OPIS PRZYPADKU CASE REPORT

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Orodental anomalies and clinical description in 10 years-old girl with a partial trisomy 22q13->qter

Anomalie zębowe oraz obraz kliniczny 10-letniej dziewczynki z częściową trisomią 22q13->qter

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Key words

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Słowa kluczowe

trisomia 22q, cechy dymorficzne, anomalie zębowe, leczenie ortodontyczne

Summary

We report orodental manifestations and clinical description in a patient with a pure partial trisomy 22q13->qter. The 10 years-old girl was evaluated by the same physicians from the birth up to date. The main characteristic features of the patients consisted of severe psychomotor retardation, short stature, failure to thrive, heart defect, bilateral inguinal hernias and a set of peculiar dysmorphic features (microcephaly, maxillary retrognathism, long philtrum, small, low set and posteriorly rotated ears, down slanting palpebral fissures, epicanthal folds, ptosis and wide mouth fissure). The intraoral examination revealed class III malocclusion, narrow high-arched palate with clefting, narrow lower dental arch, delayed eruption of permanent dentition and teeth shape abnormalities. Panoramic radiograph showed congenitally missing permanent maxillary first molar on right side, maxillary lateral incisors and lateral incisor in mandible on right side.

Reports of dental anomalies along with detail dysmorphic features description in children with rare chromosome syndromes caused by autosomal trisomies are unique findings. Usually a clinical spectrum of such abnormalities consists of a wide range of other severe congenital malformations leading towards significantly reduced life expectancy. We stress the need of further detail presentation of dental problems in trisomy 22, because it is still a very rare event in medical publications.

Streszczenie

Głównym celem pracy jest prezentacja anomalii zębowych oraz obrazu klinicznego u 10-letniej pacjentki z częściową trisomią 22q13->qter. Do głównych objawów stwierdzonych u dziecka zaliczyliśmy: znacznie opóźniony rozwój psychoruchowy, niski wzrost, słabe przybieranie na masie, wadę serca, obustronne przepukliny pachwinowe oraz zespół wybitnych cech dysmorfii twarzy (małogłowie, retrognatyzm, długi odstęp nosowo-wargowy, małe, nisko osadzone i do tyłu zrotowane uszy, skośnie w dół skierowane szpary powiekowe, zmarszczki nakątne, ptoza powiek oraz szeroka szpara ust).

Badanie wewnątrzustne wykazało wadę zgryzu klasy III, wąskie wysokie podniebienie z rozszczepem podniebienia miękkiego, wąski dolny łuk zębowy, opóźnione wyżynanie zębów stałych oraz anomalie dotyczące kształtu zębów. Zdjęcie rtg pantomograficzne wykazało wrodzony brak zawiązków zębów stałych, w tym pierwszego zęba trzonowego po stronie prawej, bocznego siekacza prawego w obrębie szczęki oraz bocznego siekacza żuchwy również po stronie prawej.

Istnieją jedynie pojedyncze doniesienia o anomaliach zębowych łącznie ze szczegółowym opisem cech dysmorfologicznych u dzieci z rzadkimi zespołami chromosomowymi. Szczególnie rzadko opisywane są częściowe trisomie. Tłumaczyć to można tym, że za-

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zwyczaj do szerokiego spektrum cech klinicznych należą ciężkie wady wrodzone, które znacznie skracają przeżycie osób z tą aberracją chromosomową. Zwracamy uwagę na potrzebę kolejnych doniesień dotyczących anomalii zębowych w trisomii 22, które są bardzo rzadko opisywanym zjawiskiem.

INTRODUCTION

The genomic disorders associated with chromosome 22 are clinically quite well defined, but dental descriptions remain a rare finding. Trisomy of chromosome 22 belongs to a group of rare chromosomal aberrations in newborns. It was first well documented and described in 1971 by Hsu et al. (1). Trisomy 22 may exist in mosaic, complete non-mosaic or in partial forms. Complete trisomy 22 was seen commonly in spontaneous abortuses (2, 3). Among live births it has been rarely reported (4-7). The mosaic forms were described in several publications (8-10). It was observed, that mosaic trisomy 22 are compatible with better prognosis for survival, while complete non-mosaic are rather lethal. Dysmorphic features and clinical signs of patients with complete and mosaic trisomies were described in a several publications (10, 11). Phenotypic descriptions of partial trisomies are uncommon and usually they are very variable due to influence of other chromosome. Pure partial trisomies of chromosome 22 are rather rare findings (12, 13).

