

A case report of hypohidrotic ectodermal dysplasia: A mini-review with latest updates

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ABSTRACT

Ectodermal dysplasia (ED) is a rare hereditary disorder involving two or more of the ectodermal structures, which include the skin, hair, nails, teeth, and sweat glands. The two most common forms of the disease are hypohidrotic/anhidrotic ED and hidrotic ED. They are caused by the mutations of several genes. We present a case of a 9-year-old child with hypohidrotic ED, who presented with hypodontia, dyshidrosis, hypotrichosis, and raised body temperature. We treated the raised body temperature symptomatically with cooling techniques and antipyretics. A multidisciplinary approach with physicians from several fields is required to provide comprehensive medical care to patients with ED.

Keywords: Early diagnosis, hypohidrotic ectodermal dysplasia, multidisciplinary approach

Introduction

Ectodermal dysplasia (ED) is a rare heterogeneous group of inherited disorders that share primary defects in the development of two or more tissues derived from the ectoderm. These tissues primarily are the skin, hair, nails, eccrine glands, and teeth. The incidence of ED is around 7 cases in 10,000 live births. The disease is broadly classified into hypohidrotic/anhidrotic (Christ–Siemens–Touraine syndrome) or hidrotic (Clouston syndrome), based on the presence or absence of sweat glands.^[1] The common clinical features of ED include dental abnormalities, hypotrichosis, abnormal nails, and reduced ability to sweat.^[2] As several organ-systems are involved in ED, the treating physician faces several treatment challenges. This case study primarily deals with the management of the disease in the pediatric age group, keeping in track with the latest developments in the field.

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Case Report

A 9-year-old boy was brought to the hospital by his parents due to decreased sweating, dry skin, recurrent episode of high-grade fever, and delayed eruption of abnormally shaped teeth. The parents revealed that the child had intermittent episodes of fever in the past, associated with physical activity. Such episodes used to occur more frequently in hot climate, but no definite cause had been diagnosed for the same. The parents denied a consanguineous marriage or having a family member with similar features as their child. On examination, patient's vitals and systemic examination were normal. Intraoral examination revealed the child had mandibular and maxillary hypodontia with two peg-shaped incisors. The hairs on the scalp were sparse and hypopigmented, and the eyebrows were absent. Both the upper and lower eyelids showed sparse eyelashes. Periorbital and perioral wrinkling was also present. The nasal bridge was depressed; consistent with a saddle-nose [Figure 1]. His skin was dry, warm, and sensitive. Patient's complete blood count, comprehensive metabolic panel, and urine analysis reports were normal. Based on the history, clinical features, and

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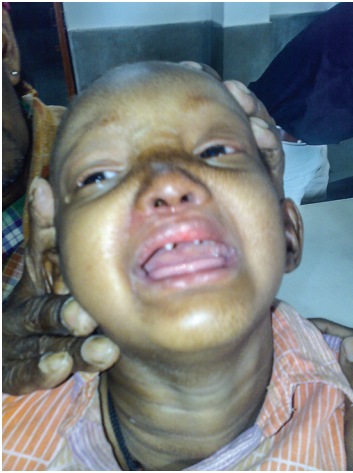


Figure 1: Facial profile of the patient showing hypodontia, hypotrichosis, periorbital wrinkling, and depressed nasal bridge

examination, the child was diagnosed as a case of hypohidrotic ED. Anticipatory guidance was given to his parents about the disease. Apart from the medical management, he was referred for dental reconstruction consultation.

Discussion

The literature describes more than 190 subtypes of ED, which can be classified according to the clinical features or the type of genetic mutation or the molecular pathway involved. However, the two most common subtypes of ED are hypohidrotic/anhidrotic ED in which the sweat glands are deficient and hidrotic ED in which the sweat glands are not affected.^[1-3]

Hypohidrotic ED is inherited by X-linked (most common), autosomal dominant, and autosomal recessive patterns. The candidate gene for the X-linked inheritance pattern is ectodysplasin A (EDA) with locus Xq12-q13.1, encoding a ligand EDA-A1, whereas the pathogenic genes for the autosomal inheritance pattern are ectodysplasin A receptor (EDAR), and ectodysplasin A receptor-associated death domain protein (EDARADD). On the other hand, hidrotic ED is inherited only by the autosomal dominant pattern by changes in the GJB6 gene, encoding connexin-30, and located in chromosome 13 (locus 13q11-q12).^[4] Molecular studies have found that the abovementioned genes are responsible for the formation of several substrates required for the activation of the tumor necrosis factor α -related signaling pathway, the WNT-signaling pathway, and the nuclear factor- κ B pathway, involved in ectoderm-mesoderm interactions, differentiation of ectodermal appendages, and organogenesis during the initiation of embryonic development.^[5]

Clinically hypohidrotic/anhidrotic ED is characterized by hypotrichosis, hypo/adontia, dyshidrosis (abnormal sweating), and facial dimorphism.^[1] On the other hand, hidrotic ED is characterized by the triad of onychodysplasia, hypotrichosis, and palmoplantar hyperkeratosis.^[2] The clinical presentation of our patient was consistent with a case of hypohidrotic ED.

