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SHORT COMMUNICATION

PARTIAL TRISOMY 9p(p22→pter) FROM A MATERNAL TRANSLOCATION 4q35 AND 9p22

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ABSTRACT

We present clinical and cytogenetic data on a 7-year-old female child with partial trisomy for 9p22→9pter as a result of a maternal balanced reciprocal translocation. Her karyotype was ascertained as 46,XX,dec(4)t(4;9)(q35; p22)mat. The father had a normal karyotype, while the mother had an apparently balanced translocation involving chromosomes 4 and 9 [46,XX,t(4;9)(q35;p22)]. This case will be briefly compared with other published cases of a similar translocation.

Key words: Chromosome 9; Partial trisomy 9p; Maternal translocation

INTRODUCTION

Trisomy 9p is the most common autosomal syndrome after trisomies 21,13 and 18, whose main clinical features include psychomotor retardation, microcephaly and brachycephaly, enophthalmos, antimongoloid eye slant, hypertelorism, abnormal ears, globulous nose, downward slanting mouth, hypoplasia of phalanges and abnormal palmar creases [1]. Here we compare a new case of partial trisomy 9p due to a maternal balanced translocation with similar cases from the literature.

CASE REPORT

A 7-year-old female child was referred to our laboratory for chromosome studies because of her hyperactivity. Her weight was 16 kg (-2.732 SDS) and her height was and 107 cm (-2.762 SDS) at the time of examination. She was the only child and born from consanguineous parents (second degree cousins), at term by natural delivery. Her birth weight was 2600 g (–1.834 SDS). She had developmental delay at all developmental stages including lifting her head, sitting up and speech.

Examination revealed hair growth down to her eyebrow region, an unusually big mouth and normal tongue, protrusion of the forehead bones, protrusion of the left bridge nose, and protrusion of the left upper lip. She also had a mild hearing impairment. She was mentally retarded and needed to attend special school (IQ had not been measured).

CYTOGENETIC STUDY

Cytogenetic analysis of phytohemagglutinin (PHA)-stimulated peripheral blood leukocytes was performed using a standard protocol [2] and additional

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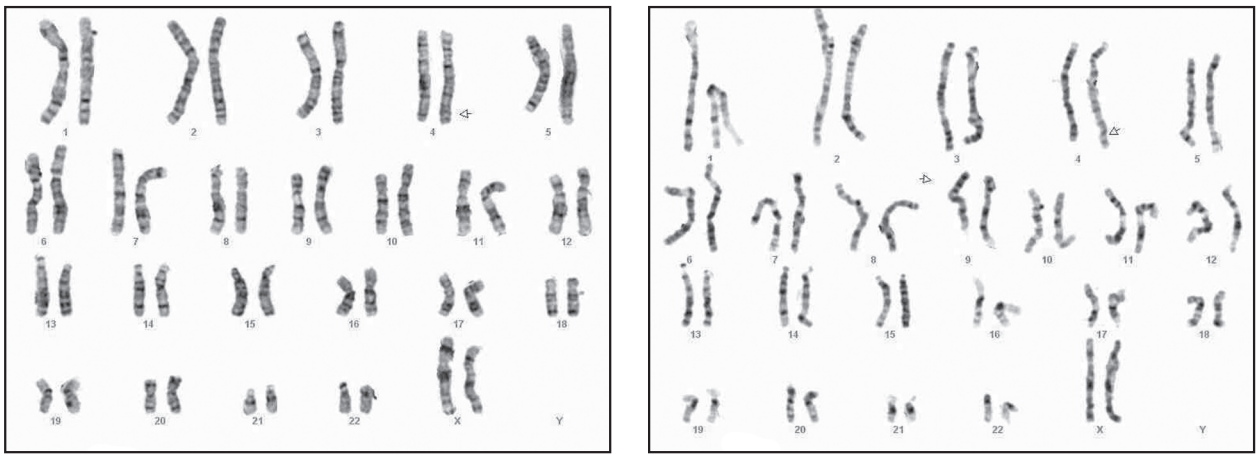

Figure 1. A) The karyotype of the patient; the arrow shows the abnormal chromosome 4.
B) The karyotype of the mother; the arrows show the abnormal chromosomes 4 and 9.

material on the short arm of chromosome 9 was detected in all cells analyzed (Figure 1A). Chromosomal analysis of her father revealed a normal karyotype but that of her mother had an apparently balanced translocation between chromosomes 4 and 9 [46,XX,t(4;9)(q35;p22)] (Figure 1B). The patient's karyotype was ascertained to be 46,XX,dec(4)t(4;9)(q35; p22)mat.

