Case reports

A second possible explanation is that the proband was homozygous for the X-linked gene, the paternal X chromosome having undergone a germinal mutation. In this case, the probability is related to the mutation rate of the gene, which is of the order of 50×10^{-6} according to Danieli *et al.* (1977).

Thirdly, an anomaly involving gonosomal number or structure might be the cause. We can eliminate this hypothesis: 50 mitoses in cultured lymphocytes were analysed after mild heat denaturation and no abnormalities were observed. Finally, the degree of phenotypic expression in a girl heterozygous for the X-linked gene can be invoked as a possible explanation. Other workers have previously reported the presence of clinical symptoms in female carriers (Emery, 1963; Johnston, 1964; Murphy *et al.*, 1965; Penn *et al.*, 1970; Stern, 1972; Zatz *et al.*, 1973; Moser and Emery, 1974). Girls are only very rarely affected as severely as boys (Johnston, 1964; Penn *et al.*, 1970; Gomez *et al.*, 1977). Such diversity in clinical expression may be accounted for by Lyonisation of the X chromosomes in the muscle cells of girls heterozygous for the myopathic gene. Several authors have proposed this hypothesis (Emery, 1963; Murphy *et al.*, 1965; Zatz *et al.*, 1973; Moser and Emery, 1974; Gomez *et al.*, 1977). We have no cytogenetic or biochemical criteria to confirm that there is a majority of active X chromosomes containing the myopathic gene in carriers with complete phenotypic expression, whereas such criteria have been established in haemophilia (Graham *et al.*, 1975). If, however, the Lyon hypothesis were proved to take place in muscular dystrophy, the preceding proposal would be feasible. Indeed, an infinite range of combinations between paternal and maternal inactivated X chromosomes is possible in carriers. The number of different clinical states and their probability of occurring would then depend on the number of future muscle cells in the zygote when inactivation occurs.

Confronted by the diversity of hypothetical genetic mechanisms that remain plausible, we can only offer the parents a relatively limited form of genetic counselling: the probability of having an affected son is 1/2 and that of having an affected daughter, though not certain, is not nil. For example, Moser and Emery (1974) suggest that perhaps 8% of carriers may have manifestations, so the chance of having a daughter who might show at least some manifestation may be as high as 4%.

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A case of partial trisomy 17 resulting from X-autosomal translocation¹

SUMMARY A case of partial trisomy 17 with partial monosomy X resulting from a maternal X-autosomal translocation t(X;17)(q13;q21) is presented. Three previously reported cases are reviewed and the phenotypic features of trisomy 17 are discussed.

Since banding techniques were introduced, three cases of trisomy 17, with different degrees of imbalance of the genetic material, have been reported. We present a new case of partial 17 trisomy with partial monosomy X, which was the result of a familial reciprocal translocation.

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Case report

A 3-year-old girl, KC-17734, was born to a 35-year-old healthy woman after an uneventful pregnancy and normal delivery. The father was 39 years old at her birth. She was the third child of these parents and two elder brothers were healthy. The parents were not consanguineous. Both were in good health and had no history of serious disease. There was no family history of congenital anomalies or spontaneous abortions.

Her birthweight was 2050 g. Immediately after birth, a peculiar face and some minor anomalies were noticed. The neonatal course was complicated by poor sucking and a tendency to vomit. Her motor and mental development was very slow. She smiled at 4 months and controlled her head at 2½ years old, but she could not sit, nor speak even simple words. Psychological orientation was very poor and she always seemed to be bad tempered. At the age of 3 years 1 month, she suffered from acute pneumonia and was admitted to our hospital. She recovered after an uneventful course. At that time, precise clinical and cytogenetic investigations were performed. Physical examination showed a slender and severely retarded girl with a peculiar face (Fig. 1), height 79.4 cm (−4.0 SD), weight 5330 g (−5.7 SD), head circumference 45.4 cm (−1.3 SD), and chest circumference 47.0 cm (−2.9 SD). She had a prominent forehead, antimongoloid slant, corneal opacity with ulceration, small, beaked nose, small mouth, high arched palate, short neck, pectus excavatum, and bilateral mild adducted thumb contracture.

Dermatoglyphic investigation showed: proband finger (I to V) U.R.U.W.U. (left), U.W.U.U.U. (right), TFRC 50, palm 11.9.7.1.13'-t'-O.O./O.O.L.O. (left), 11.9.7.4.13'-t'-O.O./O.O.L.O. (right); father, finger W.R.U.U.U. (left), U.R.U.U.U. (right),

TFRC 128, palm 9.7.5'.3.13'-t-O.O./O.O.O.L. (left), 9.7.5'.4.13'-t-O.O./O.O.O.L. (right); mother, finger U.U.A.W.U. (left), U.U.U.U.W. (right), TFRC 50, palm 7.5'.4.3.13'-t-O.O./O.O.O.L. (left), 9.X.5'.4.13'-t-O.O./O.O.O.L. (right).

