A CASE OF " G 2 DELETION SYNDROME ": RING OR PARTIAL MONOSOMY? (46,XX,22r or 46,XX,22p- ?)

M. MILANI-COMPARETTI (1), V. ROSSOLINI (2), D.P. PACE (1), M. BURRONI (2), R. MAGISTRELLI (1), F. SACCUCCI (1)

(1) Department of Biology and Genetics, Medical School, University of Ancona, Italy
(2) Children's Neuropsychiatric Clinical Unit, Fano, Italy

A case of " G 2 Deletion Syndrome " is reported, based on concordant cytogenetic, clinical and dermatoglyphic findings. The definition of the syndrome, as associated with either a ring or a partially deleted chromosome 22, is discussed. The resulting interpretation favours the hypothesis of deletion of the short arm extending into the centromere.

Chromosomal aberrations have come to include a class known as " G Deletion Syndromes " (Magenis et al. 1972). A case recently referred by the Fano Children's Neuropsychiatric Clinical Unit to the Institute of Biology and Genetics of the University of Ancona seems to belong o this class of chromosomal aberrations.

CASE HISTORY

M. Donatella; age 11 years. Born to a 31 year old mother and a 36 year old father following a normal male and two spontaneous abortions (both in early pregnancy). No relevant findings in the family.

Personal History. There was risk of a third abortion around the second month of pregnancy, while the mother suffered from facial paresis (a frigore?) that regressed in 40 days. Normal birth, light cyanotic asphyxia. Immediate, feeble cry. Feeble suction. Seriously retarded neuropsychomotor and speech development. Delayed and incomplete sphincter control. Four years of " maternal school ". Failed to qualify for regular school. Currently institutionalized in special school for the mentally retarded.

Physical Examination. The only relevant abnormalities seem to concern: absence of helix in left ear; low hairline; lanugo on forehead and cervix; underdevelopment of labia minora.
Neurologic Examination. Noncooperating subject. No apparent defect of the nervous system. Generalized hypotonia with hyperextensibility of all segments. Slow, incoordinated, dysmetric motricity. Erect stance only if on two, wide-apart feet. Uncertain and incoordinated gait.
Psychomotricity. Both quantitative and qualitative defects in psychomotor development, resulting in a syndrome combining motor infantilism with slow psychomotor responses, with maldexterity, disturbed spatio-temporal structuration, occasional synkinesias.
Psychological Examination. Discontinuous behaviour prevents definite quantitation. Only occasional interaction. Executes only simple, highly motivated commands. Language seldom evoked; nonstructured graphic expression. Exhibits motor and behaviour stereotypes with iterative tendencies.

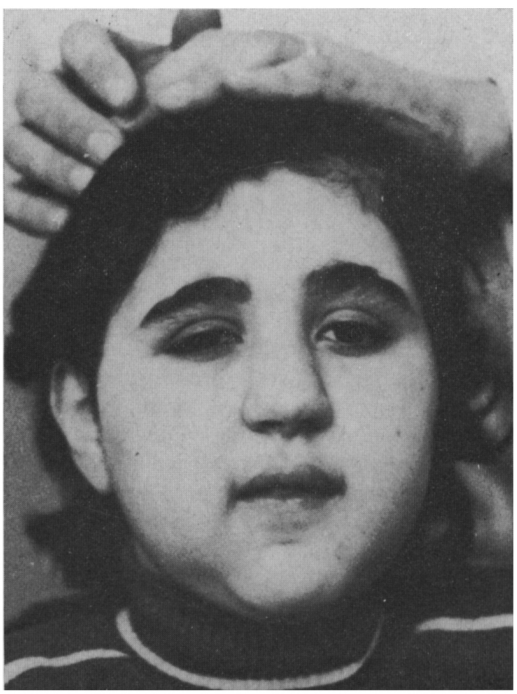

Fig. 1

Acta Genet. Med. Gemellol. (1975), 24: 311-313

Laboratory Findings (including protidogram and lipidogram): all within normal limits.
Rx Examination: osteoporosis of frontalis and slight turricephaly.
EEG: no relevant signs of cerebral defect.
Clinical Synthesis: medium to high grade mental deficiency and light dysmorphism in subject with chromosomal aberration.

Dermatoglyphics

	Fingers					atd angle	Palmar triradii
	1	2	3	4	5		
R	W	W	W	W	W	38°	6
L	W	W	W	W	W	37°	4

No simian line. TFRC: 206.

The two main G deletion syndromes are generally identified respectively as « G 1 Deletion Syndrome " and " G 2 Deletion Syndrome ". The former is also sometimes termed " antimongolism ", since several of its characteristic stigmata are the opposite of those found in Trisomy 21 (" mongolism "). Such contrasting phenotypes appear to be due to a deficiency as against an excess of genetic material in chromosomes 21. The finding of a G-group chromosome aberration must be followed by identification of the abnormal chromosome(s) and related to differential diagnosis. In our case the cytogenetic findings are in agreement with the symptoms. In the karyotype the G group includes one abnormal and three normal chromosomes; the latter are identified by ASG banding as two 21s and one 22. Thus, the abnormal chromosome is identified as a partially deleted 22, in agreement with its banding behaviour. Differential diagnosis concurs with the cytogenetic findings: the generalized hypotonia, the shape and size of the ears, as well as the presence of whorls on all fingertips, are all characteristic of the G 2 Deletion Syndrome.
The chromosomal abnormality, in the relatively few cases in the literature, is alternatively defined as " Gr " or " Gp— "; the former definition, i.e., a G ring chromosome, seems to prevail.