Many patients with duplications and trisomies of 9p have been reported. These are summarized in Table 1.

The female patient of Jelin *et al.* [3] had microcephaly and an incomplete bilateral cleft lip and palate, bilateral single palmar creases, and fifth digit brachydactyly; cytogenetic analysis revealed a partial trisomy 9p21.1→9pter and a deletion of 9p12.1 to 9p11.2. The male patient of Rossi *et al.* [4] had a partial trisomy of the 9p24 region and presented with oropharyngeal dysphagia and the common clinical signs of trisomy 9p syndrome such as microcephaly, micrognathy, brachycephaly, bulbous nose, down turned oral commissures, malformed ears and feet, and hypotonia.

The six patients of Wang *et al.* [5]reported a proband with a partial trisomy 9p as a result of a translocation between chromosome 4q35 and 9p22. The cases had mild facial and little finger anomalies and mental retardation. The five patients reported by Temtamy *et al.* [6] had *de novo* trisomy/duplication of 9p between regions p21 and p24 and exhibited growth retardation, severe intellectual disability, high broad forehead, low-set ears, hypertelorism with downslanting palpebral fissures, bulbous nose, down turned corners of the mouth, and hand and foot anomalies. A boy with a extra segment of the end of chromosome 9p from a maternally-inherited translocation t(4;9)(q31;p24) had mental retardation, delayed motor development (in holding up head, sitting, walking and speech) and facial dysmorphisms included long slant of palpebral fissures, broad space between the eyes, depressed nasal bridge, a globular nose with small nares and long philtrum [7].

Trisomy 9p has also been reported in adult and even elderly people. For example, Ricart and Pareja [8] reported on a 50-year-old mentally retarded woman with dysmorphic facies, severe cerebral malformations, limb deformities, retarded sexual maturation. Partial trisomy 9p cases have also been reported in prenatal patients. These include a fetus with a duplication of the 9p22.1p24 chromosomal region and many common features of trisomy 9p such as major growth retardation, microcephaly and microretrognathia[9] and a fetus with partial trisomy 9p (9pter→p11.2) who exhibited Dandy-Walker malformation and ventriculomegaly on prenatal ultrasound in the second trimester. In the third case referred to Chen *et al.* [10], suggested that a dosage effect of genes located on 9pter→p11.2 may be associated with abnormal development of the central nervous system in patients with partial or complete trisomy 9.

In general, the results of Panasiuk *et al.* [11] on carriers with a breakpoint position at 9p22, at 9p13 and at 9p11.2 showed that reciprocal chromosome translocations involving the short arm of chromosome 9 as a risk factor of unfavorable pregnancy outcomes. There are other reports that confirm facial malformations in trisomy 9p patients[12-22].

From the data presented in Table 1, we suggest investigation of the 9p24 region for genes that could be