Laboratory studies, including complete blood count, urine analysis, blood glucose, GOT, GPT, LDH, total cholesterol, triglyceride, thyroid function, and growth hormone secretion test, were all within normal limits. Screening tests on urine for inborn errors of metabolism showed no abnormality. X-ray examination showed retarded bone maturation. An electroencephalogram showed occasional spike and wave complexes in the bilateral central areas. Pneumoencephalogram showed dilated lateral ventricles.

She died from acute pneumonia at 3 years 4 months old. Necropsy examination showed streaked gonads, but the uterus and Fallopian tubes seemed to have a normal histological structure. Except for macroscopic and histological findings of severe pneumonia, no gross anomalies of internal organs were seen.

CYTOGENETIC STUDIES

Chromosome analysis from a peripheral blood leucocyte culture of the proband showed 46 chromosomes with a deletion of the short arm of C group sized chromosome, suggesting a karyotype of 46,XX,Cp-. Other family members had the following karyotypes: mother, 46,XX,t(Cp-;Ep+); father, 46,XY; elder brother, 46,XY; younger brother, 46,XY,t(Cp-;Ep+); maternal grandfather, 46,XX. The sibs of the mother and the maternal grandfather could not be examined. The G-banded karyotype of the proband showed one normal X chromosome and the other was replaced by an abnormal Cp- type chromosome. The G-banded karyotype of the mother showed a balanced

Fig. 1 Front and side view of proband at 3 years of age. Note small beaked nose, small mouth, and low-set malformed ears.

Fig. 2 Complete G-banded karyotype of the mother; 46,X,t(X;17) (Xpter→Xq13::17q21→17qter;17pter→17q21::Xq13→Xqter).

Table Karyotypes and main clinical features of reported cases with partial 17 trisomy including present case

	Latta and Hoo (1974)	Salamanca-Gómez and Armendarés (1975)	Palutke et al. (1976)	Present case
Age and sex	Newborn female	7y, female	11y, female	3y, female
Proposed karyotype	47,XX,+17q-(pter→q11)	46,XX,i(17) (qter→cen→qter)	47,XX,+17q-(pter→q21)	46,X,-X,+der(17)t(X;17) (q13;q21)
Short stature	+	+	?	+
Mental retardation	+	+	+	+
Small nose	-*	-*	+	+
Hypertelorism	+	+	Hypertelorism	-
Microstomia	-*	-*	+	+
Micrognathia	+	+	+	+
High arched palate	?	+	+	+
Dysplastic low-set ears	+	+	+	+
Congenital heart disease	+	+	-	-
Large joint contracture	+	+	+	-
Adduction deformity of thumb	+	Dorsiflexed	+	+ in neonatal period
Hypertonia	+	?	+	-
Convulsion	-	-	+	- but abnormal EEG
Dermatoglyphs	TFRC 141, t, tt'	TFRC 135, t	TFRC ?, t	TFRC 50, t'', t'
Others	Short neck, wide set nipples, ptosis, cubitus valgus, clinodactyly	Congenital pyloric stenosis, strabismus, epicanthus, flat nose bridge, cubitus valgus	Simian crease, deafness	Hypogonadism, corneal opacity

*Description from photographs.

Fig. 3 (a) Schematic diagram of breakpoints of chromosome X and 17; (b) partial G-banded karyotype of the mother; (c) schematic diagram of proposed meiotic pairing and segregation; (d) partial G-banded karyotype of proband.

reciprocal translocation between an X chromosome and a chromosome 17 (Fig. 2). Precise observation of the banding patterns of the abnormal chromosomes suggested that the breakpoint of the X chromosome was at q13 and that of the chromosome 17 was at q21. Consequently, the proband was partially trisomic for chromosome 17(pter→q21) and partially monosomic for the X chromosome (pter→q13). Fig. 3 shows the segregation pattern resulting in the proband's abnormal karyotype.

Unfortunately, the final conclusion mentioned above was reached after she had died. DNA replicating pattern analysis was unsuccessful and the inactivation patterns could not be determined. DNA replicating analysis of BrdU incorporated lymphocytes from the mother (BrdU-AO method, Dutrillaux and Fosse, 1974) showed late replication of the normal X in each of 35 informative nuclei.

Genetic enzyme studies for thymidine kinase and for galactokinase of the proband and her parents could not be done.

