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Trisomy 5q15-q31 due to maternal insertion, ins (6; 5) (q21; q15q31)

Magda Osztovics, P. Kiss

Cytogenetics Section, National Institute of Public Health and Apáthy Children's Hospital, Budapest

A female child with dystrophy, psychomotor retardation and dysmorphic signs was seen at the age of 20 months. The phenotypic abnormalities were attributed to 5q15–q31 trisomy that was inherited from an insertion, ins (6; 5) (q21; q15q31) of the mother.

Since the original report by Ferguson-Smith et al. (3) of a partial trisomy 5q, 13 further cases have been published (1, 2, 4, 5, 6, 7, 8). In this paper we describe another case of partial trisomy of the long arm of chromosome 5, associated with an abnormal phenotype. Furthermore, we compare the clinical features of all the 15 patients who have been observed till now.

Case Report

E. V. a female patient was born after an uneventful pregnancy at the 38th week of gestation as the second child of her parents. At the time of her birth, her mother was aged 22 years, her father 25 years. The first child of the couple is a healthy, normal boy, who was born two years earlier. The maternal grandmother had 8 pregnancies, one of which ended in stillbirth. No other events worth mentioning had occurred in the family.

Delivery took place without complication and there was no perinatal problem. Birth weight was 2400 g, body length 40 cm, head circumference 37 cm. The child was first seen at the age of 20 months. At that time, the clinical investigations showed a dystrophic patient. Her weight was 7000 g, her length 78 cm, the head circumference 39 cm. All these parameters were under the 3rd percentile value.

The probanda (Fig. 1) had a brachycephalic skull with facial asymmetry. Her flat face and bulbous nose resembled those of the mother. The upper lip was small and moderate macroglossia could be observed. On the left hand, ectrodactyly and on the right feet symbrachydactyly was present (Figs 2–5).

The child was hypotonic and could not stand or sit without help. Psychomotor development was retarded. Heart catheterization revealed a patent ductus arteriosus with pulmonary hypertension.

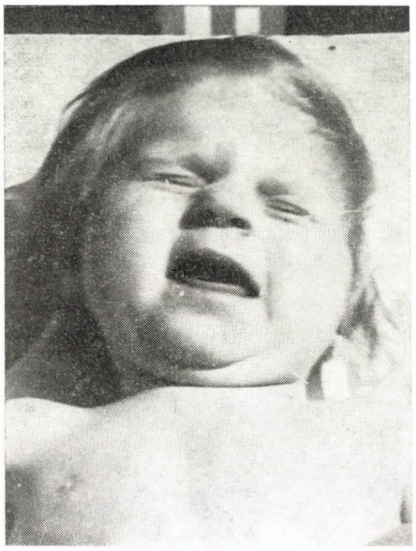

FIG. 1. The patient at 20 months of age

CYTOGENETIC FINDINGS

Slides from routinely cultivated blood cells were stained for GAG banding. In all investigated metaphases an abnormal chromosome 6 was found (Fig. 6). The father's cells showed a normal karyotype, while in the metaphases of the mother an insertion between the long arms of chromosome 5 and 6 was observed; the segment q15–q31 of the long arm of chromosome 5 was inserted into the long arm of chromosome 6 at the q21 point (Fig. 7).

The karyotype of the mother could be interpreted as 46, XX, ins (6;5) (q21; q15q31). The karyotype of the

