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Case Study

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LIGHT WEIGHT DENTURES IN ECTODERMAL DYSPLASIA: A CONGLOMERATION OF TECHNIQUES

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ABSTRACT

Ectodermal dysplasia is a genetic disease which shows various congenital dysplasia in tissues differentiated from the ectoderm. It is characterized by triad of signs comprising sparse hair, abnormal or missing teeth and inability to sweat. Anodontia or hypodontia is the most striking dental manifestation. In severe hypodontia, there is lack of alveolar development with consequent protrusion and eversion of the lips. Symptoms are more severe in males than in females and heterozygous females are usually normal showing no symptom. The treatment for these patients is diverse and depends solely on the need and choice of the patient as they become emotionally depressed and socially awkward. Along with mental ailments the patient's chewing efficiency and speech becomes deranged. This article illustrates step-by-step rehabilitation of a patient suffering from hypo hidrotic ectodermal dysplasia and anodontia with hollow denture in the maxillary arch and liquid supported denture in the mandibular arch.

KEYWORDS: Ectodermal dysplasia; Hypohidrosis; Hypotrichosis; Anodontia; Flabby Ridges; Tunnel Technique.

INTRODUCTION

Ectodermal dysplasia syndrome is a large heterogenous group of inherited disorder in which two or more ectodermally derived anatomic structures fails to develop. These structures primarily are skin, hair, nails, teeth, and eccrine glands. The disorders are congenital, diffuse and non-progressive with more than 150 different subtypes. The most common within the group is hypo hidrotic ectodermal dysplasia. It has an X linked inheritance pattern and shows male predominance.[1] The present case report describes prosthodontic rehabilitation of a patient suffering from hypohidrotic ectodermal dysplasia and anodontia with hollow denture in the maxillary arch and liquid supported denture in the mandibular arch.

CASE REPORT

A 30-year-old male patient came to the Department of Prosthodontics and Crown & Bridge, ITS Dental College, Ghaziabad with a chief complaint of missing teeth in upper and lower arches. The patient complains of being edentulous in both maxillary and mandibular arches since birth. The patient was a known case of hypohidrotic ectodermal dysplasia since birth. Extraoral examination revealed sparse hair, depressed nose and lip thickening. The patient had severe intolerance to heat, which could be attributed to underdeveloped sweat glands.

Clinical and radiographic examination revealed significant underdevelopment of alveolar ridges in both arches. Presence of high well rounded maxillary ridge with fibrous tissue on the maxillary tuberosity region and in the mandibular arch fibrous tissue was present in the anterior region. Displaceability of the tissue was assessed by two T burnishers. Inter ridge distance was evaluated to be 65mm (figure 1).

Figure 1: Maxillary and mandibular residual alveolar arches.

The maxillary and mandibular preliminary impression was made using irreversible hydrocolloid (Tropcalgin, zhermack). Custom tray was fabricated with 1 mm wax spacer not extending to posterior palatal seal area and additional tadpole spacer on mid palatine raphe and 1 mm spacer on flabby tissue. Tin foil was adapted all over. Stoppers on canine and molar region were placed according to Sharry's design. A thin layer of self-cure acrylic not more 0.2 mm thickness was added on the spacer for stabilization not extending to posterior palatal seal area and the flabby tissue region. Additional 2 mm spacer was placed on the flabby tissue region and the custom tray fabrication with anterior handle was completed. After checking the tray extensions, border molding (figure 2) was done incrementally using green stick tracing compound (DPI Pinnacle Tracing Sticks). Spacer was removed and relief holes were placed on the mid palatine raphae to facilitate the mucostatic impression technique. Tray adhesive was applied. The custom tray was loaded with medium body elastomeric impression material (Hydrorise light body impression material) and a wash impression was made. Spacer was then removed from the flabby tissue region; relief holes were made and a wash impression was taken with light body elastomeric impression material (figure 3).

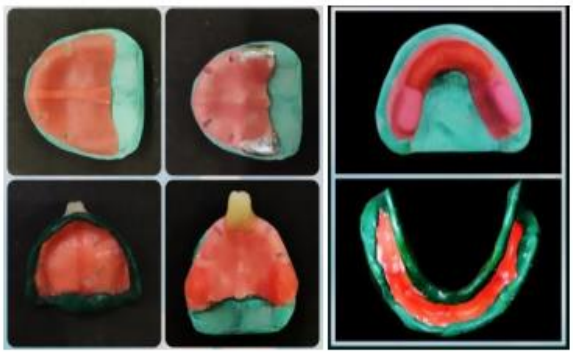

Figure 2: Maxillary and mandibular spacer designs and border molding.

