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SHORT COMMUNICATION

Clinical features of incontinentia pigmenti with emphasis on oral and dental abnormalities

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Abstract One of interesting aspects in dermatology is the fact that skin may reflect the presence of anomalies in other organs and tissues. One such example is incontinentia pigmenti (IP), a rare, complex, X-linked genodermatosis. Clinical manifestations of IP according to evolution and prognosis can be considered as skin, as well as dental, eye, and central nervous system, changes. We have investigated a total of nine families with 25 subjects, 23 females and 2 males. In 12 female and 2 male subjects, all of them with clinical characteristics of IP, we observed the following abnormalities: teeth-shape anomalies (coni- or peg-like teeth), the presence of numerous cariotic teeth, early dental loss, delayed eruption, partial anodontia, and gothic palate. To our knowledge, this is the first time that the presence of gothic palate in patients with IP has been documented. As we found out, in two female subjects and one male subject, in which nonrandomed X inactivation did not occur, gothic palate could be supposed as characteristic of IP.

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Introduction

Incontinentia pigmenti (IP) is a rare, complex, X-linked genodermatosis in which skin changes are combined with anomalies of other organs. It appears almost exclusively in women and girls and is usually lethal in men [19]. Mutations of the NEMO gene localized on chromosome Xq28 are responsible for IP [13, 16]. Affected women and girls survive because of X chromosome dizygosity and negative selection of cells carrying the mutant X chromosome, and for this reason, the nonrandomed X inactivation pattern is often used to confirm the diagnosis [10].

Clinical manifestations of IP according to evolution and prognosis can be considered as skin changes and dental, eye, central nervous system, and bone changes [4, 6, 14]. Skin changes evolve through four stages [19]. Among patients with IP, 79.9% have one or more anomalies of other organs besides skin changes [3]. The presence of anomalies other than skin changes is sometimes of great importance if skin changes are discrete from the very beginning or during their evolution. They can be of great prognostic and diagnostic value because, unlike dermatological alterations, they will be present throughout the patient's whole life [5, 7, 9]. Dental abnormalities are most frequent and present in 60% of patients [5, 18]. Partial anodontia is present in 43% of patients [3]. Peg-like and conical-shaped teeth are the most frequent anomalies [20]. Eruption may be incomplete or late. In a patient with IP and dental anomalies, significant alterations in the mineralization of the teeth were observed [2]. The diagnosis of dental

changes cannot be given earlier than the age of 1 year [3]. If no other changes are present, dental changes among the family members could be enough to make the diagnosis of IP [6]. Early caries and general poor dental quality may be specific for both first and second dentition [20].

The aim of our study was to investigate the type and frequency of dental and oral changes in IP patients and to find out changes that were not described until now.

Patients and methods

We investigated total of nine families with 25 subjects, 23 females and 2 males, in the period 1989–2005. The selection of families was done according to criterion that typical clinical appearance and evolution existed at in least one member of the family (proband). We made pedigrees for all families. Probands were first examined by a dermatologist, due to obvious skin changes, and then sent to other specialists. Other examined subjects were related to probands.

In our investigation, five probands were younger than 60 days. As, in this age, eruption has not begun yet, data concerning teeth abnormalities were not available in these patients. Therefore, subjects older than 1 year were analyzed for dental abnormalities, while the probands younger than 60 days were not taken in further consideration and statistical analysis.

Results

Data concerning patients (age, sex, type of findings) and pedigrees of families are given in Fig. 1 and Table 1, respectively. All probands had classic skin changes that went through typical evolution from vesiculobullous through verrucolichenoid to hyper- and hypopigmented features. The examination of dental changes was performed in 20 subjects from nine families. We observed following abnormalities: teeth-shape anomalies [coni-like (Fig. 2a,b) or peg-like teeth (Fig. 2c)], the presence of numerous cariotic teeth (Fig. 2b), early dental loss, and other oral findings, such as delayed eruption, gothic palate (Fig. 2a), and partial anodontia.