Discussion

It has been said that trisomy of chromosome 17 is very rare. Ohama *et al.* (1977) noted the extreme rarity of 17 trisomic conceptuses in spontaneous abortions and suggested the possibility of early abortion of these. Three reported live born cases (Latta and Hoo, 1974; Salamanca-Gómez and Armendarces, 1975; Palutke *et al.*, 1976) were all partial trisomies but were of heterogeneous origin. The Table shows the proposed karyotypes and main clinical features of these cases and the present case. Biederman (1977) pointed out that common clinical features of these cases were: dysplastic, low-set ears, micrognathia, adduction deformity of thumb, and congenital heart disease. Photographic facial features of previously reported cases are not necessarily similar to each other. It seems to be difficult at this point to establish them as a distinct clinical entity because the common trisomic portion of chromosome 17 is only 17cen→q11. The case of Salamanca-Gómez and Armendarces (1975) was monosomic for 17pter→cen and the present case was monosomic for Xpter→q13. The case most similar to our patient seems to be that of Palutke *et al.* (1976). Clinical features such as small mouth, tiny nose, and antimongoloid slant make their facial appearances similar. Cytogenetic findings also showed a nearly common trisomic portion of 17pter→q21.

Partial monosomy of Xpter→q13 should result in so-called Turner's syndrome. Our case, however, showed few characteristic features of Turner's syndrome, except for dwarfism and streak gonads.

It might be interesting to know whether the inactivation process of the translocated X chromosome extends to the autosomal segment. Unfortunately, an attempt to study DNA replicating pattern was unsuccessful. We could not conclude that the inactivation mechanism modified the clinical features of partial trisomy 17 in this case.

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18p— syndrome resulting from translocation (13q;18q) in a mildly affected adult male¹

SUMMARY The patient was a 27-year-old male with short stature, borderline mental deficiency, strabismus, and a short fourth metacarpal. His karyotype showed deletion of the short arm of a chromosome 18 as the result of *de novo* fusion centric translocation between chromosomes 13 and 18 (45,XY,—13,—18,+t(13;18) (13qter→cen→18qter).

Since the first description of a case with deletion of the short arm of chromosome 18 (18p—) by de Grouchy *et al.* (1963), over 80 cases have been reported. The phenotypic expression of 18p— cases is variable: the common features are growth and mental deficiency, hypertelorism, epicanthic folds, and large, protruding, and low set ears (Faust *et al.*, 1976). The association of arhinencephaly and cebocephaly with 18p— is also known (Lurie and Lazjuk, 1972). Many of the features of Turner's syndrome have also been reported frequently in these cases, consisting of short and webbed neck, lymphoedema at birth, and shield or funnel chest with widely set nipples (de Grouchy, 1969; Lurie and Lazjuk, 1972).

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A phenotype of Goldenhar's syndrome associated with 18p— has also been described (Buffoni *et al.*, 1976).

Variability in the phenotypic expression of 18p— is further illustrated by our patient, who exhibited only mild dysmorphic features and borderline intellectual capacity.

Case report

This case was a 27-year-old man referred because of cognitive and adaptive deficiency. He was the product of an uncomplicated term pregnancy, with a birthweight of 3600 g. The mother and father were 22 and 24 years old, respectively, at the time of his birth. Recorded length at 2 weeks of age was 52.5 cm. He was first evaluated at age 2 years 3 months for short stature and language delay, but no diagnosis was made.

The patient was in classes for the educable mentally retarded throughout his school years. He has had alternating strabismus since childhood, and a right inguinal herniorrhaphy was done at the age of 18. A cutaneous basal cell carcinoma of the right arm was removed recently at the age of 27.

The father's height was 180 cm and the mother's 166 cm. The paternal grandmother's height was 145 cm, and there was no history of short stature in the mother's family. The mother had had a total hysterectomy at the age of 42 years for carcinoma of the uterus, and her father had lung carcinoma. There was one sib, a girl, who died at the age of 3½ because of leukaemia.

Physical examination at age 27 showed the following. Height was 152.5 cm, weight 61.7 kg, and head circumference 56 cm. Arm span was 148.7 cm with an upper/lower segment ratio of 0.84. His blood pressure was 110/80. Unusual craniofacial features were noted as follows (Fig. 1): alternating internal strabismus, posteriorly rotated ears, and a rather small mandible. The neck was short and broad with normal range of motion. The teeth were carious but not malformed, and hair and nails were normal. Apart from one café-au-lait spot below the left knee, the skin was normal. The hands and feet were broad and short, and the left fourth metacarpal was short. Except for a speech articulation problem, the neurological examination was normal. Dermatoglyphs showed both palmar axial triradii in the t' position and a digital pattern of 10 ulnar loops. The mother had a digital pattern of 10 ulnar loops, the left palmar axial triradius in the t' position, and the right in the t position. The father's dermatoglyphs consisted of 8 ulnar loops, 1 radial loop, and 1 whorl, with both palmar axial triradii in the t position.

Psychological evaluation showed the patient's