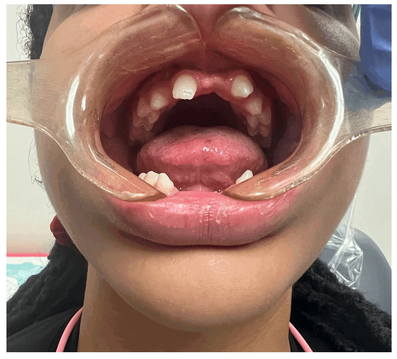
EDAR Mutation Ectodermal Dysplasia: A Case Report

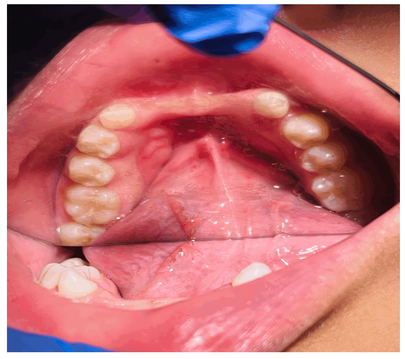
Tiffanie Brown D.D.S. and Stephen Grimm D.D.S.
Department of Pediatric Dentistry, Howard University, Washington D.C. 20059

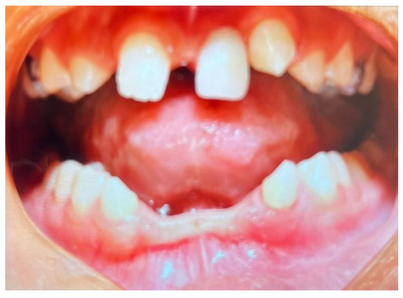
Introduction

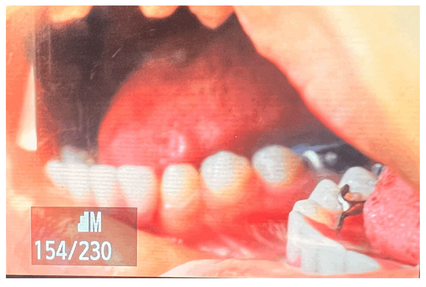
Ectodermal Dysplasia is a term used to assign a group of heterogeneous disorders in regards to their genetic causes and clinical phenotypes. It is a very rare condition occurring in an estimated one per 100,000 live births. There are at least 117 separate syndromes reported that make up the ectodermal group. There are classically considered to be an X-linked or autosomal recessive condition which implies only men can present the complete pattern of the syndrome and females are the carrier.

Hypohidrotic Ectodermal Dysplasia (HED) is the most common type of ectodermal dysplasia and most often results from an X-linked recessive mutation of the ectodysplasin A gene (*EDA*). The classic triad of associated clinical features is hypohidrosis, hypotrichosis, and dental anomalies (reduced number of teeth & abnormal tooth morphology.) In X-linked HED, males are hemizygous for the *EDA* mutation and generally display the complete triad, as well as have a propensity for respiratory disorders. Females are typically heterozygous for the *EDA mutation*. Their presentation may be subtle and diagnosis delayed.









Case Presentation

History:
A 12 year-old African American female presented to the Howard University College of Dentistry pediatric department with a chief complaint of multiple missing teeth that never came in. The mother reported no known medical conditions. The mother stated that the patient did not have problems with her hair, nails or sweating. Patient's dental history includes previous cleaning and no history of dental restorations. Patient's extraoral exam was unremarkable, however her intraoral exam revealed several missing permanent teeth: #7, 9, 23-26. The anterior mandibular alveolar ridge was narrow with no gingival inflammation or edema present. Patient's oral hygiene was fair.

Radiographic examination: Revealed that there were no permanent tooth buds for the missing permanent teeth. Tooth #10 was rotated 90 degrees. The mandibular primary canines were near exfoliation. Patient's third molar tooth buds were present.

Consultation: Consulted with faculty dental histopathologist and a differential diagnosis was determined:

- *Non-syndromic tooth agenesis*
- *Lyonized form of Ectodermal Dysplasia*
- *Hypohidrotic Ectodermal Dysplasia*

Genetic Testing: Patient's family history was discussed with a genetics counselor to develop patient pedigree. A saliva sample was obtained from the patient for genetic testing..

