Prenatal Diagnosis of Partial Trisomy 22 Derived from a Maternal t(11 ; 22) (q23 ; q11)

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393 — A fetus with partial trisomy 22 was detected by amniocentesis in a
pregnant woman with balanced translocation, 46, XX, t(11 ; 22) (q23 ; q11). The
aborted fetus had multiple congenital anomalies consisting of microcephaly, cleft
lip and palate. The extra acrocentric chromosome was identified as der (22), t(11 ;
22) (q23 ; q11). The aborted fetus is compared with other trisomic cases described
in literatures, and perinatal diagnosis of this case was discussed. ——— prenatal
diagnosis ; partial trisomy 22 ; amniocentesis ; translocation

With the development of banding and amniocentesis techniques, the prenatal diagnosis of chromosomal disorders have become possible. In 1961 Turner and Jennings first described the trisomy of chromosome 22. After that, 55 childhood cases of partial trisomy 22 were reported. To our knowledge, there have been no reports of partial trisomy 22 diagnosed prior to birth.

In this article, prenatal diagnosis of a fetus with partial trisomy 22 derived from a maternal t(11 ; 22) (q23 ; q11) are reported.

CASE REPORT

K.K. ; 24-year-old, phenotypically normal gravida 0 para 0 pregnant woman was referred to us from another university hospital. A pedigree chart of this patient (K.K. II-4) is shown in Fig. 1. She requested prenatal diagnosis because her sister's daughter is mentally retarded due to a chromosomal anomaly. Her elder sister (II-2) was confirmed to be a carrier of the reciprocal translocation t(11 ; 22), and her daughter (III-1) was diagnosed as partial trisomy 22.

The patient first visited us in the 14th week of gestation. The past histories of the couple revealed nothing particular. Immediately after her visit, chromosomal analyses of

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Fig. 1. Pedigree and explanation of symbols used in the present paper.

- ○ = male and female, not karyotyped
- ◻ ◐ = male and female, normal karyotyped
- ◻ ◐ = male and female, carrier t(11; 22)
- ● = male and female, 47, der (22) t(11; 22)
- ↓ = present case

Fig. 2. Partial karyotypes demonstrating +22q- of the fetus by amniocentesis (G-banding).

the couple were initiated by G-banding (Seabright 1971). G-banding patterns of the patient's and her husband's chromosomes demonstrated respectively, 46, XX, t(11; 22) (q23; q11) and 46, XY. Because of these findings, we decided to attempt prenatal diagnosis of fetus. The karyotype of fetus was confirmed to be 47, XX, +der (22), t(11; 22) (q23; q11) at 22 weeks of gestation.

After discussion with the family, the parents elected artificial abortion at 23 weeks of gestation.

Cytological findings. Amniocentesis was performed at 17 weeks of gestation. Amniotic fluid was cultured in nutrient mixture (HAM) F10 containing glutamine, 20% fetal calf serum, and penicillin (200 µg/ml). After 2 weeks, colcemid at a final concentration of 0.05 µg/ml was added to the cultures 2-3 hr before harvest. Chromosome spreads were prepared by the air-dry technique. Karyotype analysis of 20 cells based on G-banding preparations showed an abnormal number of 47 chromosomes.

The prenatal diagnosis of 47, XY, +der (22), t(11; 22) (q23; q11) was made at 22 weeks of gestation from two different cultured flasks of amniotic fluid cells (Fig. 2). The extra chromosome fetus seemed to be identical to the translocated chromosome 22 and was considered to the result of 3:1 segregation in meiosis I in the mother. Chromosome analysis was also carried out on the cultured leukocytes of the cord blood after abortion. The prenatal diagnosis of 47, XY, +der (22), t(11; 22) (q23; q11) was also confirmed on cord blood.

Pathological finding. The aborted fetus showed no gross abnormalities of the body (Fig. 3). The fetus weighed 440 g and was 27 cm in length, within normal limits.

Fig. 3. General propositus at 23 weeks of gestation age.

Microcephaly, cleft palate, and malrotation of sigmoid and transverse colon were found in autopsy. No other microscopic pathological findings were made.

DISCUSSION

There are about 70 cases involving amniocentesis a year in our genetic consultation-division. Three major indications for amniocentesis in these cases included previous chromosome abnormal delivery (48%), late maternal age (16%) and translocation carrier (13%).

Before the development of banding techniques, trisomy 22 syndrome is relatively rare, particularly, an extra-small acrocentric element consisting of a partial trisomy was difficult to confirm by conventional techniques. Turner and Jennings (1961) first discussed a case of trisomy 22 suspected, because of an additional acrocentric "G"-chromosome with various anomalies, but with no typical features of trisomy 21. In 1971, Hsu et al. confirmed several cases of trisomy 22 with G and Q banding. Following many reports, the characteristic features of partial trisomy were noted to be mental and growth retardation, congenital heart disease, microcephaly, micrognathia, antimongoloid slant, preauricular tags or sinuses, cleft palate, long philtrum, large and low-set ears and congenital dislocation of the hip (Kadotani et al. 1978). These anomalies were also found in patients with full trisomy 22 syndrome (Hsu et al. 1971; Garlinger et al. 1977). Other signs of 22 trisomy included renal aplasia, low-set nipples, cryptorchidism, craniofacial asymmetry, inguinal hernia, and strabismus (Penchaszadeh and Coco 1975; Vianello and Bonioli 1975; Emanuel et al. 1976). No difference in distribution between the sexes was found in trisomy 22 cases (Lalchev et al. 1978).

In our experience, a familial translocation always provides definitive information about partial trisomy. Translocations between the long arms of the chromo-

somes 11 and 22 have been noted rather frequently. In the case described in this paper, the patient's sister was also found to be a (11 ; 22) carrier and her daughter was diagnosed 22 partial trisomy at 1 year of age. Severe mental retardation, congenital hip dislocation and pulmonary stenosis were found in her sister's daughter. In our case, cleft palate, microcephaly, and malrotation of the sigmoid and transverse colon were found after artificial abortion. As for mental retardation it is unclear because of the fetus.

According to Creasy and Crolla (1974), the incidence of trisomy in abortive material is 1.7%. Vianello and Bonioli (1975) believe that the lower incidence of trisomy 22 is due to death of the fetus. Maeda et al. (1976) reported a miscarried fetal case of translocation form of trisomy 22 in a woman with previous multiple abortions and who was a carrier of balanced translocation 22/22. They believed that the triplication of the long arm of the chromosome 22 was the lethal factor.

In recent years, two collaborative studies concerning the 11q ; 22q translocation have been reported (Fraccaro et al. 1980 ; Iselius et al. 1983). Fraccaro et al. (1980) reported 43 unpublished cases (unbalanced karyotype 31 cases, balanced carrier 12 cases). Also, Iselius et al. (1983) reported 20 new cases (unbalanced carrier 12, balanced carrier 8). Fraccaro and Iselius calculated the minimal recurrence risks (2.7 and 2.0%) for this unbalanced translocation in their reports. However, no case of prenatal diagnosis of partial trisomy 22 appears in their reports.

This case reconfirms the importance of prenatal diagnosis of chromosomal abnormality when chromosomal translocation or other structural chromosomal abnormality is found in either parent.

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