We present a 10 years follow-up of a unique patient with the pure partial trisomy 22q13->qter. Detail phenotype descriptions with emphasis on dental problems are of increased value. Dental abnormalities due to different chromosomal trisomies are rarely described because of a poor lifespan prognosis. It also requires a good cooperation between patient's family and many medical care providers (clinical geneticists, pediatricians, dentists, orthodonticians, cardiologists, etc.). We have not found any follow-up report regarding orodental problems in a child with trisomy 22.

In a child with genetic disorder is especially difficult to set up appropriate management of dental problems. Usually dental abnormalities come along with other birth defects (e.g. heart, gastrointestinal or CNS problems) and a variable degree of mental retardation. An appropriate treatment planning is essential in accuracy of diagnosis. Craniofacial growth charts are different among many genetic syndromes. Parental support and understanding of harmful because of intensity, frequency, and duration of treatment process is of great value. It is not possible in rare genetic disorders, where phenotypic spectrum is not well defined.

CASE REPORT

A female patient was admitted to genetic counseling unit at the age of one month due to a set of distinct dysmorphic features, hypotonia and other major congenital malformations. A girl was born from the second pregnancy, by normal vaginal delivery at the 37th week of pregnancy to young, healthy and non-consanguineous parents. IUGR (Intrauterine Growth Retardation) and polyhydramnions were detected in prenatal ultrasound examination at 28 weeks of gestation. Birth biometry was: weight 2440 g, length 47 cm, head circumference 32 cm, thorax circumference 30 cm and Apgar score 6. Cleft hard and soft palate, pes equinovarus, hypotonia and unusual face were described during first examination by a neonatologist. Respiratory distress syndrome was noticed shortly after birth. Hypoglycemia, hypocalcaemia, severe bilirubinemia and ASD III° were diagnosed at the 3rd day of life. Initially poor lifespan prognosis was given, but the girl was getting better from day to day. Finally she spent 10 days at the hospital. Intensive rehabilitation was used from the first days. She was operated for bilateral inguinal hernia and palate clefting during first 12 months of life. Gastroesophageal reflux was treated. Orthopedic intervention for pes equinovarus was necessary. Ophthalmological examination did not revealed typical cat eye sign. Strabismus and hyperopia were detected. She was operated for strabismus at the age of two years. Recurrent bilateral otitis media were noticed. Tympanometry revealed type B curve in right and left ear.

Genetic testing was suggested by clinical geneticist. Karyotype from lymphocytes was initially established as 46,XX, add(22)(p11) using standard GTG banding technique. Large satellites at the short arms (p) of chromosome 22 were detected. It was excluded by CTG banding. M-FISH (Multiplex Fluorescence in Situ Hybridization) testing confirmed that extra material on chromosome 22 comes from the same chromosome 22, because showed the chromosome 22 specific spectral signature. In further FISH analysis with 22q specific probes was evaluated that additional material was derivered from the long arm of chromosome 22. Final karyotype was: 46,XX,dup(22)(q13->qter) (fig. 1). Karyotypes of both parents were normal.

Her psychomotor development was delayed. She began to walk at 2 years, to say a few simple words and sentences at 4 years. Her psychological test at 6 years estimated her nonverbal intelligence as II = 57 (by Leiter P-93 scale), social development was below average IDS = 77 (by Doll scale). Her expressive language was retarded according AFA-scale. She underwent cardio surgical operation for ASD at the age of 10 years.

Orthodontic care management was started from the age of 4 years.

Detail dysmorphic evaluation was set up during last examination at the age of 10 years and compared to photographic documentation from the age of 5 years (fig. 2).