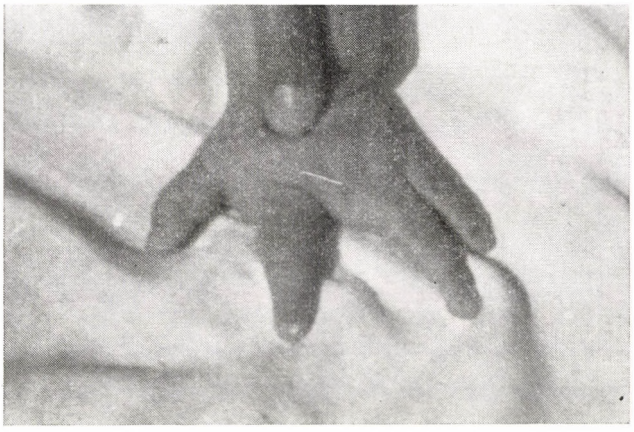

FIG. 2. Left hand of the patient

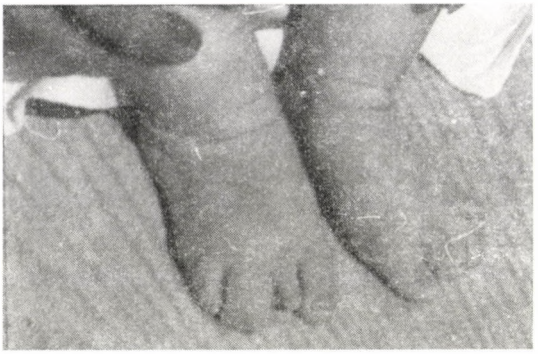

FIG. 3. Feet of the patient

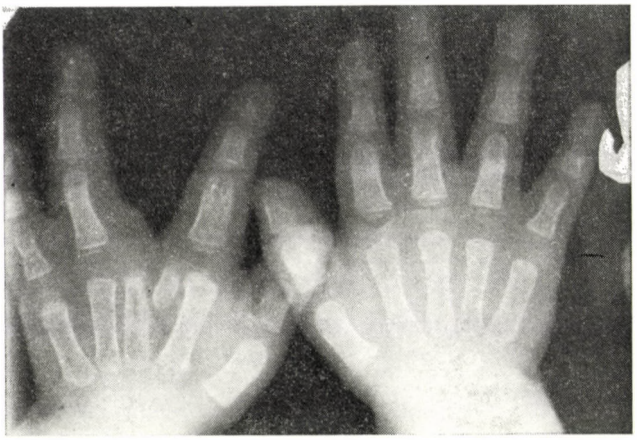

FIG. 4. X-rays of the hands. Right hand: normal osseus development. Left hand: the 3rd finger is missing, only a hypoplastic intrametacarpal mid-phalanx and a small metacarpal bone are present

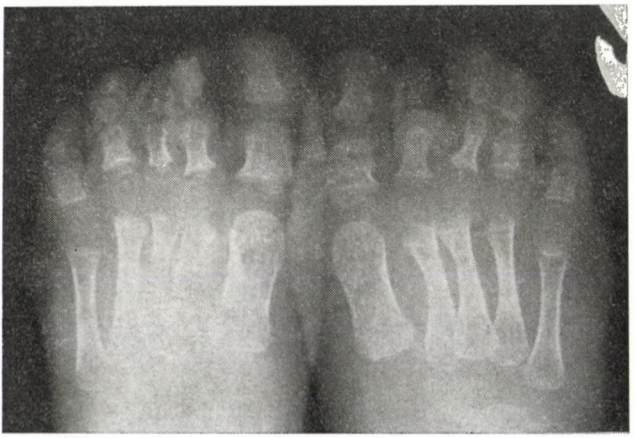

FIG. 5. X-rays of the feet. Right foot: the distal phalanx of the 2nd toe is missing. A complete cutaneous syndactyly between the 3rd and 4th toes is seen. The distal phalanges of the 3rd, 4th and 5th toes are hypoplastic