Proband VA's mother and grandmother had caries. Proband CM (girl) had a gothic palate. Because of age in case of proband CM, there was no possibility for dental observation. Proband CM's mother had conical teeth of bad quality and with caries. She also had a gothic palate. Proband IJ had delayed eruption and peg-like teeth, and all of them had caries. Proband IJ's mother had peg-like canine teeth and a number of cariotic teeth. Proband IJ's mother's sister had conical teeth and problems with caries; because

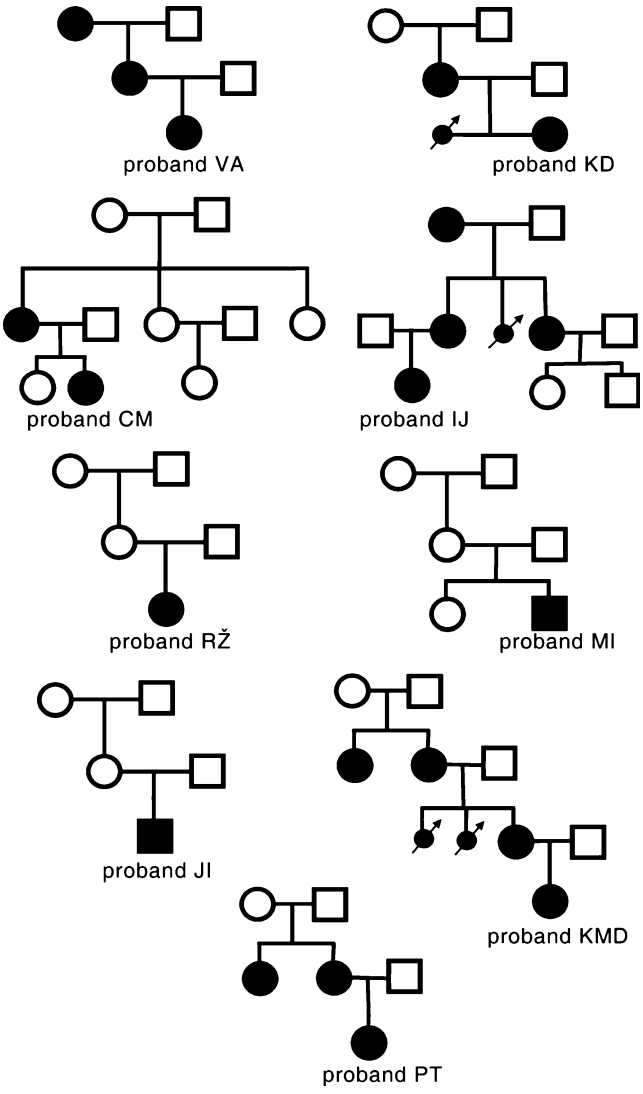

Fig. 1 Pedigrees of investigated families. Affected individuals denoted by *blackened symbols*. Miscarriage is denoted by a *black dot* with an *arrow*

of this, she had them all extracted in her twenties and had total prothesis. Proband IJ's grandmother had lost her teeth at the age of 23 due to poor quality, poor shape, and numerous cariotic problems. Proband MI (boy) had delayed eruption and partial anodontia. His teeth were conical and peg-like. The upper and lower premolars were missing all four lower incisors, and two right upper incisors and one left upper incisor were missing. The gums were inflamed. There was maxillar hypoplasia, progenia, and hypodontia. He also had a gothic palate. Proband JI (boy) had peg-like canine teeth and malformed insiders. Proband KMD's mother had numerous cariotic teeth. Proband KMD's grandmother had hardly any teeth and they were cariotic. Proband PT's mother had bad-quality teeth. Proband PT's mother's sister had partial anodontia and coni-shaped and

Table 1 Facts concerning basic subjects' data (age and sex) and key clinical findings

