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# PROSTHODONTIC REHABILITATION OF PEDIATRIC HYPOHIDROTIC ECTODERMAL DYSPLASIA USING THE NEUTRAL ZONE TECHNIQUE: A CASE REPORT

Dentistry

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## ABSTRACT

**Aim and background:** Hypohidrotic ectodermal dysplasia (HED) is a genetic disorder involving structures derived from the ectoderm, commonly characterized by hypotrichosis, hypohidrosis, and hypodontia or anodontia. Early prosthetic intervention is essential in pediatric patients to restore function, aesthetics, and psychological well-being. **Case Description:** A 6-year-old male patient presented with complete anodontia in the mandibular arch and partial anodontia in the maxillary arch, along with classical extraoral features of HED. Due to thin, underdeveloped alveolar ridges, complete denture was fabricated using the neutral zone technique to enhance stability and muscular balance in mandibular arch and Cusil denture in maxillary arch. **Conclusion:** In this case, the prosthesis demonstrated satisfactory retention and stability and was associated with improved mastication, speech, and facial aesthetics. The patient and parents also described significant psychological improvement after early rehabilitation. Overall, the potential role of the neutral zone technique in improving denture stability in Pediatric Hypohidrotic dysplasia patients with compromised ridges. **Clinical Significance:** Early prosthetic treatment in children with HED helps restore mastication, speech, and facial appearance. Using the neutral zone technique improves denture stability in cases with undeveloped thin ridges. Cusil dentures allow preservation of existing teeth while improving function. Such early rehabilitation also boosts the child's confidence and social interaction.

## KEYWORDS

Hypohidrotic Ectodermal Dysplasia, Pediatric Prosthodontics, Neutral Zone Technique, Complete Denture, Anodontia.

## INTRODUCTION

Ectodermal dysplasia (ED) is a diverse group of inherited disorders that primarily involve tissues of ectodermal origin, such as hair follicles, nails, sweat glands, and dentition. [1] Thurnam (1848) firstly described and reported two typical patients with ED in the medical literature [2] Among its various forms, hypohidrotic ectodermal dysplasia (HED)—also referred to as Christ–Siemens–Touraine syndrome—shows X-linked recessive inheritance, and clinically, it is more commonly observed in males. It is estimated that the incidence of the syndrome in men is approximately 1 in 100,000 births, while carriers have an incidence of around 17 in 100,000 women.

The hallmark features typically include a classical triad of:

- Hypotrichosis: sparse or sparse-to-missing hair
- Hypohidrosis: diminished sweating
- Hypodontia or anodontia: absence or reduced number of teeth [3]

Children affected by HED may develop reduced lower facial height, difficulty with mastication, impaired speech, and prominent aesthetic concerns, which together can negatively influence social interactions and self-esteem. [4]

Prosthetic rehabilitation in pediatric patients is particularly challenging due to ongoing craniofacial growth and dynamic oral changes. Denture fabrication and retention are often compromised by thin and underdeveloped alveolar ridges, primarily resulting from tooth absence and reduced bone development. [5]

The neutral zone technique represents a functional approach to denture construction, wherein teeth are positioned within an area of balanced muscular forces between the tongue and the lips and cheeks. By minimizing muscular displacing influences, this concept enhances the harmony between the prosthesis and surrounding oral structures. When appropriately applied, it can significantly improve denture retention and stability, particularly in patients with compromised alveolar ridges [6].

## CASE DISCRIPTION

### Patient History

A 6-year-old male was referred to the Department of Prosthodontics, Crown and Bridge, Implantology, Vijayawada with the chief complaint of missing teeth in both the maxillary and mandibular arches, accompanied by difficulty in chewing food. The patient and parents also noted concerns related to the child's facial appearance. A detailed medical and family history was recorded. There was no reported occurrence of similar findings among the patient's parents, grandparents, or siblings. The parents reported consanguinity in the marriage, but no other familial pattern was identified.

### Clinical Examination

On extraoral examination, multiple features consistent with hypohidrotic ectodermal dysplasia (HED) were observed, including: (Figure. 1 & 2)

- Sparse, dry scalp hair (hypotrichosis)
- Prominent forehead
- Sparse eyebrows and eyelashes
- Dry skin
- Periorbital and perioral hyperpigmentation
- Prominent lower lip
- Straight facial profile
- Reduced lower facial height

Collectively, these findings supported a clinical impression of hypohidrotic ectodermal dysplasia (Christ–Siemens–Touraine syndrome).

**Figure. 1: Pre – op Photograph**

**Figure. 2: Extraoral Photograph of hands**

Intraoral examination revealed significant dental and skeletal alterations: (Figure. 3 & 4)

- Complete absence of teeth in the mandibular arch
- In the maxillary arch, two peg-shaped lateral incisors and the first permanent molars were present.
- Thin and underdeveloped alveolar ridges, indicating compromised ridge form.
- Reduced vertical dimension of occlusion.

