DENTAL PHENOTYPE IN A PATIENT WITH HYPOIDROTIC ECTODERMAL DYSPLASIA AND SEVERE IMMUNODEFICIENCY

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Abstract

Ectodermal dysplasia is a rare disease which affects at least two ectoderm-derived structures such as hair, nails, skin, sweat glands and teeth. The dentition is altered in number and shape.

A 14-year-old male patient with hypodontia, micrognathia, ankylosed teeth and conical shaped teeth was referred for examination, evaluation and treatment. The child exhibited the classic dental phenotype of Ectodermal Dysplasia plus a severe immunodeficiency. Radiographic examination revealed ankylosed primary molars. Ocular findings are reported.

Conservative dentistry to reduce the abnormal shape was carried out , and an ultrasound scaling every 4 months, with a strong follow up established. The child fulfilled a good occlusion.

Every 3 months the patient has been seen in our department for control of hard and soft tissue in the mouth and after 36 months the dental situation is very well accomplished by patient, family and dental staff.

Oral rehabilitation must be carried out at the earliest age possible in order to maintain and correct the oral functions, alignment, good occlusion and a good compliance in smiling and feeding.

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Introduction

Ectodermal dysplasias (Eds) refer to a group of inherited disorders involving dysplasia or absence of the ectodermal appendages[1]. The commonly known signs of nail dystrophy (onychodysplasia), alopecia or hypotrichosis (scanty, fine light hair on the scalp and eyebrows), and palmoplantar hyperkeratosis[2] are usually accompanied by a lack of sweat glands (hypohidrosis) and a partial or complete absence of the primary and/ or permanent dentition[3-6].

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Orofacial characteristics of this syndrome include hypoplastic conical teeth, underdevelopment of the alveolar ridges, frontal bossing, a depressed nasal bridge and protuberant lips[4-8].

The most frequently reported ectodermal dysplasia syndrome is X-linked recessive hypohidrotic ectodermal dysplasia[4-7,9] where males are usually more severely affected, and carrier females show a variable severity ranging from mild to severe because of X-chromosome inactivation[9,10].

The hypohidrotic/anhidrotic form of ectodermal dysplasia has been attributed to at least 4 genes (EDA1 [ectodysplasin]; EDAR [the EDA-A1 isoform receptor]; and EDARADD [EDAR-associated death domain]), with at least 3 modes of inheritance: X-linked recessive (OMIM 305100), autosomal dominant (OMIM 129490), and autosomal recessive (OMIM 224900).

Recently, the syndrome X-linked ectodermal dysplasia with immunodeficiency[11] (XL-ED-ID) (OMIM 300291) was described in patients with hypomorphic mutations in IKBKG (inhibitory B kinase gene), which encodes NEMO (nuclear factor B [NF- B] essential modulator) protein, the regulatory subunit of the IKK (I B kinase) complex. Mutations in the IKBKG gene NEMO can cause an heterogeneous group of disorders, including Incontinentia Pigmenti and Hypohidrotic Ectodermal Dysplasia and immunodeficiency with or without osteopetrosis and lymphoedema. Mutations of IKBKG are difficult to diagnose early in infancy, most of them presenting with manifestations of immunodeficiency[12].

We present the case of a 14-years-old boy with XL-ED-ID carrying the c.1167dupC mutation in the IKBKG gene and showing the characteristic dental features of the syndrome, jointly with a complex set of symptoms, who required a specific, non-invasive, dental treatment.

CASE REPORT

A 14 years old boy came to the attention of the Pediatric Dental Department of our Institute for Infancy after a long medical history, including bone marrow transplantation (BMT), recurrent colitis, blindness, progressive hearing loss, severe immunodeficiency[13].

After an oral examination the patient presented a scarce level of oral hygiene, caries and visible multiple tooth agenesis with consequent atrophy of the alveolar ridges, ankylosed teeth, with abnormal shape, especially in the crown, and in the frontal region conically shaped. All these clinical findings led us to the diagnosis of HED-ID.

An Orthopantomogram and Cephalometric radiographs were carried out showing a third skeletal class, the presence of permanent maxillary central incisors, primary maxillary lateral incisors conically shaped, primary maxillary first and second molars, permanent first mandibular molars, primary mandibular second molars ankylosed in the bone although asymptomatic, primary mandibular first molars, and 5 conically shaped mandibular teeth resembling primary incisors. (Figures 1,2)

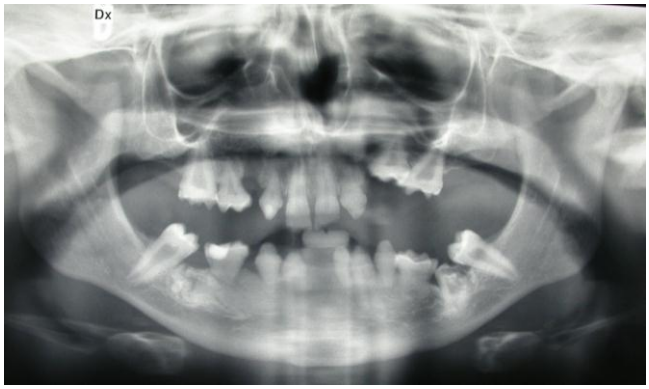

Figure 1. Orthpantomography showing ankylosed teeth, mesialisation of permanent mandibulary molars, and conical shaped teeth in the frontal upper and lower region**.**