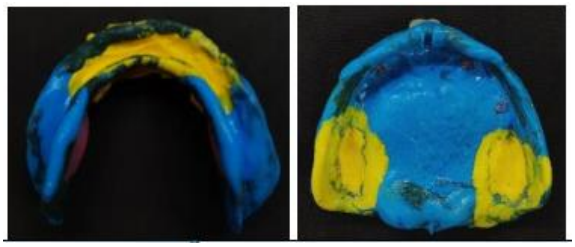

Figure 3: Maxillary and mandibular final impressions.

Orientation jaw relation was recorded using the facebow, and then transferred onto a semi-adjustable articulator, patient's vertical jaw relation was first determined using Niswonger's method.

Figure 4: Jaw relation and teeth setting in Lingualized occlusion.

Teeth selection according to the patient's skin tone and facial shape was carefully done and teeth arrangement was done as per the lingualized occlusion scheme. Set up trial arrangement was done and centric was verified intraorally during try-in procedure (figure 4).

To reduce the weight of the prosthesis and preserve the residual alveolar ridge, it was decided to rehabilitate the patient with hollow denture for the maxillary arch and a liquid supported denture for the mandibular arch.

Steps of fabrication of hollow denture for maxillary denture

1. V-shaped notches were made at five sites on the land area of the maxillary cast and the waxed maxillary denture was sealed to the master cast. The maxillary trial denture was duplicated with irreversible hydrocolloid impression material (Tropicalgin, Zhermack, Badia Polesine, Italy).
2. A template of 1mm thick BIOPLAST (Scheu Dental GmbH, Iserlohn, Germany) transparent film was then fabricated on this working cast with the help of a BIOSTAR (Scheu Dental GmbH) heat and vacuum press to obtain the trial denture external contours.
3. The maxillary trial denture was invested and de-waxed in the conventional manner
4. After deflasking the clear matrix was placed on the definitive cast using the indices in the land area as seating guides.
5. An endodontic file with a rubber stop was used to measure the space between the matrix and the processed base (Figure 6).
6. Vinyl polysiloxane putty [Aquasil, Dentsply Corporation, Germany] was mixed and adapted on the base and shaped to the approximate contours of the matrix.
7. The polymerized putty was shaped with a bur to leave 2–3 mm of space between the putty and matrix (Figure 5).
8. For the purpose of achieving the hollow cavity, first a temporary putty spacer (Zeta Plus, Zhermack) was fabricated, adjusted for suitability and used for all the steps of denture fabrication up till the trial closure.
9. Salt wrapped in a plastic sheet was used to replicate the putty spacer for use during the final closure and

acrylization. The exact replication was ensured by measuring with a Vernier's caliper (figure 5).

10. The accuracy of the 3D spacer from all aspects was assessed by placing between the master cast and the BIOSTAR template (figure 5).
11. After this, a trial closure was carried out using the temporary putty spacer. The flasks were opened and temporary putty spacer retrieved. The mold space was visually assessed for adequate resin thickness all around the hollow cavity. The hollow space left by the temporary putty spacer was now filled with the salt spacer and final closure of the flasks was achieved. The denture was acrylized in conventional manner.
12. Using a micromotor handpiece, openings were cut into the denture base distal to the second molar.
13. The denture was then immersed in a bowl of water to allow dissolution of salt.
14. The denture was immersed in water overnight and weighed before and after immersion to assess leakage into the cavity (figure 6). A water test was performed to evaluate the hollow space as evident by the floating denture (figure 7).

Figure 6: Weight measurement.

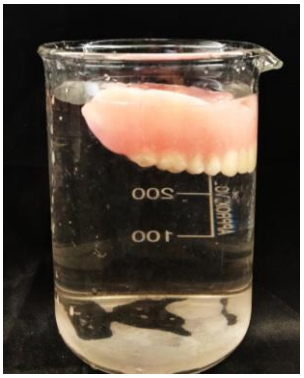

Figure 7: Water test.

Steps of fabrication of liquid supported denture for mandibular denture

1. Vacuum heat-pressed polyethylene sheet (Biostar® vacuum sheet, Scheu-Dental, Germany) of 2 mm and 1 mm thickness were fabricated on the maxillary master cast. The 2 mm thick sheet acted as a temporary spacer (figure 9), and it was made 2 mm short of the vestibular depth.
2. After dewaxing, this sheet was adapted on the maxillary cast, and petroleum jelly was applied over it, so that it can be retrieved easily (figure 8).