**Figure. 3: Intraoral Photograph of Maxilla**

**Figure. 4: Intraoral Photograph of Mandible**

A panoramic radiograph demonstrated: (Figure. 5)

- Impacted maxillary canines
- Reduced alveolar bone height

**Figure. 5: OPG**

**Treatment Plan**

Because the patient was only 6 years old, treatment was planned with growth changes in mind. The child also had thin, poorly developed ridges, which can reduce denture retention, along with functional and psychological concerns.

Therefore, complete denture for mandibular arch were planned using the neutral zone technique to help achieve better tooth position, improved muscular balance, and enhanced denture stability during chewing and speech and cusil denture in maxillary arch.

**Clinical Procedure**

Preliminary impressions with polyvinyl siloxane (PVS) were made for maxillary and mandibular arches to preserve surface details, then poured in Type III stone for diagnostic casts. (Figure. 6) Custom trays were fabricated with auto-polymerizing acrylic resin with 1mm wax spacer. (Figure. 7) Single-step Border Moulding performed with heavy body polyvinyl siloxane (PVS) material, followed by final impressions with light body polyvinyl siloxane (PVS) material. Master casts were poured in Type IV stone. (Figure. 8)

**Figure.6: Primary Impression Cast**

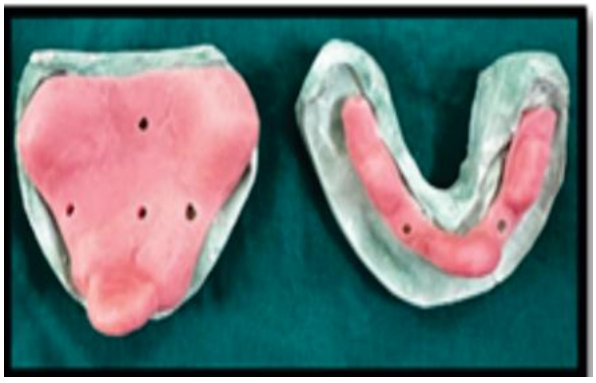

**Figure.7: Custom Tray Fabrication**

**Figure.8: Secondary Cast**

Record bases and occlusal rims were fabricated. Vertical dimension was established using facial proportions, phonetics, and physiologic rest position. Centric relation was recorded by guided mandibular closure. (Figure. 9)

**Figure.9: Jaw relation**

Because of the narrow and undeveloped mandibular ridges, the neutral zone technique was adopted to optimize tooth placement within the functional envelope of muscular balance. A thermoplastic compound mixture composed of impression compound and green stick compound in a 3:7 ratio was plasticized and adapted over the mandibular record base. The patient was instructed to perform functional movements such as swallowing, phonation, tongue elevation, and lip pursing. These activities allow dynamic moulding of the compound by the surrounding musculature, thereby delineating the zone in which muscular forces are in equilibrium. A plaster index was subsequently made to preserve the recorded contour and guide the arrangement of artificial teeth within the established neutral zone. (Figure. 10)

**Figure.10: Neutral zone technique**

Age-appropriate, minimal-sized acrylic teeth were selected with controlled spacing to maintain a natural appearance of transitional dentition of child. After try-in to confirm occlusion, aesthetics, and phonetics, dentures were processed with heat-polymerized PMMA. (Figure. 11) On insertion, occlusion was refined and pressure-indicating paste used for selective relief. (Figure. 12) Care instructions were given, and periodic recall was planned to accommodate craniofacial growth and maintain function.

**Figure.11: Denture Fabrication**


**Figure. 12: Post – op Photograph**

## RESULTS

The definitive prostheses demonstrated satisfactory retention and stability during functional movements, particularly during mastication and speech. Establishment of an appropriate vertical dimension restored lower facial height and improved facial profile support. The patient exhibited noticeable improvement in masticatory efficiency and phonetic articulation, especially with labiodental and linguodental sounds. Enhanced lip competence and facial balance contributed to improved overall aesthetics. In addition to functional gains, a marked improvement in the patient's self-confidence and social interaction was observed, as reported byhe parents. Periodic follow-up appointments were scheduled to evaluate tissue response, monitor prosthesis adaptation, and assess craniofacial growth–related changes.

## DISCUSSION –

Hypohidrotic ectodermal dysplasia (HED) is a hereditary disorder characterized by hypodontia or anodontia, hypotrichosis, and hypohidrosis, often leading to significant functional and esthetic challenges in pediatric patients. The absence or malformation of teeth adversely affects mastication, speech development, facial growth, and psychosocial well-being, making early prosthodontic intervention essential.

Prosthodontic rehabilitation in pediatric patients with ectodermal dysplasia is particularly challenging due to ongoing craniofacial growth, reduced alveolar ridge development, and limited denture-bearing areas. Conventional complete or partial dentures remain the most commonly recommended treatment during early childhood, as they are non-invasive, cost-effective, and adaptable to growth changes [8,10]. Early intervention has been shown to improve masticatory efficiency, speech, and self-esteem in affected children [9].