In participants with a family history of hypohidrotic ED, early prenatal diagnosis can be established by DNA-based linkage analysis and genetic tests for detecting mutations in EDA/EDAR/EDAEADD. In the second trimester of pregnancy, sonography, and fetal skin biopsy are suitable diagnostic tests.^[6,7] Antenatal diagnosis is usually reached before the age of 3 years through the clinical features.

As numerous clinical and psychological aspects need to be addressed in patients with hypohidrotic ED, a multidisciplinary approach is the key. The treating physician may encounter patients with hypohidrotic ED with elevated body temperatures or hyperpyrexia. Hence, cooling techniques such as cold sponging, placing the child in a tub containing cold water, using cooling vests, applying chilled emollients, seeking air-conditioned surroundings, and consuming cold water should be initiated immediately. The parents should be advised to avoid the child from indulging into intense physical activities, and exposure to high temperatures. Other common manifestations of ED such as atopic dermatitis, xerostomia, dryness of eyes and nose should be treated symptomatically.^[2,7,8]

Mortality is as high as 30% in the first 3 years of life in children with hypohidrotic ED, due to numerous complications such as failure to thrive, pulmonary infections, and hyperthermia. Hence, additional care must be provided to infants and young children by the treating physician. After 3 years of life, life expectancy is normal.^[9]

Dental referral is warranted in all patients of hypohidrotic ED. In childhood, dentures are the primary line of treatment for the dental abnormalities. These dentures are regularly evaluated by the pediatric dentist as per the child's growth and development and are modified/replaced accordingly. In older individuals dentures, dental implants, and orthodontia are usually the preferred treatment options.

Patients with hypohidrotic ED may suffer from low self-esteem, insecurity, and depression due to their unusual physical appearances and lack of social acceptance.^[2,7,8] Hence, psychological counseling should be advised on a regular basis. Use of wigs in patients with severe alopecia, and early initiation of dental prosthetics may improve their cosmetic appearance. Consultation with a speech therapist and an otolaryngologist is warranted if abnormalities in phonetics and word-articulation are detected.

Intravenous injection of recombinant EDA-A1 to newborn dogs with X-linked hypohidrotic ED has found to restore the growth of their teeth, skin structures, and mucous glands. Furthermore, intra-amniotic injections of recombinant EDA-A1 to pregnant mice partially improved the phenotype of the X-linked hypohidrotic ED newborn mice.^[10] Recombinant EDA-A1 at present is in Phase-II clinical trials and is being administered to newborn males with hypohidrotic ED to hopefully alleviate some of their symptoms.

Conclusions

A multipronged approach by a team consisting of physicians from several clinical modalities is required to provide comprehensive medical care to children suffering from ED. The pediatrician/treating physician should manage acute complications of ED such as hyperpyrexia and respiratory infections symptomatically. The pediatric dentist should use dentures, prosthetics, etc., so as to support the normal functions, esthetics, and psychosocial well-being of the child. Consultation with a child psychologist, dermatologist, otolaryngologist, and speech-therapist should be warranted, as and when required.

Declaration of patient consent

These authors certify that they have obtained all appropriate patient consent forms. In the form, the legal guardian has given his consent for images and other clinical information to be reported in the journal. The guardian understands that names and initials will not be published and due efforts will be made to conceal patient identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

References

1. Freire-Maia N, Pinheiro M. Ectodermal dysplasias - Some recollections and a classification. *Birth Defects Orig Artic Ser* 1988;24:3-14.
2. Joseph S, Cherackal GJ, Jacob J, Varghese AK. Multidisciplinary management of hypohidrotic ectodermal dysplasia - A case report. *Clin Case Rep* 2015;3:280-6.
3. Salinas CF, Jorgenson RJ, Wright JT, DiGiovanna JJ, Fete MD 2008 international conference on ectodermal dysplasias classification: Conference report. *Am J Med Genet A* 2009;149A: 1958-69.
4. Zeng B, Xiao X, Li S, Lu H, Lu J, Zhu L, *et al.* Eight mutations of three genes (EDA, EDAR, and WNT10A) identified in seven hypohidrotic ectodermal dysplasia patients. *Genes (Basel)* 2016;7: pii: E65.
5. Trzeciak WH, Koczorowski R. Molecular basis of hypohidrotic ectodermal dysplasia: An update. *J Appl Genet* 2016;57:51-61.
6. Wünsche S, Jüngert J, Faschingbauer F, Mommsen H, Goecke T, Schwanitz K, *et al.* Noninvasive prenatal diagnosis of hypohidrotic ectodermal dysplasia by tooth germ sonography. *Ultraschall Med* 2015;36:381-5.
7. Deshmukh S, Prashanth S. Ectodermal dysplasia: A genetic review. *Int J Clin Pediatr Dent* 2012;5:197-202.
8. Clarke A. Hypohidrotic ectodermal dysplasia. *J Med Genet* 1987;24:659-63.
9. Blüschke G, Nüsken KD, Schneider H. Prevalence and prevention of severe complications of hypohidrotic ectodermal dysplasia in infancy. *Early Hum Dev* 2010;86:397-9.
10. Hermes K, Schneider P, Krieg P, Dang A, Huttner K, Schneider H, *et al.* Prenatal therapy in developmental disorders: Drug targeting via intra-amniotic injection to treat X-linked hypohidrotic ectodermal dysplasia. *J Invest Dermatol* 2014;134:2985-7.