

Deletion 9p and duplication 17p due to a translocation $t(9;17)(p23;p13)pat$

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ABSTRACT

A patient with partial monosomy 9p and partial trisomy 17p derived from a paternal translocation $t(9;17)(p23;p13)$ is described. His phenotype is close to that found in 9p monosomy syndrome.

INTRODUCTION

Monosomy 9p is a well-described syndrome with at least 90 cases reported in the literature (Huret *et al.*, 1988; Nagy *et al.*, 1991; Teebi *et al.*, 1993) while trisomy 17p appears to be a rare condition, with just nine cases in the literature (Latta and Hoo, 1974; Bartsch-Sandhoff and Hieronimi, 1979; Jinno *et al.*, 1982; Feldman *et al.*, 1982; Rethoré *et al.*, 1983; Martsolf *et al.*, 1988; Schrandner-Stumpel *et al.*, 1990; Spinner *et al.*, 1993; Köhler *et al.*, 1994).

Translocations involving both chromosomes 9 and 17 are rarely found in the literature (Lindenbaum *et al.*, 1985; Stengel-Rutkowski *et al.*, 1988; Daniel *et al.*, 1989). We studied a patient affected by partial monosomy 9p and partial trisomy 17p derived from a paternal translocation $(9;17)(p23;p13)$. The clinical picture of the patient was compared with that found in monosomy 9p and trisomy 17p.

CLINICAL REPORT

Clinical data

L.S.P., a white Brazilian boy, was born after an uneventful pregnancy, from healthy and nonconsanguineous parents. The mother was 26 years old and the father was 29 years old at the time of conception. The boy, the product of his mother's first gestation, was delivered at term through a C-section. Birth weight was 3670 g, length was 47 cm and occipital frontal circumference was 33 cm (all values in the normal range). At birth a peculiar face, minor anomalies and a heart murmur were noted. A ventricular septal defect (VSD) was diagnosed. Since the neonatal period the patient has had feeding problems, with persistent vomiting. These problems continued, along with failure to thrive, several bronchopulmonary infections and highly delayed psychomotor development. At the age of six months gastroesophageal reflux plus deglutition incoordination were diagnosed. At two years of age (Figure 1), when we started studying the patient, his physical examination showed: weight, 5680 g, height, 73 cm and cephalic circumference, 44 cm (all these values below the 5th percentile). There was microbrachycephaly (cephalic index = 86.6), frontal prominence and bilateral temporal depression; a peculiar, slightly asymmetrical and triangular face; frontal and facial hirsutism and

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synophrys; bushed eyebrows and big eyes; ocular hypertelorism with the outer canthal distance in percentile 97 and inner canthal distance above percentile 97; epicanthus; lightly blue sclera, strabismus and horizontal nystagmus; slight exophthalmia; small nose and anteverted nares; smooth and long philtrum; high narrowed palate; normal teeth and a thin upper lip. Microretrognathia was also present. The ears were slightly posteriorly angulated, prominent and simplified, with hypoplasia of the helices and absent lobules. The neck was short,

as was the sternum. Heart auscultation revealed a systolic murmur $++/6$. The abdomen was normal. Genitalia were male and both testes were present in the inguinal canal. The patient had normal proportions and normal extremities. The right fifth toe was short and proximally implanted. There were bilateral transverse palmar creases and whorls in all the digits of the hands.

There was hypotonia and a severe delay in development. At two years of age the patient was still unable to sit. At this time he had the bone age of a newborn. An abdominal ultrasonography did not show any visceral anomaly. Cardiac evaluation confirmed the VSD, without hemodynamic repercussion. An ophthalmological examination revealed hypopigmented retina. At this time a gastrostomy was performed. After the gastrostomy, the boy started gaining weight and showed improvement in general health. At 2 years 6 months an audiometric evaluation suggested an auditory deficit. The boy started to sit without support at 2 years 9 months. Now he is five years old and the gastrostomy has already been closed. He sits without support and started to say some words. He has generalized hyporeflexia and hypotonia.

Cytogenetic study

G- and R-banding identified chromosome 9 to be derived from a paternal balanced translocation (9;17)(p23;p13) (Figure 2). The mother's chromosomes were normal. Paternal grandparental chromosomes were also normal. The patient's karyotype can be described as 46,XY,-9,+der(9),t(9;17) (p23;p13)pat, which



Figure 1 - Frontal and lateral view of the patient.

results in a partial monosomy 9pter \rightarrow p23 and partial trisomy 17pter \rightarrow p13.

DISCUSSION

Since unbalanced offspring produced by carriers of a particular reciprocal translocation almost always result from the same meiotic segregation mechanism, individuals with the translocation (9;17)(p23;p13) are at risk for unbalanced offspring after 2:2 adjacent-1 segregation. This will result in double segment imbalance, i.e., trisomy or monosomy of the segment distal to the breakpoint in one chromosome arm and monosomy or trisomy of the segment distal to the breakpoint in the other chromosome arm. The risk of imbalance at birth can be evaluated according to the most viable mode of imbalance (Jalbert *et al.*, 1980), to the length in R-bands contained in the translocated segments (Cans *et al.*, 1993), and to the viability of the potential imbalances resulting from the translocation (Cohen *et al.*, 1994). For the present translocation, based on empirical data, the mean risk for an unbalanced offspring is around 1.4% (Stengel-Rutkowski *et al.*, 1988).