In the present case, the neutral zone technique was employed to enhance denture stability and retention. This technique is especially beneficial in patients with severely resorbed ridges or compromised muscular balance, as it records the zone where the forces of the tongue and perioral musculature are in equilibrium. Previous literature supports the use of this approach in patients with ectodermal dysplasia, where conventional denture stability is often inadequate due to underdeveloped alveolar ridges [8]. By positioning the prosthesis within the neutral zone, functional forces help stabilize rather than dislodge the denture, resulting in improved comfort and function.

Orthodontic and dentofacial orthopedic considerations may also play a role in managing ectodermal dysplasia, particularly in cases with retained teeth or developing occlusion. However, in patients with severe hypodontia or anodontia, prosthetic rehabilitation remains the primary modality [7]. The timing of treatment is critical, and prostheses often require periodic modification or replacement to accommodate growth changes.

Although dental implants are increasingly being explored as a treatment option, their use in pediatric patients remains controversial due to concerns about interference with jaw growth and implant positioning over time. Recent systematic reviews suggest that implants may be considered in selected cases, particularly in older adolescents, but removable prostheses remain the standard of care in younger patients [11].

The present case highlights the clinical effectiveness of the neutral zone technique in improving denture stability and patient adaptation. The approach not only enhances functional outcomes but also contributes to better esthetics and psychological confidence, which are crucial in growing children.

## CONCLUSION-

Within the limitations of this case report, the neutral zone technique proved to be a predictable approach for improving denture stability in a pediatric patient with hypo hidrotic ectodermal dysplasia and severely compromised alveolar ridges. Functional balance achieved through physiologic tooth positioning contributed to improved mastication, speech, facial harmony, and psychological well-being. Early prosthetic rehabilitation combined with structured follow-up care is essential to accommodate ongoing growth and ensure sustained treatment success.

**List of Abbreviations -** ED – Ectodermal Dysplasia, HED- Hypohydrotic ectodermal dysplasia, PMMA- Polymethyl methacrylate.

## DECLARATIONS

### Patient Consent:

Informed consent was obtained from the patient's guardian for publication of this case report and accompanying images.

### Conflict of Interest:

The authors declare no conflict of interest.

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## REFERENCES:

1. Tarjan I, Gabris K, Rozsa N. Early prosthetic treatment of patients with ectodermal dysplasia: a clinical report. J Prosthet Dent. 2005 May;93(5):419-24. doi: 10.1016/j.prosdent.2005.01.012. PMID: 15867750.
2. Khan, Abid & Musani, Smita & Dugal, Ramandeep & Lodha, Mitesh & Madanshetty, Pallavi & Godil, Aamir. (2020). Prosthetic rehabilitation of an adolescent with ectodermal dysplasia utilizing multidisciplinary approach: A case report. Indian Journal of Case Reports. Volume 6. 504-507. 10.32677/IJCR.2020.v06.i09.008.
3. Mantri, Sneha & Shivkumar, Poonam. (2013). Management of a Patient with Ectodermal Dysplasia — A Case Report.
4. Bhide SV, Sabane A, Pradhan R, Nijhawan O, Jadhav R, Patil A. Prosthetic management of a patient with ectodermal dysplasia: a case report.
5. Bondarets, N & Jones, R & McDonald, Fraser. (2002). Analysis of facial growth in subjects with syndromic ectodermal dysplasia: A longitudinal analysis. Orthodontics & craniofacial research. 5. 71-84. 10.1034/j.1600-0544.2002.01159.x.
6. Beresin V, Schiesser F, The neutral zone in complete dentures, The Journal of Prosthetic Dentistry, 95, 93-100
7. Cerezo-Cayuelas M, Pérez-Silva A, Serna-Muñoz C, et al. Orthodontic and dentofacial orthopedic treatments in patients with ectodermal dysplasia: a systematic review. Orphanet J Rare Dis. 2022;17:376. doi:10.1186/s13023-022-02533-0.
8. Nejabi MB, Anwari A, Shadab H, Mtawakel N, Omarzad F, Ahmadi ME. Prosthodontic management of a patient with ectodermal dysplasia: case report. Clin Cosmet Investig Dent. 2023;15:133-41. doi:10.2147/CCIDE.S419939. PMID: 37576744; PMCID: PMC10416782.
9. Elabdouli Rabab, Ghazzar Fatima Zahra, Rhalimi Loubna, Bellemkhannate Samira, et al. Prosthetic Management of Ectodermal Dysplasia: Case Reports. International Journal of Dental Sciences and Research, 2025, Vol. 13, No. 1, 11-14
10. Nedumgottil, Binoy Mathews; Sam, Sajina1. Ectodermal Dysplasia and Prosthodontic Management. International Journal of Oral Care and Research 8(3):p 43-44, Jul–Sep 2020. | DOI: 10.4103/INJO.INJO_37_20
11. Barve KD, Padawe DS, Takate VS. Dental Implants as a Treatment Option for Prosthetic Rehabilitation of Children with Ectodermal Dysplasia: A Systematic Review. Int J Clin Pediatr Dent. 2025 Mar;18(3):339-347. doi: 10.5005/jp-journals-10005-3069. Epub 2025 Apr 19. PMID: 40415755; PMCID: PMC12096864.