Family–subject	Age	Sex	IP-positive	Skin	CNS	Eyes	Teeth	Caries	Dental loss	Other oral findings
VA										
Proband	40 days	F	+	+	−	−	*	*	*	−
Mother	29 years	F	+	+	−	−	−	+	−	−
Grandmother	56 years	F	+	−	−	−	−	+	−	−
KD										
Proband	35 days	F	+	+	N	R	*	*	*	−
Mother	27 years	F	+	+	−	−	−	−	−	−
CM										
Proband	25 days	F	+	+	−	−	*	*	*	GP
Mother	23 years	F	+	+	−	−	+	+	−	GP
IJ										
Proband	5 years	F	+	+	−	−	+	+	−	DE
Mother	29 years	F	+	+	−	−	+	+	−	−
Mothers' sister	33 years	F	+	+	−	−	+	+	+	−
Grandmother	57 years	F	+	−	−	−	−	+	+	−
RZ										
Proband	22 years	F	+	+	−	−	−	−	−	−
Mother	44 years	F	−	−	−	−	−	−	−	−
MI										
Proband	9 years	M	+	+	−	−	+	+	−	DE, GP, PA
Mother	32 years	F	−	−	−	−	−	−	−	−
JI										
Proband	7 years	M	+	+	−	−	+	+	−	−
Mother	26 years	F	−	−	−	−	−	−	−	−
KMD										
Proband	39 days	F	+	+	−	−	*	*	*	−
Mother	20 years	F	+	−	N	MO	−	+	−	−
Grandmother	46 years	F	+	−	−	C, R	−	+	+	−
Grandmothers' sister	49 years	F	+	−	−	R	−	+	+	−
PT										
Proband	60 days	F	+	+	−	−	−	*	*	*
Mother	23 years	F	+	+	−	−	−	+	−	−
Mothers' sister	25 years	F	+	+	−	−	+	+	−	PA
Grandmother	49 years	F	+	+	−	−	−	+	−	−

Initials indicate the proband's family. Asterisks mean that data are not available because of the proband's age
C cataract, *DE* delayed eruption, *GP* gothic palate, *MO* microophthalmus, *N* nystagmus, *PA* partial anodontia, *R* retinal abnormalities

cariotic teeth. Proband PT's grandmother had bad-quality teeth.

In two investigated families, dental anomalies were not observed. Proband RZ, 22 years old, and her mother had no dental disorders, as well as proband KD's mother. Because of age in the case of proband KD, there was no possibility for dental observation.

Because of age, dental examination was done in only 20 of a total of 25 subjects of nine families. Considering the subjects' age, dental investigation was only possible in 20 subjects in our study; different dental and oral abnormalities were observed in 70% of the subjects (Table 2). All subjects, regardless of age, were checked for palate anomalies, and gothic palates were found in 3 out of 25 (12%).

Discussion

All of the examinees had typical changes for IP either on the skin or in other areas such as the teeth, eyes, and central nervous system, which is in accordance with other results in the literature [4, 6, 14].

Skin changes are the most obvious effects. Apart from the skin, the most frequently affected area is the teeth [6, 18]. The second most frequent findings were ophthalmological [8]. In our study, we have similar results: 70% of subjects older than 1 year had dental anomalies, while eye anomalies were present in 16% of subjects.

Our subjects' dental abnormalities were different from those of other studies, such as shape abnormalities, delayed eruption, partial anodontia, and poor quality in general with