The literature shows that patients with monosomy 9p as a sole abnormality exhibit trigonocephaly, upward slant of palpebral fissures (more pronounced than in cases of trisomy 21), long philtrum, short nose, short broad and webbed neck, dolicocephalangy, and excess of whorls on the fingers. Among the cases with one associated unbalanced segment, trigonocephaly, long philtrum, dolicocephalangy, inguinal as well as umbilical hernias are often encoun-

tered (Huret *et al.*, 1988). Our patient does not show trigonocephaly and upward slant of palpebral fissures, but a number of his clinical manifestations are the same as 9p monosomy.

The frequency of unusually long fingers and toes has been estimated to be 82% in patients with monosomy 9p syndrome (Young *et al.*, 1983). However, a clinical impression of an increased phalangeal/metacarpal ratio (Serville *et al.*, 1976), indicative of a dolichomesophalangy, was not consistently observed (Young *et al.*, 1983; Al-Awadi *et al.*, 1988). The hand measurements of our patient at 2 years 9 months were below the 3rd percentile and the middle finger (3.5 cm) was even shorter than the hand (9 cm).

Gastroesophageal reflux has been observed twice in patients with ring chromosome 9 (Manouvrier-Hanu *et al.*, 1989). The same observation in the present case is probably coincidental, since this symptom was not described in other cases of ring chromosome 9 or monosomy 9p.

Some patients with 17p duplication have a remarkably similar facial phenotype, with a long face, downslanted palpebral fissures, long philtrum and open mouth (Bartsch-Sandhoff and Hieronimi, 1979; Feldman *et al.*, 1982). These signs, associated with intra-uterine growth retardation and flexion deformities, are the main distinctive characteristics in this syndrome (Spinner *et al.*, 1993). The facial features observed in our patient are clearly different from those presented in patients with 17p trisomy, being closer to those found in 9p monosomy syndrome.

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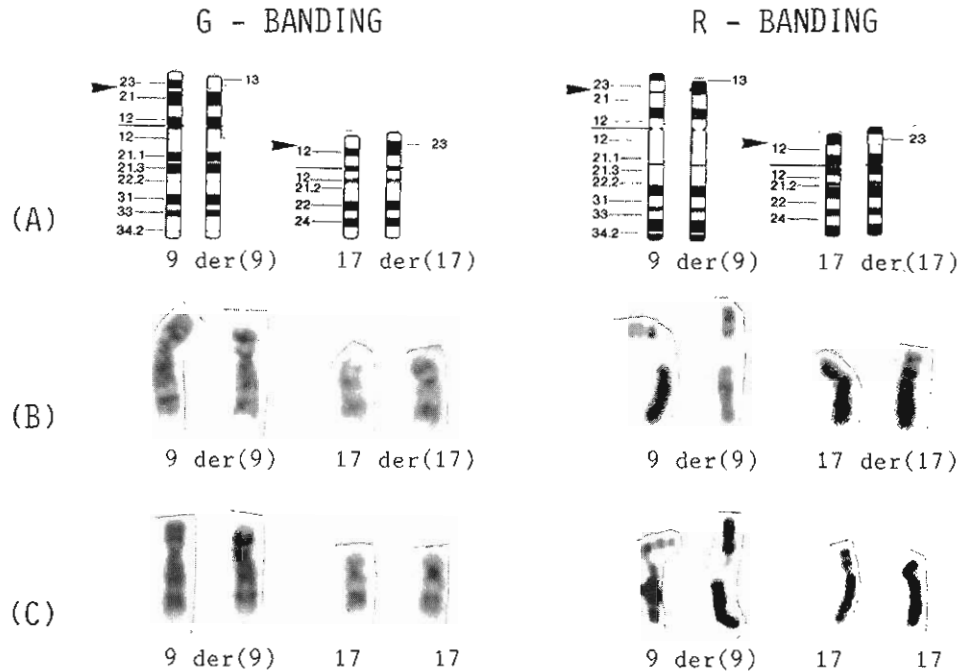


Figure 2 - Partial karyotypes (in G-banding and R-banding) showing (A) an ideogram of chromosome pairs 9 and 17 involved in $t(9;17)(p23;p13)$ found (B) in a balanced form in the patient's father and (C) in an unbalanced form in the patient.

RESUMO

Relatamos o caso de um paciente apresentando monossomia 9p e trissomia 17p parciais decorrentes de uma translocação equilibrada paterna $t(9;17)(p23;p13)$. O fenótipo resultante no paciente assemelha-se mais ao observado na síndrome da monossomia 9p.

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