Table 1. Clinical findings of patients with partial trisomy/duplication of 9p

Region	Sex-Age	Mouth	Nose	Ears	Lips	Eyes	Other Facial Anomalies	Ref.
46,XX,dec4,t(4;9)(q35;p22)mat	F-7	unusually big mouth (macroglossia)	protrusion, left bridge	malformed ears	protrusion, left upper lip down turned	–	protruding frontal bone, hair growth down to the eyebrow region	This
Partial trisomy 9p21.1→9pter and a deletion of 9p12.1 to 9p11.2	F: at birth	bilateral cleft palate	–	–	bilateral cleft lip	–	narrow forehead	3
46,XY,der(9)t(9;15) (9p24;9q11::15q11;15q26),-15	M: at birth	down turned oral commissures	bulbous nose	malformed ears, low-set ears	–	hypertelorism, bilateral epicanthic fold	–	4
46,XY,der(21)t(9;21) (9p22;2;21q22.3)pat (six patients/23 member family	M-F	–	–	–	–	–	mild facial anomalies	5
trisomy/duplication of 9p between regions p21andp24 (five patients)	M-F	down turned corners of the mouth	bulbous nose	low-set ears	–	hypertelorism with down-slanting palpebral fissures	high, broad forehead	6
46,XY,t(4;9)(q31;p24)	M-1	–	nasal bridge, globular nose with small nares	–	long philtrum	long slant of palpebral fissures, broad space between the eyes	–	7
47,XX,(9p+)	F-25	corners of the mouth	–	low-set ears, cup-like simple ears and down turned	midfacial, hypoplasia	bilateral simian palmar creases, epicanthic folds, hypertelorism	–	8
46,XY,invdup(9)(p22.1p24) (34-week fetus)	M	–	–	low-set	short upper philtrum	hypertelorism	–	9
46,XX,der(12)t(9;12)(p11.2;p13.3)mat	F-5	large mouth with down turned corners	–	low-set malformed ears	–	hypertelorism, deep-set and down slanting eyes	–	10
47,XX,+9p	F-50	–	–	–	–	–	dysmorphic facies	12
[46,XY,dup(9)(p13p24)]	M-3 mths	–	broad base of the nose	–	–	hypertelorism	–	13
[46,XX,dup(9)(p22p24)]	F-9	narrow mouth	a prominent, wide nose with a high nasal bridge	–	short, wide philtrum with thin upper lip	deep-set eyes, small palpebral fissures	midfacial flattening mild micrognathia	14
46,XX,der(13) t(9;13)(p11; q10) (wcp9+, wcp13+)	F-6 mths	mouth "V"	–	low-set ears	–	inverted convergent strabismus	craniofacial asymmetry	15
46,XY,add(16)(qter),Ishder(16) t(9;16) (p21.1;qter) (tel16p+/16q+tel/tel9p+)		corner of mouth in "V"	–	low-set ears	thin upper lip	inverted convergent strabismus hypertelorism	mandibular hypoplasia	15
47,XX,der(14)t(9;14)(p21;q13)mat	F: at birth	down turned corners of the mouth	bulbous nose, hypoplastic nares	low-set, malformed ears	thin upper lip	slight epicanthus, slightly downward slanting eyes	craniofacial dysmorphias, such as thin hair and strabismus	16

Continue

Table continued

47,XX,der(14)t(9;14)(p21;q11.2)mat	F: at birth	protruding tongue	bulbous nose	low-set ears	–	slight upward slant to the deep-set eyes, hypertelorism	–	16
46,XY,t(5;9)(p.13.3;13.1)	M-2	down turned corners of the mouth	large nasal bridge	low-set ears	–	hypertelorism, downward slanting palpebral fissures	–	17
47,XX,+9pter+q22	M: at birth	–	–	–	–	antimongoloid slant of palpebral fissures	–	18
trisomy 9p with de novo t(9;15) and 9p isochromosome	M-4	downward slanted corners of the mouth	–	–	an everted lower lip	palpebral fissures	–	19
46,XX,der(9)(p22→p24.2::p24.2→pter)	F-20	down turned mouth	bulbous nose	low-set ears	short philtrum, thick lips	deep-set eyes	–	20
46,XY,-7,der(7)t(7;9)(q36;p12)pat	M-4	high arched palate	–	–	–	–	cyclopia	21
46,XY,der(9)t(9;13)(9p;13p)	M	–	–	–	–	–	dysmorphic facies	22

responsible for some of the facial malformations such as those of the nose, mouth and ear, as in our patient, and in many cases with the partial trisomy 9p24. We also suggest that a region in 9p may contain a gene(s) responsible for the common features of partial trisomy/duplication 9p such as antimongoloid eye slant, abnormal ears, a globulous nose and downward-slanting mouth.

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