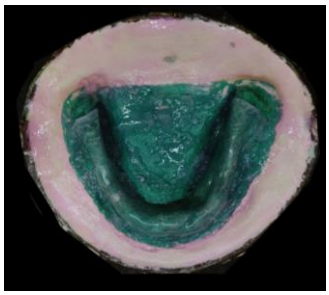

Figure 8: Mandibular denture cured with 2 mm polyethylene sheet.

3. The mandibular denture with this sheet was then acrylized (Lucitone 199, Denture Base Resin, Dentsply USA), finished and polished in conventional manner.
4. The dentures were inserted in to the patient's mouth to check for retention, support, stability, and border extension.
5. The patient was asked to wear the denture for two weeks to get adjusted to it. After two weeks, the patient was recalled to convert the mandibular denture into a liquid supported one.
6. The temporary polyethylene 2 mm thick spacer sheet was removed from the maxillary denture (figure 9).

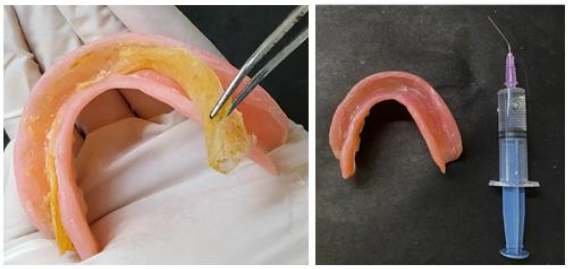

Figure 9: Removal of 2 mm thick sheet after 2 weeks followed by glycerin incorporation.

7. The 1 mm thick final polyethylene sheet was incorporated in the denture creating a 1 mm space between tissue surface of the denture and permanent polyethylene sheet.
8. Cyanoacrylate adhesive and auto polymerizing acrylic resin were used to seal the borders and prevent escape of liquid.
9. The space created due to the replacement of the 2 mm thick sheet with a 1 mm thick sheet was filled with viscous glycerin liquid (figure 9).
10. This was done by making two holes drilled on the buccal flange in the molar area of the denture by round bur and injecting the glycerin through these holes, and both holes were sealed with auto polymerizing cure acrylic resin.
11. The liquid supported denture was delivered and denture care instructions were given to the patient

(figure 11). The patient was advised to clean the tissue surface using cotton. The patient was recalled for follow-up at regular intervals. The denture was well maintained and patient was quite satisfied with the denture.

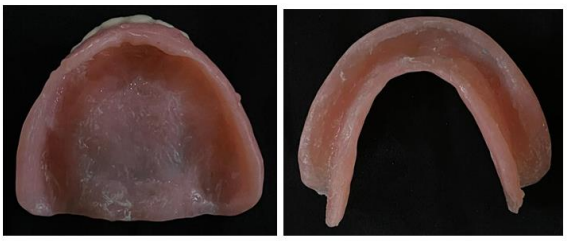

Figure 10: Final prosthesis.

Figure 11: Pre-op and Post- op.

DISCUSSION

Treatment of patients with ectodermal dysplasia has always posed a challenge for the clinician. The first treatment plan that was discussed with the patient was involving dental implants and surgical resection of the flabby mucosa but due to the unavailability of bone and financial constraints this option was then rejected by the patient.

The selective pressure or minimally displacive impression techniques with the use of holes, windows and wax relieve reduces the hydraulic pressure, should help to overcome some of these situations as they minimize the displacement of the bearing flabby tissues and apply pressure on other stress bearing areas.

Fabrication of hollow and liquid supported dentures has been tried to decrease the weight of the prosthesis which in turn increases the retention and stability. Although successful, the biggest disadvantage of using putty as a spacer is its tedious retrieval especially from the anterior region of the prosthesis between the canines due to the curvature of the arch. The advantage of using a salt spacer is its ease of retrievability and biocompatibility.

The inherent use of the lingualized occlusion that was opted in the case report was found to have the greatest benefits in regards to the mastication and stability of the denture.

CONCLUSION

Prosthodontic rehabilitation should start in early childhood and needs to be revised in accordance with the patient's growth. Pre-prosthetic surgeries and implant-retained prosthesis may not be possible in all cases due to systemic diseases or cost. In such cases, a lightweight complete denture is a logical alternative. Hollow complete denture or a liquid supported denture considerably reduces the weight of the prosthesis which in turn prevents transmission of detrimental forces which would otherwise be transmitted from a conventional heavy prosthesis to the underlying tissues.

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