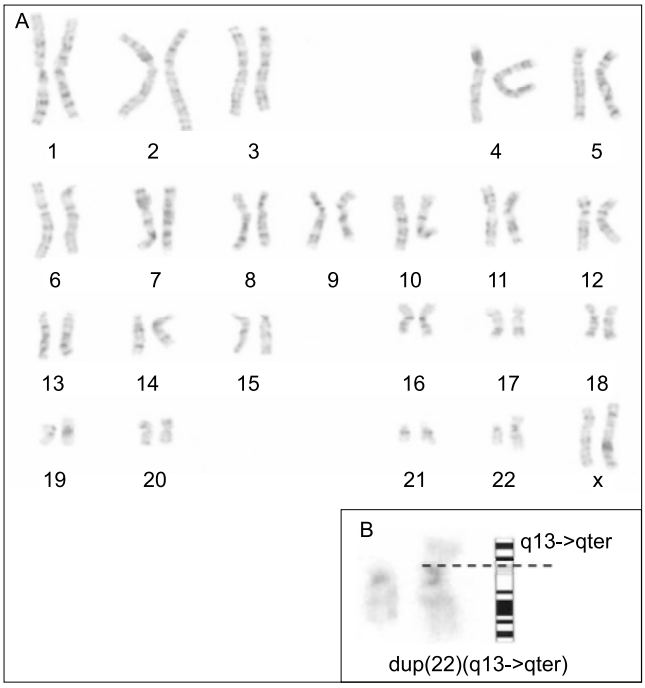

Fig. 1. (A) Karyotype and (B) partial karyotype of dup(22)(q13->qter).

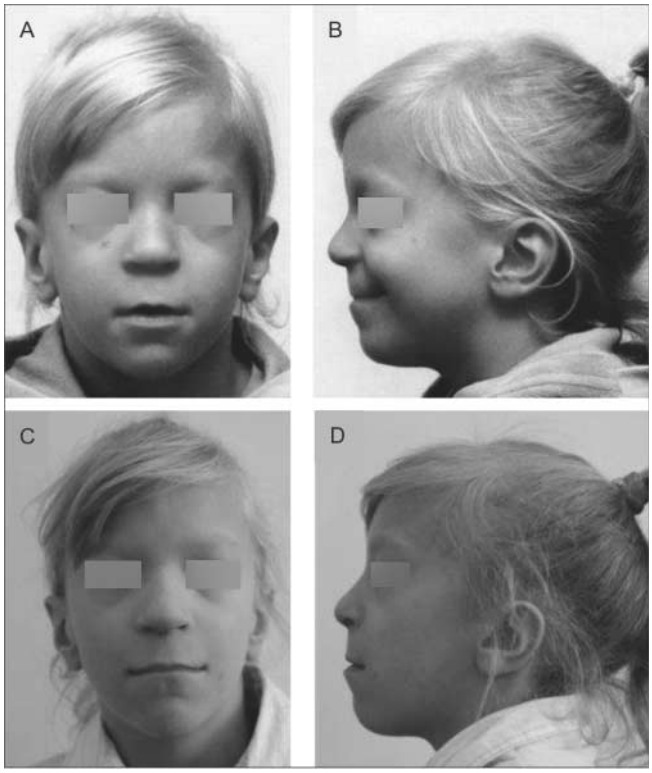

Fig. 2. The phenotype in a girl with a pure partial trisomy 22q13->qter- at the age of 5 and 10 years-old: (A) face (*en face*) 5 years old, (B) face (profile view) 5 years old, (C) face (*en face*) 10 years old, (D) face (profile view) 10 years old.

Head/skul (n = 6): microcephaly (48 cm, < 3 centile), narrow skull, high forehead, prominent metopic suture, high frontal hairline, thin scalp hair.

Face (en face) (n = 3): long, narrow face, bitemporal narrowing.

Face (profile view) (n = 5): small retrusive maxilla, low midface, long philtrum, straight profile.

Eye region (n = 9): broad intercanthal distance, epicanthal folds, ptosis, narrow, low palpebral fissures, sparse eyebrows and eyelashes, deep set eyes, strabismus.

