



Ectodermal dysplasia: A report of two cases

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ARTICLE INFO

Article Type: Case Report

Received: 3 Jan 2017

Revised: 2 Feb 2017

Accepted: 29 Feb 2017

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ABSTRACT

Introduction: Ectodermal dysplasia (ED) is a group of syndromes and disorders in the human body characterized by structural anomalies in the ectoderm and often associated with hair, teeth and skin abnormalities. There are many syndromes associated with ED.

Case report: Here is a case report of two young patients with different manifestations of ectodermal dysplasia.

Conclusion: One patient was diagnosed as Rapp-Hodgkin syndrome and the other as Hypohidrotic ectodermal dysplasia, according to clinical findings.

Key words: Ectodermal dysplasia, Hypodontia, Hypohidrotia.

Introduction

Ectodermal dysplasia (ED) is a group of syndromes and disorders characterized by structural anomalies of ectodermal origin. These syndromes involve disturbances in the skin, hair, nails and salivary glands. ED may appear in every race but is more common among Caucasians [1].

In the early 1980s two physicians, Friere-maia and Pinheiro suggested ED to be classified as (A) absolute ED and (B) ED dysplasia syndrome [2].

Type A is defined as congenital malformations of two or more ectodermal structures such as:

1) Teeth: they might be missed or formed as peg-shaped or pointed, spaced or highly susceptible to decay because of malformed enamel. Affected children usually need

dentures at the age of 2 while adults may need to implant teeth. Orthodontic treatment might be helpful.

2) Nails: might be thin, thick, malformed, discolored, scalloped or weak and brittle. Cuticles may be vulnerable to infection.

3) Hair: dry, brittle, curled, coarse and thin hair growth, mostly sparse.

4) Sweat glands: they lack excretion or barely excrete. Over heating during the summer is a major problem because the human body is not able to regulate body temperature without sweating.

5) Skin: might be thin, pale or dry which is easily prone to harms, infection or sun burn. Palms and soles could

have hyperkeratosis. Exposed skin surfaces such as the posterior part of the head and feet are at risk of erosion. Bleeding, infection and any harm to skin must be avoided as far as possible [3].

Type B includes the congenital disorders mentioned above along with one or more malformations in other ectodermal structures such as the ears, lips or fingers' skin [2]. The following syndromes can be mentioned with respect to the involved sites: Ectrodactyly-ED-clefting syndrome, ectodermal dysplasia of palatal cleft (ankyloblepharon), ectodermal dysplasia, mid-face hypoplasia (Rapp-Hodgkin) and chondroectodermal dysplasia (Ellis-Van Creveld syndrome) [5, 4].

The most frequent syndrome is hypohidrotic ectodermal (Christ-Siemens-Touraine) syndrome which is X-linked recessive and is inherited to the male gender. Sometimes the term "anhidrotic" is used instead of "hypohidrotic" [5]. This syndrome consists of a classical triad of hypohidrosis, hypodontia and hypotrichosis in addition to a dimorphic face [3]. Other clinical features of this syndrome are frontal bossing, saddle nose, wrinkling or hyper pigmentation of the periorbital region, sparseness or absence of hair and an enlarged forehead and chin. Different dental malformations such as anodontia, hypodontia along with conical teeth might exist whereas the most common physiologic manifestation is reduced or lack of sweating [4- 6].

Ectrodactyly-ectodermal dysplasia-clefting (EEC) is an autosomal dominant inherited syndrome which consists of ectrodactyly with or without syndactyly, ectodermal dysplasia (involving the hair, nails, teeth and skin) and lip and palatal clefts. The presence of all three features in one patient is rare and estimated to be 1.5 in 100,000,000 births. This syndrome is linked to chromosomes 3q27 and 19, also disturbance in p63 gene has been reported and the diagnosis is based on genetic testing [1, 7, 8].

The Hidrotic type (known as Clouston syndrome) affects the hair, nails and teeth but sweat glands are mostly normal. This syndrome is autosomal dominant and usually reported in Canada and France [3]. It is diagnosed based on history and clinical examination; its classical manifestations include heat intolerance, sweating disability, abnormal dentition, and thin hair [9].