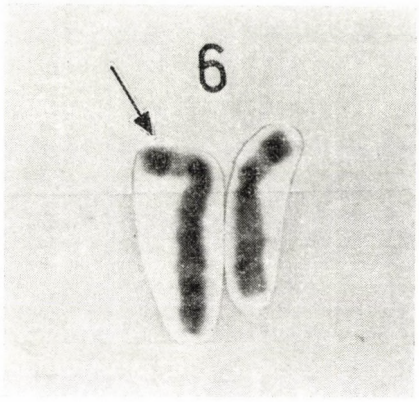

FIG. 6. The abnormal chromosome 6 of the probanda

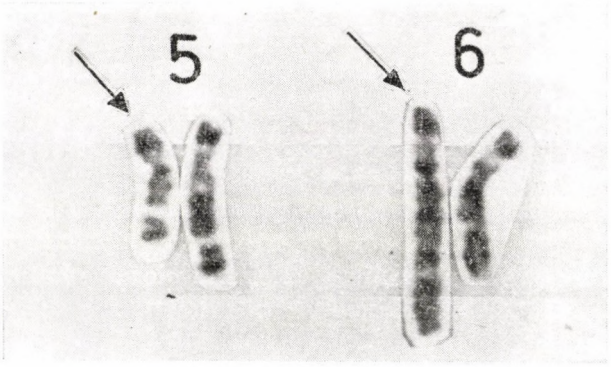

FIG. 7. Chromosomes 5 and 6 of the mother

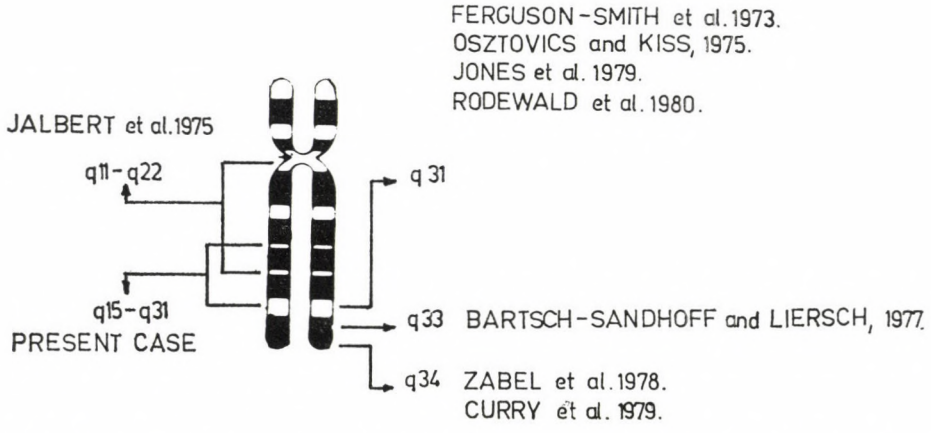

FIG. 8. Distribution of the breakpoints defined in 9 index patients with 5q trisomy

probanda was 46, XX, −6, der (6) (6pter–q21::5q15–q31::6q21–qter) mat. According to the cytogenetic analysis the patient has a 5q15–q31 trisomy.

Discussion

Fifteen cases of partial trisomy of the long arm of chromosome 5 (Table I) were observed on the basis of 9 index patients, as 5q-trisomy occurred four times in close relatives (1, 2, 6, 7). This reduces the number of patients for delineation of the characteristic clinical form of 5q-trisomy. Besides, the trisomic segments of the long arm of chromosome 5 varied (Fig. 8). In one case (4) the proximal part, q11–q22, was involved. Trisomy of the middle part occurred in our present case, where the breakpoints could be localized at q15 and q11. In the remaining 7 cases, a distal type of partial 5q-trisomy occurred, the q31-qter segment was trisomic in 4 cases (3, 5, 6, 7). A q33-qter trisomy was also described (1, 8) as well as a case of q34-qter trisomy (2).

The partial 5q-trisomy proved to be inherited from maternal insertion in 2 out of 9 index patients (4 and in the present case). Partial 5q-trisomy originated from parental translocation in 7 cases, 6 times from the father, once from the mother. In two cases, the second translocation chromosome was chromosome 2 with identical breakpoints (3, 6). In the other 5 families, chromosomes 9, 11, 8, 16 and 22 were defined as second chromosome. Breakage of the second chromosome occurred at the terminal band in each translocation without exception. This circumstance probably allows to disregard the various partial monosomies associated with partial 5q-trisomy when we attempt to compare the clinical picture of the patients.

Independently from the type (proximal, interstitial, terminal), partial 5q-trisomy was associated with low birth weight (under 3000 g), a delay in somatic and psychomotor development, and microcephaly. Congenital heart defect was also frequently found (5/8 index patients and 7/14 investigated patients).

Finger anomalies, too, seemed to be common, although different in severity (8/9 index patients and 9/13 investigated patients); enlarged first toes (4) and clinodactyly by itself (3) or with zygodactyly (8) have also been reported. Preaxial hexadactyly occurred in two patients (6, 7). In one case a hypoplastic thumb connected to the hand by a thin pedicle (5) and in another retroversion of the distal phalanges of the thumbs was found.

