[5] Persson and Thilander found that earliest obliteration in male was in a 21 years and no obliteration at all in a 32-year-old male. [6] According to Sperber obliteration may start in adolescence but complete fusion is rarely found before 30 years.[7] We use the Haas expander which consists of a metal framework with an expansion screw in the palatal vault and acrylic pad on the palatal tissue,[8] when the expansion of the maxillary denture is needed.[8] The vertical and sagittal skeletal relationship will be improved by oral rehabilitation of the hypohidrotic ED patient during craniofacial growth and development, as well as to increase improvement of the efficiency of esthetics, speech, and masticatory functions.[8]

Clinical Report

A 4-year-old edentulous child was referred to the Department of removable prosthodontics at the School of Dentistry at the University of Aleppo for prosthetic assessment. His medical record revealed a history of ED and he exhibited the classical features of hypohidrotic ED including diffusely sparse hair, eyelashes, eyebrows, severe hypohidrosis, and dry skin. The facial profile showed a sunken nasal bridge (so-called “saddle nose”), with prominent forehead and lips were everted. The child was complained from nutrition, speech, and esthetic problems due to the absence of his teeth [Figure 1]. The vertical occlusal dimension loss (VDL) was cleared after extra oral examination [Figures 2 and 3]. Panoramic radiographs [Figure 4] show the dentition and bone appearance and confirmed the clinical findings. The alveolar process was atrophic in all edentulous areas. Vertical alveolar growth was occurred with development of the permanent unerupted right maxillary first molars. Radiographically, severe resorbed mandible and maxilla were observed at the “D” level of the Misch classification (Severe resorption e bone only at basal level) [Figure 4].[9] A complete overdenture retained by implants was the first suggestion, but this suggestion was canceled because of severely resorbed mandible and maxilla. Treatment options were discussed with various dental specialists, and then a traditional mandibular complete denture and a maxillary complete denture with an incorporated palatal expander into the mid-palatal region were determined to be the treatment of choice. This technique was used to simulate the growth of mid-palatal suture to help to get benefit from the denture as long as possible before rebasing or remaking a new denture. Preliminary impressions of the edentulous arches were made with irreversible hydrocolloid (Hydrogum Alginate; Zhermack) and poured with Type IV dental stone (Fujirock; GC Corp). Individual trays were made with auto polymerizing acrylic resin (Vertex; self-curing acrylic resin) for a definitive impression. Border molding was taken with modeling plastic impression compound (impression compound; SS white), then the definitive impression was made with zinc oxide eugenol paste (ZOE impression paste; SS white) and poured with Type IV dental stone (Fujivrock; GC Corp). According to esthetic and functional principles, record bases with occlusion rims were made and adjusted for determining of the intermaxillary relations. The casts were mounted in an articulator using facebow records after a centric relation interocclusal record was obtained. Modified
artificial teeth (Acryrock) were arranged and evaluated in the mouth of the child to verify the esthetics, lip support, occlusal vertical dimension (OVD), maximum intercuspation, and phonetics. Prosthetic primary teeth were chosen to achieve an age-appropriate appearance for the child. The occlusion and position of the prosthetic teeth were evaluated intraorally, and the necessary corrections were made before processing the dentures. Heat polymerized acrylic resin (Vertics; heat-curing acrylic resin) was used to process both maxillary and mandibular denture [Figure 5]. The completed dentures was polished and finished. The palatal expander (medium expander, IOS) (max: 6 mm and full turn: 0.8 mm) was added on the mid-palatal region of the maxillary denture during waxing and processing the dentures. The design of this expander was invented by Haas (1965) (medium expander, IOS) max: 6 mm and full turn: 0.8 mm [Figure 6]. Then maxillary and mandibular complete dentures were inserted [Figure 7]. Medical grade adhesive (Bony plus) was used for retention. The child was instructed to follow an oral hygiene regimen. Finally, the child and his parents were informed that the screw of the palatal expander should only be turned if instructed by his orthodontist and prosthodontist. Medical grade adhesive (Bony plus) was used for prosthesis retention. In the 3rd and 4th weeks, the palatal expander was reactivated after bisecting the maxillary denture and the screw was turned. Then the maxillary denture was relined again in the direct way (chairside) using auto polymerizing acrylic resin (Tokoyama self-curing acrylic resin). The flanges were trimmed and the undercuts was removed. The new relining material (Tokoyama self-curing acrylic resin) was then mixed and applied to the fitting surface. The maxillary denture was inserted and the patient was asked to bite gently on the denture to ensure that the occlusion was not altered by the procedure. The palatal expander was reactivated at the rate of one-quarter turn of the screw (0.25 mm) every 3-4 weeks [Figure 8]. The rate of one-quarter turn of the screw (0.25 mm) every 3-4 weeks, the ratio of device to skeletal expansion is about 1 to 1. After 1 month follow-up appointment, only minor problems were reported during the adaptation period and also significant improvements in speech, esthetics, and general well-being, including facial appearance, and quality of life of the child. Follow-up evaluations were made at 3, and 6 months after delivery of the dentures. No functional or esthetic complications were noted.

Figure 4: Panoramic radiograph right maxillary permanent molar is present

Figure 5: Age-appropriate inferior-complete denture

Figure 6: Palatal expander is incorporated into age-appropriate maxillary complete denture

Figure 7: Age-appropriate complete denture in place
Palatal expander incorporated into the denture for edentulous child

Attar, et al.

The technique of incorporated palatal expander into the mid-palatal region of the complete removable dental prostheses is an alternative procedure for removable dental prostheses that are used in young patients with hypodontia to simulate the growth and development of mid-palatal sutures and facilitate the clinical and laboratory procedures during follow-up appointments. New prosthetic therapy for children with ED was provided by a unique opportunity for a participating effort among the pedodontist, orthodontist, and the prosthodontist.

References