Rapp-Hodgkin syndrome is a rare form of anhi-

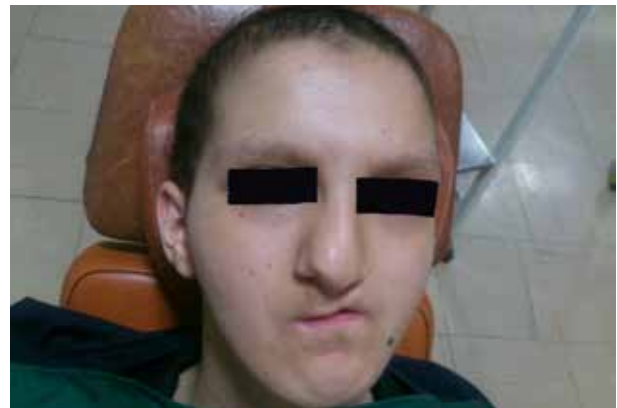
drotic ectodermal dysplasia in which patients have special appearances such as a high forehead, hypoplastic maxilla, low nasal bridge, small mouth and a thin upper lip. These features are present along with the clinical manifestations mentioned above (hypodontia, brittle hair, dysplastic nails, mid-facial hypoplasia and lacrimal duct anomalies) [10-11].

Case 1

A 15-year-old girl was referred to the oral and maxillofacial surgery department of Mashhad Dental School for cleft palate treatment. Her parents were normal with a non-consanguineous marriage. She was the second child of the family and had healthy siblings. Her height was 140cm and she weighed 44 Kg. Clinical examination revealed sparse scalp hair, extremely sparse eyelashes and eyebrows (Fig. A1), dry and drought skin and slow-growing, thin, malformed (dysplastic) nails (Fig. A2); also palmar and plantar hyperkeratosis (Fig. A3).

In Intra-oral examination she had dental anomalies such as missing, malformed and discolored teeth. Radiographic study showed no retained teeth (Fig. A4). Oral mucosa was normal but periodontal disease was noticed. Scars of a previous surgical cleft treatment were apparent on her lip, and she had a wide sagittal palate and alveolar cleft (Fig A5).

Her mental development was in normal limits and she had a normal educational status. The patient mentioned that her niece has similar clinical features but she did not visit us despite having called her parents several times. According to her clinical features, she was diagnosed as Rapp-Hodgkin syndrome. In this type of ED, the cleft palate becomes evident which differentiates it from other types. Her chief complaint was fistula in the palate and velopharyngeal dysfunction (hypernasality).



A1. Frontal view: Thin and sparse hair, distorted nose and upper lip due to cleft palate.



A3. Palmar and plantar hyperkeratosis.

Case 2

A 17-year-old male patient was referred to the oral and maxillofacial surgery department of Mashhad Dental School with signs such as sparse thin hair, heat intolerance, hypodontia, peg-shaped teeth, elongated forehead and creases and hyperpigmentation in the periorbital region (Fig B1, B2). His parents were physically normal with a non-consanguineous marriage. His sibling was also normal and no family history of this disorder was reported. Intraoral examination revealed missed teeth (he only had central incisor, canine and the first molar in each side of the maxilla, and canine and the second molar in each side of the mandible). Atrophic maxillary and mandibular ridges were also revealed. OPG showed no retained teeth (Fig. B3).

His syndrome was diagnosed as 'Hypohidrotic ectodermal dysplasia' which is X-linked recessive. The disorder is fully expressed in males only and is transmitted through the maternal X chromosome. It manifests as partial or complete absence of certain sweat glands, abnormal spars hair (hypotrichosis) and hypodontia [12].

His chief complaint was the abnormal appearance of his edentulous jaws which had caused teasing by his schoolmates. He asked for a partial denture of the maxilla and mandible; therefore the possible treatment plans were discussed with him. The final treatment plan was decided as dental implant of the posterior maxilla and partial denture of the mandible along with orthodontic and restorative treatment for achieving aesthetic goals in the anterior maxilla. Deficiency was diagnosed in the width and height of the maxillary alveolar bone and as the patient did not consent to an autograft, allograft bone blocks were used for reconstruction. Dental implants were inserted 6 months later (Fig B4).

Furthermore, there was a diastema in the maxillary midline which was closed with orthodontic treatment (Fig. B5). The final view of the anterior maxilla after orthodontic and restorative treatment is shown in Figure B6 and the final view of the maxilla after completion of all treatments is demonstrated in Figure B7.



B1. *Frontal view*: Elongated forehead, sparse scalp hair, wrinkles and hyperpigmentation in the periorbital region.



B2. *Dental anomalies*: Peg-shaped teeth, diastema between maxillary centrals and hypodontia.



B4. *Implant insertion* after reconstruction with allograft corticocancellous bone blocks.



B5. Diastema was closed by orthodontic treatment providing space for lateral implants in the future.

Discussion

Ectodermal dysplasia is a rare abnormality which can affect both ectodermal and mesodermal structures [1]. It was first described in 1848 by Thuman whose diagnosis was based on lack of sweating, hypotrichosis and dental anomalies [5]. X-linked hypohidrotic ectodermal dysplasia is the most frequent form of ED caused by mutation in the ED gene which encodes the EDA-A protein [6].

