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A CASE OF 46,XX,18p−/46,XX,r(18) MOSAICISM

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Summary A mosaicism of cells with a ring and a deleted chromosome No. 18 was observed in a 30-month-old female infant with congenital malformations. With the G- and C-banding techniques, the karyotype of the patient was shown to be a 46,XX,del(18)(p11.1)/46,XX,r(18)(p11.1q23). The clinical features of the patient included short stature, mental retardation, microcephaly, hypertelorism, epicanthus, prominent ear lobes, saddle nose and tapering fingers, which were similar to those frequently seen in the 18p− syndrome.

INTRODUCTION

To date, a number of cases with various structural abnormalities of chromosome No. 18, for example, a partial deletion of the short arm, 18p− (de Grouchy *et al.*, 1963; Summitt, 1964; Van Dyke *et al.*, 1964) or the long arm, 18q− (de Grouchy *et al.*, 1964; Law and Masterson, 1966; Lejeune *et al.*, 1966), and a ring chromosome, r(18) (Wang *et al.*, 1962; Lucas *et al.*, 1963; Gropp *et al.*, 1964), have been reported. Some of the r(18) cases were accompanied with cells involving a loss of one of No. 18 chromosomes, *i.e.*, a mosaicism of 46,XX,r(18)/45,XX,−18 (Lucas *et al.*, 1963; Gripenberg, 1967). Similar instances of mosaicism with structural abnormalities in one of No. 21 chromosomes which coexisted with monosomy of No. 21 have been reported (Shibata *et al.*, 1973; Mikkelsen and Vestermark, 1974). On the other hand, a few mosaic cases with different types of structural abnormalities in the same chromosome have also been reported (Wertelecki and Gerald, 1971; Ruthner and Golob, 1974).

A new case of mosaicism involving two different types of structural abnormalities of chromosome No. 18 is presented here.

CLINICAL REPORT

The patient was a 30-month-old girl who was the second live-born child of a

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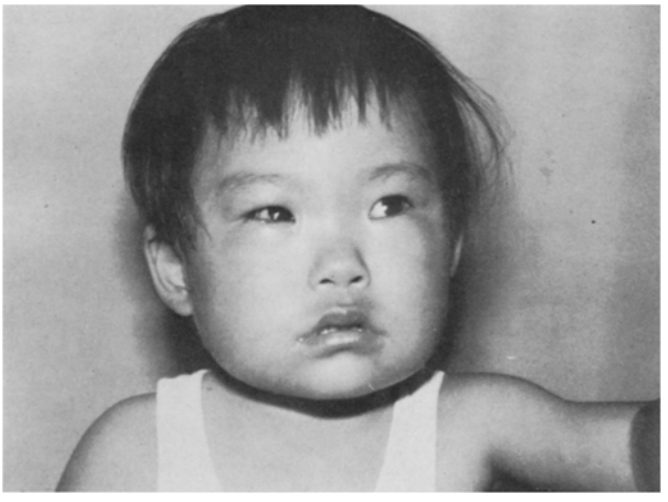

Fig. 1. Front view of the patient with a mosaicism of 46,XX,18p−/46,XX,r(18).

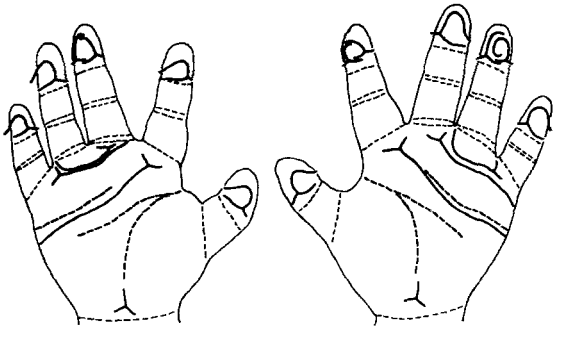

Fig. 2. Dermatoglyphics of the patient.

27-year-old mother and a 35-year-old father. The mother had experienced three spontaneous abortions, twice during the third month of pregnancy and once during the fourth month. The patient was born after 41 weeks of gestation and the birth weight was 1,980 g. Main clinical features found in the patient were short stature, mental retardation, microcephaly, hypertelorism, epicanthus, prominent ear lobes, saddle nose and tapering fingers (Fig. 1).

The dermal patterns of the patient were as follows: *Right hand.* Palmar formula, 9•0•5″•5′-t-A^{u}•0•0•0•0, *atd* angle=37°; digits=U,W,U,W,U. *Left hand.* Palmar formula, 11•0•7•5′-t-A^{u}•0•0•0•0, *atd* angle=36°; digits=U,U,W,U,U. Digital triradius *c* situated at the base of the fourth finger was not noted bilaterally (Fig. 2).

The mother had not taken X-rays nor any special drug for therapy during and

prior to the gestation. No consanguinity between the parents was ascertained. The elder sister and younger brother of the patient were normal.

CHROMOSOME STUDY

Peripheral blood cultures from the patient, her parents and siblings were used for the chromosome analysis following the G- (Sumner *et al.*, 1971) and C-banding techniques (Arrighi and Hsu, 1971). Although all cells examined had 46 chromosomes, there were observed two kinds of cells with different karyotypes (Fig. 3), one with a deletion of the short arm of chromosome No. 18 and the other a ring chromosome of the same one. In 44% of 172 cells investigated the 18p− chromosome was present, and in the remaining cells r(18) chromosome was included. The results thus revealed that the patient had a mosaicism of 46,XX,18p−/46,XX,r(18).