We would like to suggest an interpretation tending to favour the " 22p— " definition rather than the ring. Our interpretation postulates a deletion of the short arm (obviously including the satellites) extending into the centromere.

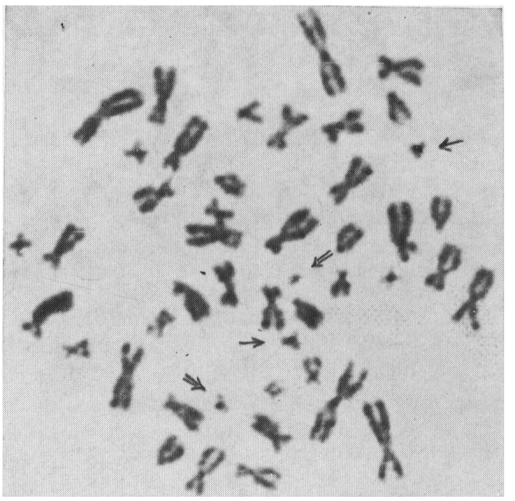

Fig. 2

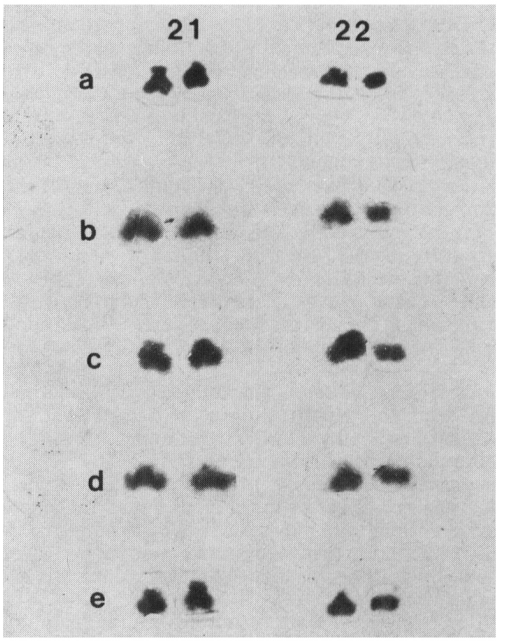

Fig. 3

https://doi.org/10.1017/S0001566000010436 Published online by Cambridge University Press

In most cases the abnormal chromosome exhibits a variability in morphology from a single " blob " to two distinct round points. Clear examples are to be found in Nevin et al. (1971), Magenis et al. (1972), and in our own case (cfr. Fig. 3). We hold that the two round points (Fig. 3 c & e) are incompatible with the ring hypothesis: they are interpreted as " repulsion " of the long arms, held together by the remains of the centromere. In fact, they tend to appear in those plates in which the other chromosomes also tend to repulsion, and if the repulsion figures for the normal G chromosomes in the same plates are observed with the simple trick of covering with a piece of white paper the short arms and the centromere, one obtains figures closely resembling the abnormal chromosome in the same cell.

Of course this does not mean that G rings do not occur, and in fact the case reported in Blank and Lorber (1969) is almost certainly a ring, but we do believe that definition of most cases (including the present one) as G rings is at least an overgeneralization.

As a technical note, we believe that it would be good to limit the morphological examination to slides not treated for banding; enzymatic digestions should be specially excluded, because it allows good identification but causes gross morphological changes.

As for the frequent occurrence of a mosaic G monosomy in these cases, as reported for instance by Blank and Lorber (1969) and Armendares et al. (1971), this appears to be compatible with our hypothesis of a deletion involving part of the centromere, resulting in impaired attachment to the spindle.

According to the above interpretation, we prefer to define our case as partial monosomy 22, in line with Lejeune's definition (Lejeune et al. 1964), identified as 46,XX,22p—.

REFERENCES

Armendares S., Buentello L., Cant-Garza J.M. 1971. Partial monosomy of a G-group chromosome (45,XY,G—/46,XY,Gr): report of a new case. Ann. Genet., 14: 7-12.

Blank C.E., Lorber J. 1969. A patient with 45,XX, G—/46,XX,Gr mosaicism. J. Med. Genet., 6: 220-223.

Lejeune J., Berger R., Réthoré M.O., Archambault L., Jérome H., Thieffry S., Aicardi J., Broyer M., Lafourcade J., Cruveiller J., Turpin R. 1964. Monosomie partielle pour un petit acrocentrique. C.R. Acad. Sci. (Paris), 259: 4187.

Magenis R.E., Armendares S., Hecht F., Weleber R.G., Overton K. 1972. Identification by fluorescence of two G rings: (46,XY,21r) G deletion syndrome I and (46,XX,22r) G deletion syndrome II. Ann. Genet., 15: 265-266.

Nevin N.C., MacLaverty B., Campbell W.A.B. 1971. A child with a ring G chromosome (46,XX,Gr). J. Med. Genet., 8: 231-234.

Prof. M. Milani-Comparetti, Istituto di Biologia e Genetica, Facoltà di Medicina, Università degli Studi, 60100 Ancona, Italy.