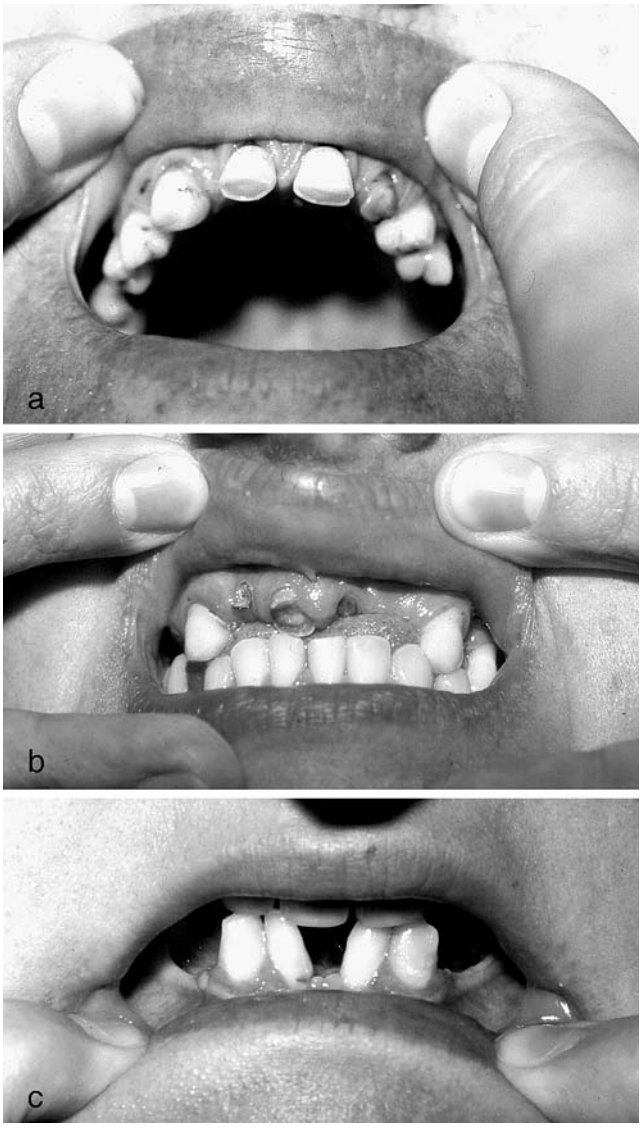

Fig. 2 **a** Gothic palate and coni-like teeth. **b** Cariotic and peg-like teeth. **c** Peg-like teeth

a number of cariotic teeth. According to literature data, the most frequent dental findings are partial anodontia in 43%, coni-like teeth in 30%, and all other dental findings [15]. Frequencies of different dental and oral findings in our subjects are given in Table 2.

Gothic palates were found in three investigated patients, one male and two females, members of two families. To our knowledge, this is the first time that the presence of highly arched gothic palates in patients with IP has been documented. Gothic palate was described in some hereditary diseases, like fragile X syndrome [1]. Nonrandomed X inactivation pattern in women and girls can lead to unusual examples of comorbidity [12]. However, as we found gothic palates in two female patients and one male patient, in which nonrandomed X inactivation did not occur, gothic palate could be considered as characteristic of IP.

Table 2 Frequencies of different dental and oral findings in investigated subjects

Finding	Number of patients	Percent of patients older than 1 year
Coni- or peg-like teeth	7	35
Cariotic teeth	10	50
Early dental loss	4	20
Delayed eruption	2	10
Partial anodontia	2	10
Gothic palate[a]	3	12[a]

[a] Gothic palates were observed among 25 subjects

Dental findings among family members where IP is present are sufficient for detecting the presence of the IP gene [6]. Thanks to this, it is easier to follow the pattern of inheritance in several generations [11].

The severity of skin lesions in the neonatal period is the reason why IP is more known by dermatologists then dentists [17]. Dermatologists are ideally placed to identify individuals with IP in early childhood because skin changes start nearly immediately after birth, and dermatologists should refer patients with indications of IP to proper medical specialists. As dental changes are the second most frequent finding in IP, especially in cases without skin changes, the role of dentists is very important. Although dental findings are not life-threatening, they may attract attention for further investigations because IP may sometimes be a very severe hereditary illness. It is important that children with IP gain access to specialist dental care, including orthodontics, prosthodontics, and oral surgery.

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