According to Yunis and Sanchez (1975) and Ray *et al.* (1975), the band p11 of chromosome No. 18 can be subdivided into four bands 11.1, 11.2, 11.3 and 11.4. This was confirmed by us, as illustrated in Fig. 4, together with putative subdivisions for the long arm. The sub-bands p11.1 and p11.3 were slightly positive with the G-banding, while the sub-bands p11.2 and p11.4 were almost negative. The break point of the 18p− chromosome was identified as the sub-band p11.1. On the other hand, the break points responsible for the formation of the r(18) chromosome were located at bands p11.1 and q23. The C-bands seen on the 18p− and r(18) chromosome were the same in size as those on normal No. 18 chromosomes. Therefore, the karyotype of the patient may be described, by the short-system designation, as

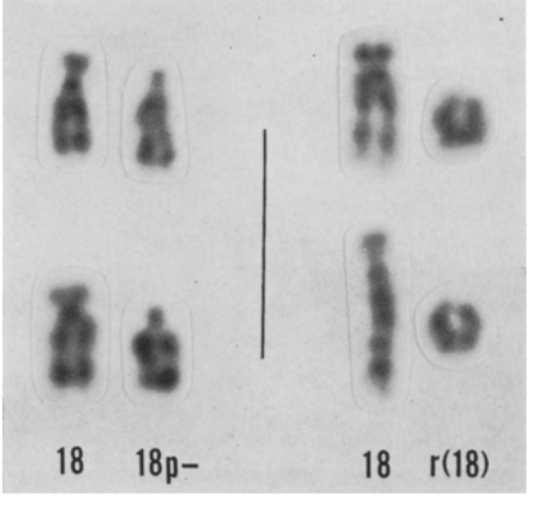

Fig. 3. G-banding patterns in normal and abnormal chromosome No. 18 from four cells of the patient.

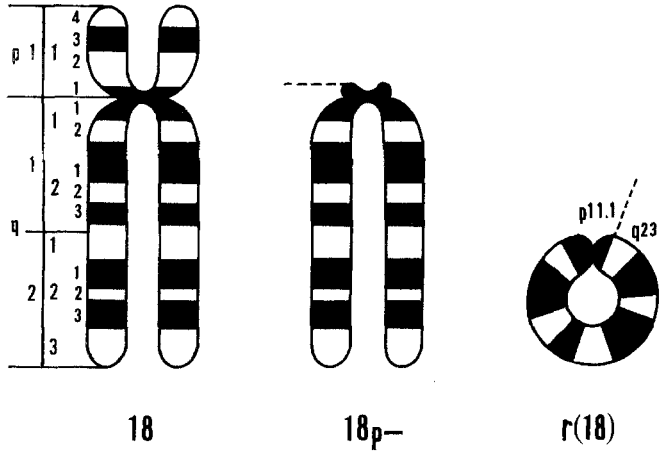

Fig. 4. Schematic representation of a normal, the deleted and the ring chromosome of No. 18.

46,XX,del(18)(p11.1)/46,XX,r(18)(p11.1q23), since no evidence was obtained for the possible terminal deletion in the region (q23→qter) of the r(18).

The parents and siblings of this patient had an apparently normal karyotype of either 46,XX or 46,XY.

DISCUSSION

Literature refers to a considerable number of cases with 18p− syndrome (de Grouchy, 1969; Lurie and Lazjuk, 1972). The main clinical features frequently noted in the 18p− cases were mental retardation, epicanthus, hypertelorism, strabismus, micrognathia, prominent ear lobes with malformation, and short and/or webbed neck (de Grouchy, 1969; Lurie and Lazjuk, 1972). The clinical features of the present case were very similar to those of the 18p− cases, except for webbed neck which was absent in the present case.

Referring to a number of reported cases with r(18) involving various amount of missing segments of the long and short arm, Lurie and Lazjuk (1972) have suggested that the symptoms of r(18) cases are in-between those of 18p− and 18q−. The present case did not show mid-face hypoplasia, narrow ear canals, abnormal genitalia, muscular hypotonia and excess of whorls on fingertips (> 5) which are frequently seen in 18q− cases (Lurie and Lazjuk, 1972; Schinzel *et al.*, 1975). This may be inferred that the r(18) chromosome of the present case has almost no missing segments in the long arm. In fact, no cytogenetic evidence was obtained for the partial loss of the long arm (q23→qter) in the present r(18). Alternatively, even if any undetectable deletion is present in the distal long arm segment of the r(18), the expected phenotypic effects could be masked by the presence of the complete long arm in the

18p− cell line. As to the short arm of the abnormal No. 18 chromosomes in our mosaic case, the missing segments of the 18p− were apparently included in those of the r(18), *i.e.*, the partial loss of the short arm (pter→p11.1) was ascertained in both 18p− and r(18). It is conceivable that the r(18) cells might have been derived from one of the preexisted cells with 18p− which were possibly formed in a germ cell or at a very early cleavage stage prior to the formation of the r(18).

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