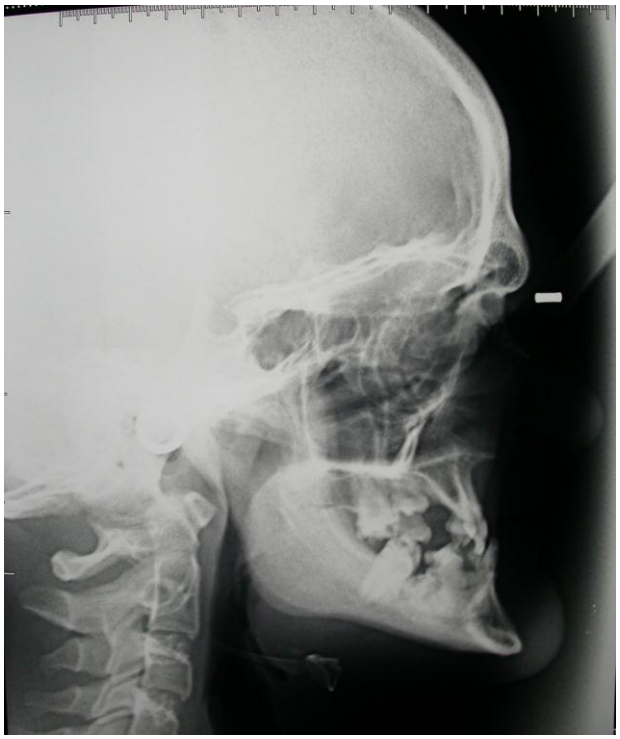

Figure 2. Cephalometry film showing a third skeletal class.

After a professional cleaning of the hard and soft tissue of the mouth with mouth rinsing and scaling by ultrasound ablation, in the second appointment, aesthetic dentistry[14] with multiple fillings have been carried out. In a period of 18 months we have been able to reach a satisfying aesthetic and functional result.

Whether still a skeletal third-like class was persisting, that is characteristic for patients affected by HED[15], a treatment therapy plan has

been discussed with the dentistry team and the patient's family.

The final aim to achieve a perfect occlusion was selective extraction of ankylosed teeth, extraction of primary teeth with almost complete root resorption, rapid expansion of the high narrow palate, and placement of implants in the edentulous region.

Ocular features

The past ocular history was significant for chronic uveitis and progressive retinitis in both eyes; because of these persistent inflammations the child underwent enucleation of right eye and lensectomy with pars plana vitrectomy of the left eye. At the last ocular examination the left eye was blind due to a persistent retinal detachment, and slit lamp examination revealed transparent cornea, deep anterior chamber, iridectomy with a slight pupil deformation (Figure 3).

Although various forms of ocular involvement have been reported in anhidrotic HED[16], in our case ocular findings were correlated to persistent ocular inflammation following to severe immunodeficiency without the usually related clinical condition.

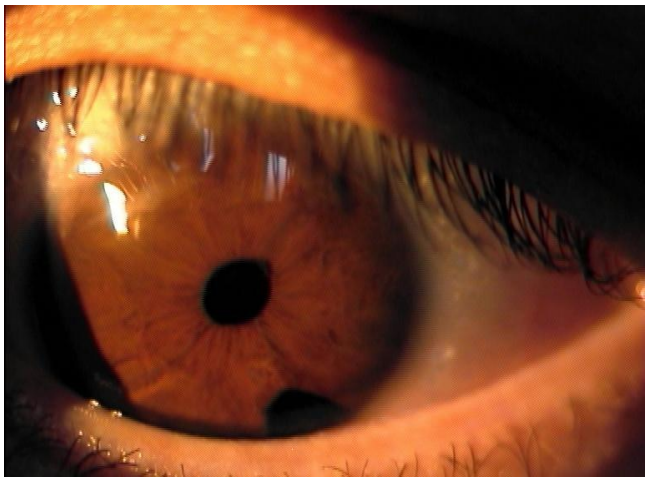

Figure 3. Transparent cornea, deep anterior chamber, miosis, slight pupil deformation, iridectomy, aphakia

Discussion

Ectodermal dysplasia is a rare, genetically transmitted, multisystem disorder. Diagnosis of ectodermal dysplasia, without any other diagnostic precision, would be difficult at best.

Steiner analyses are useful for revealing a facial height reduction and concavity[4], maxillar reduction, labial retrusion, chin prominence, nasolabial and chin reinforcement[4]. However the researchers should be in attention that these measures may be unreliable because they vary according to tooth agenesis and to the severity of ectodermal dysplasia. The consequence of the dental agenesis could curb bone growth[4].

All clincal signs give the ectodermal dysplasia cases a prematurely aged appearance. That is in agreement with previous research[4-6].

Several affected infants and children may also exhibit underdevelopment (hypoplasia) or absence (aplasia) of mucous glands within the respiratory tract and, in some cases, decreased lung capacity and function, potentially causing an increased susceptibility to certain infections and/or allergic conditions. A number of affected patients experience recurrent attacks of wheezing and breathlessness (asthma), and respiratory infections[4-6].

Considering the long medical history of our young patient who is now 16 year old, and his personal satisfaction with the actual dental situation, and along with the consent of the parents, in order to prevent any kind of further complains due to expansion of the palate and selective extraction under general anesthesia, the decision has been agreed for a strong follow-up with a 3 month dental control by maintaining the actual dental status and a daily careful tooth-brushing with fluoride toothpaste and mouth rinsing at a concentration of chlorhexidine below 0.05%.

A multidisciplinary approach is required in modern dentistry for diagnosis and treatment ectodermal dysplasia cases.

Conclusions

Ectodermal Dysplasia represents a large group of inherited disorders, with many gene mutations involved. Clinical findings and genetic counselling can lead to an early diagnosis.

This is an unique case in which conically shaped teeth, dry skin, sparse hair and an appropriate study of the Nemo gene has led us to the correct diagnosis and to the possibility of achieving a good compliance for the treatment.

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Declaration of Interest

The authors report no conflict of interest. The article is not funded or supported by any research grant.

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