A Case of Familial Translocation between Chromosomes 2 and 18

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ABSTRACT

Authors describe case of translocation trisomy in chromosome 18. Proband's chromosomal aberration was a result of maternal reciprocal translocation t (2; 18) (q13; q23). The proband A., 28 years old, was directed to the genetic consultation at 12 weeks of pregnancy about detected by ultrasonography chromosomal markers in the fetus. Pregnant burdened reproductive history: the first pregnancy - miscarriage at an early date, second pregnancy is underdeveloped. This third pregnancy was uneventful. Genealogical history of monogenic hereditary diseases and congenital malformations is not burdened. The proband pregnancy was terminated with the consent of the family for the period of 12 weeks for medical reasons due identified chromosomal disorders in the fetus - translocation trisomy 18 (Edwards syndrome) with a poor prognosis.

Empirical risk of giving birth to a sick child in families with reciprocal translocations is about 33%, the theoretical risk is 50% [5].

Keywords: balanced translocation, chromosome 18, Edwards syndrome, karyotyping.

INTRODUCTION

Chromosomal pathology is one of the leading places in the structure of human hereditary pathology. The different types of chromosomal and genomic mutations are described. Genomic mutations include aneuploidies and ploidy changes of the structurally unchanged chromosomes. A trisomy is a type of aneuploidies (an abnormal number of chromosomes). This is due to incorrect differences of certain chromosomes during meiosis in gametogenesis from a parent. The most famous trisomies are Down syndrome (trisomy 21), Edwards syndrome (trisomy 18) and Patau syndrome (trisomy 13).

Edwards syndrome is a trisomy of 18 chromosome. The frequency of occurrence of this syndrome in the population - one in about 7,000 births [5]. Complete or full trisomy 18 is the most common form. In addition, there is also a mosaic form. An alternative, but rare, cause of Edwards syndrome is «unbalanced translocation»[4]. This can occur because one of the baby's parents carriers what is known as a "balanced translocation".

The aim of the study is to conduct a cytogenetic study of the family, which is the carrier of balanced translocation between chromosomes 2 and 18.

MATERIALS AND METHODS

All samples for cytogenetic studies were received by «nego» method of the chorionic villi and «indirect» method of peripheral blood lymphocytes cultured within 72 hours, in accordance with standard procedure.

A standard cytogenetic analysis of metaphase chromosomes using differential coloring GTG on the microscope Olympus BX43F equipped with a digital camera, with auto karyotyping CytoLabView is made.

RESULTS AND DISCUSSION

The proband A., 28 years old, directed to the genetic consultation at 12 weeks of pregnancy about detected by ultrasonography chromosomal markers in the fetus. Pregnant burdened reproductive history: the first pregnancy - miscarriage at an early date, second pregnancy is underdeveloped. This third pregnancy was uneventful. Genealogical history of monogenic hereditary diseases and congenital malformations is not burdened Fig.(1).

Phenotype: asthenic physique, poor posture, scoliotic deformity, head of the usual form, a symmetrical face, hypocaloric, uneven tooth alignment. From the side of other organs and systems without violations

Ultrasound examination of the fetus done at 12 weeks of pregnancy: identification of chromosomal markers - a nuchal translucency measurement of 6 mm, aplasia of the nasal bone, abnormal yolk sac, pathological spectrum of blood flow in a venous duct, it is not excluded congenital heart disease.

Maternal serum screening: the β –subunit of hCG gonadotropin (beta-hCG)- 2,67 mlU/L /0,051 MoM (low), pregnancy – associated plasma protein A (PAPP-A) - 3,120 mlU/L /1,051MoM (normal).

The calculation of individual risk for trisomy 21,18,13 using the program «Astraya»: high risk for trisomy 21 (down syndrome) - 1:18, trisomy 18 (Edwards syndrome)- 1:4, trisomy 13 (patau's syndrome) - 1:88.

Given the presence of chromosomal markers identified for the ultrasound examination of the fetus and the high risk of combined screening, invasive prenatal diagnosis - transabdominal chorionic biopsy was done. Karyotyping was carried out in the proband, her husband.

Cytogenetic studies: cytogenetic analysis of the proband's husband showed normal karyotype 46, XY. Cytogenetic analysis of the proband revealed 46, XX, t (2; 18) (q13; q23), Fig. (2).

When fetal karyotyping were identified derivative two chromosomes that are the result of maternal reciprocal translocation t (2; 18) (q13; q23) and three copies of chromosome 18 through derivative of chromosome 18, inherited from the mother. Thus, fetal karyotype was identified as 47, XY, t (2; 18) (q13; q23) mat, +18 Fig. (3).

Proband's family was also examined for chromosome analysis. A t(2;18)(q13;q23) was found in the proband's mother, sister and niece.

Considering the mechanism of formation «translocation» trisomy Edwards syndrome, you may notice that when heterozygous carrier of reciprocal translocations in prophase of meiosis chromosomes form not bivalent and quadrivalent - complex of four chromosomes [1]. This complex spatial structure violates easy chromosomes in the anaphase to the poles cells may diverge as two chromosomes (segregation 2:2), and three and one (segregation 3:1).

In our case Fig.(4) a gamete got 3 chromosome: two chromosomes involved in reciprocal translocations and one chromosome 18. When combined such gametes with normal gamete, occurs trisomy 18 - Edwards syndrome.

The proband pregnancy was terminated with the consent of the family for the period of 12 weeks for medical reasons due identified chromosomal disorders in the fetus - translocation trisomy 18 (Edwards syndrome) with a poor prognosis.

Empirical risk of giving birth to a sick child in families with reciprocal translocations is about 33%, the theoretical risk is 50% [5].

CONCLUSION

Thus, the identified family translocation is essential for genetic counseling from the point of view of assessing the genetic forecast and opportunities of prenatal diagnosis. Timely prenatal diagnosis of fetal allowed to properly diagnose, identify a balanced translocation from the mother and to assess the risk of recurrent cases of the disease in the offspring.

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