

New Human Double Trisomy or Tetrasomy

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Several studies have been reported on the cytogenetic analysis of spontaneous abortions (Aspillage *et al.*, 1966; Boué, Boué, and Lazar, 1967; Carr, 1967; Clendenin and Benirschke, 1963; Hall and Källén, 1964; Inhorn, Therman, and Patau, 1964; Rashad and Kerr, 1965; Singh, Rubinoff, and Carr, 1966; Szulman, 1965; Thiede and Salm, 1964; Thiede and Metcalfe, 1966; Waxman, Arakaki, and Smith, 1967), and the common chromosomal anomalies seen are autosomal trisomies, sex monosomies, triploidy, and tetraploidy. In addition to these there are some rare abnormalities, such as double autosomal trisomies (Carr, 1967; Boué *et al.*, 1967). The present case is an abortus with a modal number of 48 chromosomes, the two extra chromosomes are large acrocentrics belonging to the D group.

Case Report

The abortus was a complete small sac spontaneously aborted at 11 weeks of gestation (Fig. 1). At first sight it appeared to be an empty sac, but close examination showed a minute 1 mm. speck of whitish opaque tissue attached to the amnion. This was presumed to be an embryo of about 2 to 3 weeks of gestational age. The placenta was apparently normal and weighed about 12 g., but the chorionic sac seemed to be underdeveloped for its gestational age. This abortus was from the third pregnancy of a 24-year-old mother whose first two pregnancies also ended in miscarriages during the first trimester.

Cultures were set up from the presumptive embryonic tissue and amnion. Fibroblast cells from the first and second subcultures were harvested and permanent slides were prepared for chromosome analysis. The 50 cells counted had 48 chromosomes with female sex chromosome complement. Analysis of 8 cells revealed the presence of two additional large acrocentric chromosomes in the D group (Fig. 2).

Both parents had normal chromosomes.

Various attempts have been made to identify the individual large acrocentric chromosomes of the D group, but they cannot always be morphologically separated from each other (Denver Study Group, 1960; Patau, 1960 and 1961). Autoradiographic techniques have been used recently to differentiate between D_1 , D_2 , and D_3 (Giannelli, 1965; Giannelli and Howlett, 1966; Schmid, 1963; Yunis, Hook, and Mayer, 1964). Using the

autoradiographic technique as described by Giannelli (1963), identification of the two additional D chromosomes in the present case was attempted. However, because of the small number of cells available for analysis and the difficulties encountered from the large number of D group chromosomes, no definite conclusion could be reached.

Comment

Double autosomal trisomy is rare in live births as well as in abortuses (Becker, Burke, and Albert, 1963; Boué *et al.*, 1967; Carr, 1967; Dekaban, 1963; Gagnon *et al.*, 1961). Gagnon and co-workers (1961) described a mongoloid infant with 48 chromosomes who died shortly after birth. The extra chromosomes were interpreted as representing numbers 18 and 21. Dekaban (1963) published another case with double trisomy of numbers 17 and 21. The third case, a 4-year-old female child, with double autosomal trisomy, was reported by Becker *et al.* (1963); in this case the extra chromosomes belonged to the D and G groups. There are 3 abortuses with double autosomal trisomies and a total number of 48 chromosomes (Carr, 1967; Boué *et al.*, 1967); in 2 of these the extra chromosomes were recognized as E and G (Carr, 1967; Boué *et al.*, 1967), and in the third they were identified as D and G (Boué *et al.*, 1967). The present case is the first abortus with 48 chromosomes and two extra D group chromosomes with either double trisomy or tetrasomy.

The normal chromosome complement of the parents and a single stem line of cells in this abortus indicate that this anomaly occurred probably during parental gametogenesis. This aberration might have arisen by non-disjunction during both meiotic divisions or double non-disjunction during the first meiotic division possibly during oogenesis, if one assumes that a spermatozoan with disomy or trisomy is inviable. Another possibility, though remote, is that a meiotic nondisjunction involving the long acrocentrics occurred coincidentally during gametogenesis of both parents, resulting in fertilization of a hyperhaploid ovum by a hyperhaploid sperm.

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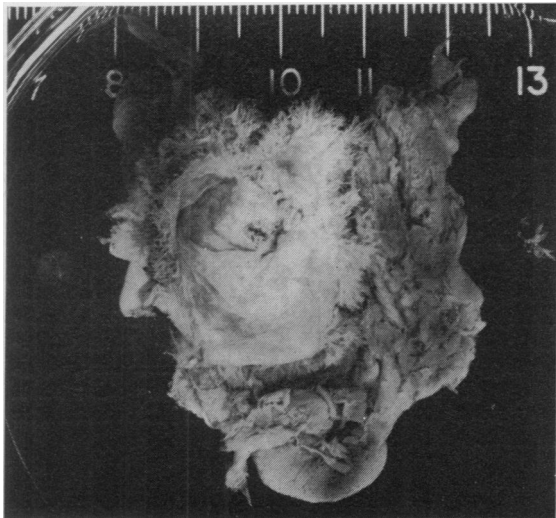


FIG. 1. The abortion specimen as seen after the sac had been opened.

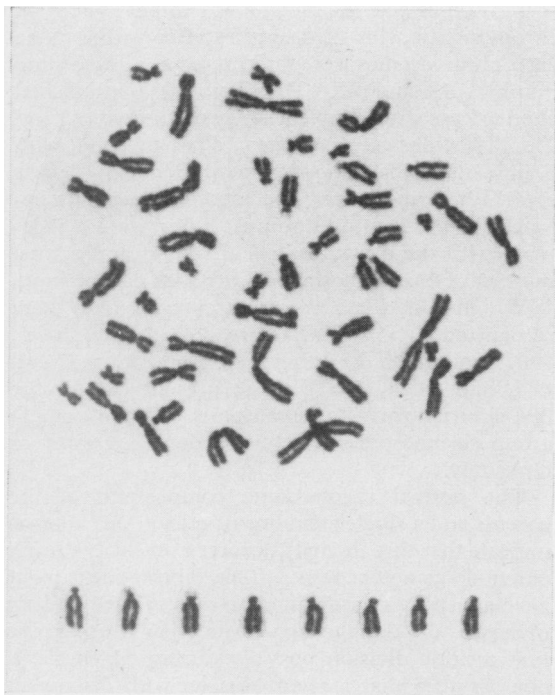


FIG. 2. Metaphase and its partial karyotype showing D group chromosomes.

Summary

A first trimester human abortus with a modal number of 48 chromosomes and two extra D group

chromosomes, with either double trisomy or tetrasomy, has been described. Both parents have normal chromosomes.

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