Nose region (n = 5): broad nasal root, small nasal wings, broad interalar distance, small nares, broad nasal tip.

Mouth region (n = 9): receding maxillary region, long nasolabial distance, divergent philtrum columns, narrow mucous upper lip, everted mucous lower lip, long integumental lower lip, upturned mouth corners, narrow high-arched palate with clefting scarf.

Teeth (n = 4) teeth position irregularities, hypodontia, malocclusion, teeth shape anomalies.

In intraoral examination: class III malocclusion, anterior cross bite with -5 mm overjet, narrowed upper and lower dental arch, delayed eruption of permanent dentition and persistent deciduous teeth. The panoramic radiograph showed congenitally missing permanent maxillary right first molar, maxillary lateral incisors and lateral incisor in mandible on right side, elongated crowns and shortened roots of first molars (fig. 3). A lateral cephalogram shows maxilla retrusion (Na to A point -3.2 mm), obtuse nasolabial angle (111.4°), low midface lengh (68.5 mm), high mandibular plane angle (35.8°), retroclined maxillary incisors (-1.2 mm) (fig. 4, tab. 1) (14).

Ear region (n = 5): small, low set and posteriorly rotated ears, thick ear lobules, deep concha.

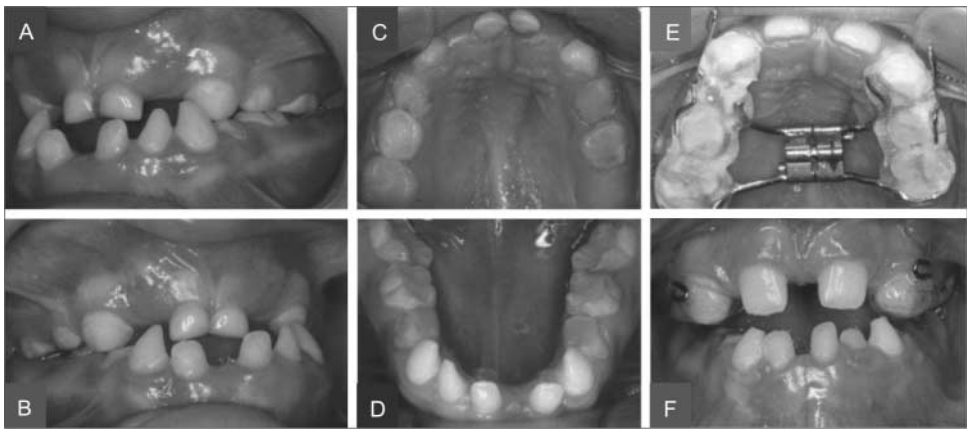

Fig. 3. (A-D) Pretreatment intraoral regions: delayed eruption of the permanent teeth. (E) First phase of treatment with bonded expansion appliance. (F) Patient after the first phase of treatment.

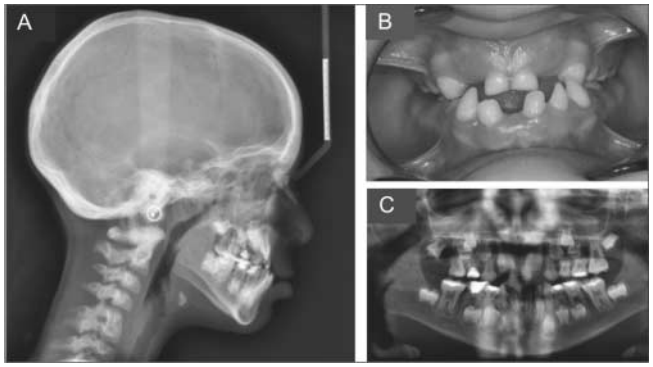

Fig. 4. (A) Pretreatment cephalometric radiograph: maxillary skeletal retrusion, obtuse nasolabial angle, low midface lengh (height), high mandibular plane angle, retroclined maxillary incisors. (B) Pretreatment intraoral photograph: persistent deciduous teeth. (C) Pretreatment panoramic radiograph: lack of 16, 12, 22, 42 teeth, prolongated crowns and shortened roots of 26, 36 and 46 teeth.

