Case reports

⁴ Chudley AE, Bauder F, Ray M, McAlpine PJ, Pena SD, Hamerton JL. Familial mental retardation in a family with an inherited chromosome rearrangement. *J Med Genet* 1974;11:353-62.

⁵ Verjaal M, De Nef J. A patient with a partial deletion of the short arm of chromosome 3. *Am J Dis Child* 1978; 132:43-5.

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describes a case of $\text{inv}(11)(\text{p12q25})$ that was shown to be present in two generations.

Case report

The proband, a 37-year-old Caucasian, gravida 4, para 3, and her 38-year-old spouse were referred for genetic counselling and prenatal diagnosis because of advanced maternal age. The pedigree is shown in fig 1. There was no known family history of consanguinity, spontaneous abortions, or perinatal

Familial pericentric inversion of chromosome 11 detected prenatally

SUMMARY A pericentric $\text{inv}(11)(\text{p12q25})$ was detected by prenatal diagnosis and subsequently found in four other family members. There was no apparent evidence of clinical consequences caused by this inversion.

With the advent of banding, pericentric inversions have now been described for the majority of human chromosomes.¹ The most common inversion is a pericentric inversion of chromosome 9, which occurs in approximately 1 to 1.5% of the population.^{2,3} Inversions of chromosome 11 are rarely seen, for generally this chromosome appears to be relatively stable. To our knowledge, there have been four cases of pericentric inversion of chromosomes 11, each having different breakpoints.⁴⁻⁶ This report

FIG 1 Pedigree of the family.

Received for publication 5 June 1981

FIG 2 Partial karyotypes of (a) father, (b) fetus, and (c-e) sibs showing the pericentric inversion of chromosome 11.

deaths. The three daughters were healthy with no apparent congenital anomalies.

INVESTIGATIONS

Amniocentesis and fetal ultrasound examination were performed in the 16th week from the last menstrual period. The ultrasound study and amniotic fluid α -fetoprotein (17 520 ng/ml by radioimmunoassay) were normal.

Amniotic fluid cells were cultured by standard techniques. Chromosome analysis after trypsin-Giemsa banding revealed a pericentric inversion of chromosome 11 (46,XY,inv(11)(p12q25)). This structural rearrangement was shown to be paternal in origin after peripheral blood studies were done on both parents. All three sibs had the same inversion of chromosome 11 (fig 2).

Current knowledge of pericentric inversion carriers in a family in which segregation of the inverted chromosome occurs without producing recombinants indicates that the risk for clinically abnormal offspring resulting from duplication-deficiency chromosomes is nominal, with an approximate risk of 1%.^{7,8} Based upon these findings, and upon the observation that the father and sibs were apparently normal, it appeared that the fetus was not at significantly high risk for congenital anomalies. The parents elected to continue the pregnancy, which was uncomplicated. A healthy male infant was delivered at term with no apparent anomalies. Birthweight was 3414 g, length 52 cm, and head circumference 35 cm. The baby had an Apgar score of 8 at 1 minute and 7 at 5 minutes. The cord blood study confirmed the prenatal cytogenetic findings of inversion 11.

Discussion

As reviewed by Moorhead,⁷ inversions themselves do not appear to cause clinical anomalies. Production of duplication-deficiency chromosomes after crossing over within the inverted segment rarely results in unbalanced offspring or spontaneous abortions. Non-disjunctional events reported with inversions may be coincidental. Infertility in inverted carriers is rare although there has been questionable association with pericentric inversion of chromosome 9.

These findings are supported by the clinical cases of inversion chromosome 11 as well as our report of five family members. For inv(11)(p15q23) and (p11q11) described by Simola *et al*,⁴ there appeared to be no detectable clinical consequences related to either inverted chromosome, both of which segregated in three generations. Similar observations were reported by Autio-Harmainen

and de la Chapelle⁶ for inv(11)(p11q13.3) and Boué and Boué⁵ for inv(11)(p15q14).

There is a general impression that unbalanced offspring are more likely to occur when a large part of the genetic material is inverted, leading to a greater incidence of crossing over and probable abnormal recombinant chromosomes.¹ Although in the present case of inv(11)(p12q25) and in the case of Simola *et al*⁴ of inv(11)(p15q23), where large pericentric inversions were segregating, there appeared to be little risk of abnormal offspring or spontaneous miscarriages in either family.

The work was supported by grant MCT-000423-17. We are grateful to Geeta Joseph, Charles Garner, Jesse Gore, and Barbara Myers for their technical assistance.

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