HED is primarily characterized by partial or complete absence of certain sweat glands (eccrine glands), causing lack or diminished sweating (anhidrosis or hypohidrosis), heat intolerance, and fever; hypotrichosis and absence and/or malformation of certain teeth. Many individuals with HED also have characteristic facial abnormalities including a prominent forehead, a sunken nasal bridge (so-called “saddle nose”), unusually thick lips, and/or a large chin. The skin on most of the body may be abnormally thin, dry, and soft with an abnormal lack of pigmentation. However, the skin around the eyes may have hyperpigmentation and fine wrinkles, appearing prematurely aged [13]. HED is diagnosed during early childhood when characteristic dental and hair abnormalities become apparent and prompt further testing. Such diagnosis is based upon a thorough clinical evaluation, identification of characteristic physical findings, a detailed patient and family history, and specialized laboratory testing. In some cases, during the newborn period, heat intolerance, unexplained fevers, and/or extensive skin peeling may lead to an earlier diagnosis [14]. Treatment may require the coordinated efforts of a team of specialists who need to systematically and comprehensively plan an effective individual’s treatment. Such specialists may include pediatricians or internists, dermatol-

ogists, dental specialists, otolaryngologists, allergists, and/or other health care professionals. Early dental intervention and restoration is also important. Artificial teeth and/or other devices (prosthetics) may be used to replace absent teeth. Braces, bridges, dental surgery, and/or other corrective measures may be used to help correct dental abnormalities and ensure appropriate nutrition [15]. Bigeta et al. in 2003 reported 5 syndromic cases that had various dental malformations including hypodontia, enamel hypoplasia and multiple caries [16]. Our first case had similar complains such as microdontia, enamel hypoplasia and lots of decays. This syndrome must be distinguished from others with ectrodactyly-ectodermal dysplasia and orofacial clefts.

In a case report in 2012, a family presented with X-linked hypohidrotic ectodermal dysplasia with different orofacial manifestations. Male members had a classic phenotype with dental anomalies, hypohidrosis and craniofacial malformations. Carrier heterozygote members had lateral incisors agenesis [17].

Kim and Shin in 2010 reported a 5-year-old boy with cup-shaped ears, a broad nasal root, thin upper lip, mid-facial hypoplasia, coarse hair, and twenty-nail dystrophy. According to clinical examination and laboratory testing the patient was diagnosed as Rapp-Hodgkin syndrome. They stated that Rapp-Hodgkin syndrome can be differentiated from the other two ectodermal dysplasia syndromes with a cleft palate on the basis of key clinical features. EEC syndrome is characterized by ectrodactyly (abnormal development of the median rays of the hands and feet) whereas the AEC syndrome generally presents with a collodion-like membrane at birth and ankyloblepharon filiforme adenatum (strands of skin between the eyelids) [10].

Bougeard et al. studied two unrelated patients with Rapp-Hodgkin syndrome (RHS). The patients had healthy unrelated parents but their appearance showed signs of ED; genetic tests revealed mutation in the TP63 gene. They believed that RHS was the most likely diagnosis in both patients since they did not present either ankyloblepharon or ectrodactyly, which argues against the diagnosis of AEC and EEC [11].

In a study of ectodermal dysplasia, brittle skin has been reported as a rare autosomal dominant form of this syndrome caused by mutation in the PKP1 gene. This mutation results in brittle skin, erosion, patch, body and extremities sloughing, perioral inflammation, hypotrichosis, palmoplantar keratosis (with

painful slashes) and other ED anomalies [2]. Affected patients are susceptible to caries and gingivitis. In both cases, all basic characteristics of this syndrome in addition to the high risk of caries and morphological and structural malformations (enamel hypoplasia) were noticed which explains the special demands of treatment. Early management is indicated in such cases due to physiological and psychological reasons [18]:

1. Bone formation in the maxillary and mandibular sutures affects cranial base positions and missing teeth inhibit the new bone formation in vertical dimensions.
2. Alveolar defects as a result of anodontia decrease sufficient support for removable prosthesis [19].
3. Anodontia, speech defects and esthetics could cause social problems. Dental implants are a valuable way to solve the problem in affected patients.

Conclusion

Our first case was characterized by ED, improperly developed nails and lips and a cleft palate; so she was diagnosed as the Rapp-Hodgkin syndrome. The second case manifested the classical triad of hypohidrosis, hypodontia and hypotrichosis. He suffered from the most frequent form of ED named 'Hypohidrotic ectodermal dysplasia' which is X-linked recessive. Taken together, it can be concluded that patients with different ED manifestations have multiple problems and need multidisciplinary treatment.

Conflict of Interest

There is no conflict of interest to declare.

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Please cite this paper as:

Kazemian M, Razmara F, Ghadiri Moghadam N; Ectodermal dysplasia: A report of two cases. *J Craniomax Res* 2017; 4(2): 377-382