One patient showed severe skeletal abnormities (4). This was the only observed case of 5q-trisomy of the proximal type. Therefore, it is not possible to declare that skeletal anomalies are specific for the proximal type of 5q-trisomy. We cannot agree with the recently suggested view (7) that according to the trisomic segments three clinically characteristic phenotypes may be distinguished. We rather believe that many more

TABLE I

Data of patients

	Jalbert et al. (1975)	Present case	Ferguson-Smith et al. (1973)	Osztovics and Kiss (1975)		Jones et al. (1979)
				2*	1	
Age	3y 7/12m	20m	4y	14m	6y	2m
Sex	F	F	M ←	F	F	← F
Growth retardation	–	+	+	+	+	+
Mental deficiency	+	+	+	+	+	+
Birth weight	2880	2400		2700	2650	2190
Microcephaly	M	+	+	+	+	+
Carp-shaped mouth	–	–		–	–	+
Thin lip	–	–		+	+	–
Finger anomaly	+	+	+	+	–	+
Congenital heart defect	VSD	Ductus art. persist.		ASD + VSD	–	ASD + VSD
Origin of 5q-trisomy	ins(1;5) (q32; q11q22) mat	ins(6;5) (q21; q15q31) mat		t(2;5) (p23; q31) pat	t(2;5) (p23; q31) pat	t(5;9) (q31; p24) pat
Trisomic segment	q11–q22	q15–q31		q31–qter	q31–qter	q31–qter

* = index patient

observations are needed to establish the clinical differential diagnosis in the different types of partial 5q-trisomy.

The cranio-facial dysmorphism of patients with distal type 5q-trisomy consists, as far as it has been observed, in microcephaly, hypertelorism, strabism, thin upper lip, carp-shaped mouth and low-set ears.

REFERENCES

1. Bartsch-Sandhoff, M, Liersch, R: Partial duplication 5q syndrome: phenotypic similarity in two sisters with identical karyotype (partial duplication 5q33–5qter and partial deficiency 8p23 – pter). *Ann Genet (Paris)* 20: 281, 1977
2. Curry, CJ, Loughman, WD, Francke, U, Hall, BD, Golbus, MS, Derstin, J, Epstein, CJ: Partial trisomy for the distal long arm of chromosome 5 (region q34-qter). A new clinically recognizable syndrome. *Clin Genet* 15:454, 1979
3. Ferguson-Smith, MA, Newman, BF, Ellis, PM, Thomson, DMG, Riley, ID: Assignment by deletion of human cell acid phosphatase gene locus to the short arm of chromosome 2. *Nature New Biology* 242:271, 1973
4. Jalbert, P, Jalbert, H, Sele, B, Mouriquand, C, Malka, J, Boucharlat, J, Prison, H: Partial trisomy for the long arms of chromosome 5 due insertion and further "aneusomie de recombinaison" *J Med Genet* 12:418, 1975
5. Jones, LA, Jordan, DK, Taysi, K, Strauss, AV, Tóth, JK: Partial duplication of the long arm of chromosome 5: a case due to balanced paternal translocation and review of the literature. *Hum Genet* 51:37, 1979
6. Osztovics, M and Kiss, P: Familial translocation, t(2; 5) (p23; q31). *Clin Genet* 8: 112, 1975

with 5q-trisomy

Rodenwald et al. (1980)		Bartsch–Sandhoff and Liersch (1977)		Zabel et al. (1978)	Curry et al. (1979)			
1*		1*	2		1	2	3	4
3y 6/12m	6m	4m	7y	10m	22y	21y	21y	16y
F	F	F	F	M	F	F	M	M
+	+	+	+	+	+	+	+	+
+	+	+	+	+	+	+	+	M
1700	2700	2400	3250	2460	2940	2760	2760	2724
+	+	+	+	+	+	+		
+	–	+	+	–	–	–	–	–
–	+	+	+	–	+	+	+	+
+	–	–	–	+	+	+		
ASD	–	VSD	VSD	–	–	–	–	–
t(5;11) (q31; q25)pat		t(5;8) (q33; p23)pat			t(5;22) (q33; p13)pat		t(5;16) (q34; q24)mat	
q31–qter		q33–qter			q33–qter		q34–qter	

M = mild

7. Rodewald, A, Zankl, M, Gley, EO, Zang, KD: Partial trisomie 5q: Three different phenotypes depending on different duplication segments. *Hum Genet* 55:191, 1980

8. Zabel, B, Baumann, W, Gehler, J, Conrad, G: Partial trisomy for short and long arms of chromosome No. 5. *J Med Genet* 15:143, 1978

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M. Osztovics, M. D.
Gyáli út 2
H-1966 Budapest, Hungary