Treatment:
Fixed partial dentures (FPD) were fabricated for both the upper and lower arches to replace the edentulous spaces, with molar bands were cemented on #3, 14, 19, and 30 with mesial rests on #21 and #28.

Outcome:
Mother reported that since receiving the FPD, patient has become more confident, hangs out with friends and joined extracurricular activities.

RESULT: POSITIVE

One Pathogenic variant identified in EDAR. EDAR is associated with autosomal recessive and dominant hypohidrotic ectodermal dysplasia and autosomal dominant tooth agenesis.

GENE	VARIANT	ZYGOSITY	VARIANT CLASSIFICATION
EDAR	c.1208C>T (p.Thr403Met)	heterozygous	PATHOGENIC

About this test
This diagnostic test evaluates 73 gene(s) for variants (genetic changes) that are associated with genetic disorders. Diagnostic genetic testing, when combined with family history and other medical results, may provide information to clarify individual risk, support a clinical diagnosis, and assist with the development of a personalized treatment and management strategy.

Discussion

Ectodermal Dysplasia (ED) can be described by a triad of findings involving a primary defect of the skin, teeth, and appendages such as hair, nails and glands such as exocrine and sebaceous. Our patient did not present with the classic triad of symptoms of Ectodermal Dysplasia making the diagnosis challenging. Extraorally, the patient's hair and nails were within normal limits. Mother reported the patient didn't have a problem sweating but experiences heat intolerance. Intraorally, the patient presented with missing teeth, as well as conical shaped anterior teeth. With the use of genetic testing, we were able to diagnose our patient with Hypohidrotic Ectodermal Dysplasia.

Due to the lack or absence of teeth, the alveolar ridge does not develop resulting in the patient having a reduced vertical height. The shape of the teeth may be peg shaped or conical (due to the Pax9 protein) especially in the anterior; the roots of the teeth may express taurodontism and root fusion. The most commonly affected teeth include the maxillary and mandibular canines, first molars and the mandibular central incisors (Kratochvilova 141).

For children with many missing primary teeth, partial dentures can be constructed at an early age; 2- and 3-year-old children have successfully worn partial dentures. Their ability to masticate food increases, and their nutritional status may improve. A partial denture can be adjusted or remade at intervals to allow for the eruption of permanent teeth (Dean72). If treatment isn't done early, interim treatment should begin in around 7-9 years of age before the affected children realize they are different from other children (Rakhshan).

.

CONCLUSION

Diagnosing a patient with Ectodermal Dysplasia can be complicated if the patient does not present with traditional symptoms.There are several types of ED syndromes so genetic testing is advised in order to deliver the best form of care for your patient. Treatment planning should begin early, with removable partial dentures being the well-accepted form of treatment due to aesthetic outcomes and functionality. Treatment should begin early to help with aesthetic and psychological aspects of ED. Through history, assessment and genetic testing dental professionals will be able to provide a proper diagnosis to help guide patients' interim and future treatment who present with atypical Ectodermal Dysplasia.

REFERENCES

Kratochvilova L, Dostalova T, Schwarz M, Macek M Jr, Marek I, Malíková M, Míšová E. Ectodermal dysplasia: important role of complex dental care in its interdisciplinary management. Eur J Paediatr Dent. 2022 Jun;23(2):140-146. doi: 10.23804/ejpd.2022.23.02.12. PMID: 35722846.

Khalekar Y, Zope A, Chaudhari L, Brahmankar U. Ectodermal dysplasia. Indian J Multidiscip Dent 2016;6:55-7
Emery and Rimoin's Principles and Practice of Medical Genetics (Sixth Edition), 2013
Dean, Jeffrey A. (Jeffrey Alan) et al., eds. *McDonald and Avery's Dentistry for the Child and Adolescent*. Eleventh edition. St. Louis, Missouri: Elsevier, 2022. Print.
Rakhshan Vahid. Congenitally missing teeth (hypodontia): A review of the literature concerning the etiology, prevalence, risk factors, patterns and treatment