Table 1. Pretreatment cephalometric measurements (14).

Traits	Value	Average
Maxilla to Cranial Base		
Na to A point	-3.2	0.0+/-1.0
Nasolabial Angle	111.4	102.+/-8.0
Maxilla to Mandible		
Condylion to point A	68.5	80.0+/-4.0
Condylion to Gnathion	96.5	97.0+/-4.0
Difference Maxillary-Mandibular	28.1	17.0+/-4.0
Lower Anterior facial Height	59.4	57.0+/-4.0
Mandibular Plane Angle	35.8	26.9+/-4.0
McNamara Facial Axis	94.5	90.0+/-3.0
Mandible to Cranial Base		
Pg – Na Perpendicular	-6.1	-7.0+/-2.0
Dentition		
I to Point A	-1.2	5.0+/-1.0
I to A-Po	4.9	2.0+/-1.0
Airway Analysis		
Lower pharynx	13.7	12.5+/-3.0
Upper pharynx	15.8	17.5+/-3.0

Other (n = 9): low height 121 cm (< 3 centile), low weight 19 kg (< 3 centile), reduced subcutaneous tissue, short neck, long, narrow thorax, hypoplastic nipples, thin upper and lower limbs.

Treatment plan was set up in a few phases. In the first phase of treatment bonded expansion appliance for the maxillary expansion was placed with instructions to activate it every fourth day. For the second phase of treatment, face mask was applied to move the maxilla forward (fig. 3). A further treatment plan will depend on the maintenance of the results obtained in the first and second phase of treatment and the patient's health.

DISCUSSION

Comparisons of dysmorphic features and clinical traits in complete and mosaic forms were rarely made previously (10, 11). Pure partial trisomies 22q have been reported only in a few cases. An exclusively rare were trisomies of the distal region 22q13->qter (13, 17, 18). Characteristic features common for trisomy 22q13->qter patients were: IUGR, psychomotor retardation, microcephaly, micrognathia, cleft lip and, palate, low set, dysplastic ears. The majority of them were present also in our case.

Wieczorek et al. (13) described partial trisomy 22q13->qter in a 9-months-old girl, who was first suspected for Wolf-Hirschhorn syndrome. Another 3 years-old case of trisomy 22q13->qter was published by Mirza et al. (18). We found those patients to as the most similar phenotypicaly to our case.

Preauricular pits or tags, coloboma and anal atresia were absent in reported patients and also in three other cases with trisomy 22q13->qter (13, 18). They are hallmark features for complete trisomy 22 or trisomy of proximal region of 22q (3, 5, 7, 12, 19, 20).

Phenotypic manifestations for trisomy 22q13->qter were given, but detail orodental descriptions were not detected. Usually we can find them named in general as "dental problems". To the best of our knowledge, presented patient with pure partial trisomy 22q13->qter, is the first case of dental interest published to date. Our case is the oldest living child with such chromosomal abnormality. Long patient's life span, absence of severe congenital malformations and good cooperation between parents and medical care providers allows for better management.

The oldest reported patient with partial trisomy 22q11.2-q13.1 was 27 years-old man with moderate intellectual disability and a set of dysmorphic features. Only prognathism of lower jaw was mentioned as orofacial trait in that case (12).

Summarizing orofacial characteristics in our patient, as main characteristics we should point low midface lengh, maxilla retrusion, obtuse nasolabial angle, class III malocclusion, narrowed upper and lower dental arch, delayed eruption of permanent dentition and persistent deciduous teeth with missing permanent maxillary right first molar, lateral incisors and lateral incisor in mandible on right side, elongated crowns and shortened roots of first molars.

In this patient, orthodontic treatment in the first and the second phase was to minimize the problems of occlusion and allow the eruption of permanent teeth. Further treatment plan will depend on the maintenance of the results obtained in the first and second phase of treatment and the patient's growth and health.

Further detail descriptions of orodental problems and dysmorphic features in partial trisomy 22q13->qter are necessary for better syndrome delineation and appropriate management and dental care.

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