MOLECULAR CYTOGENETICS

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Complex small supernumerary marker chromosome with a 15q/16p duplication: clinical implications

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Abstract

Background: Complex small supernumerary marker chromosomes (sSMCs) consist of chromosomal material derived from more than one chromosome and have been implicated in reproductive problems such as recurrent pregnancy loss. They may also be associated with congenital abnormalities in the offspring of carriers. Due to its genomic architecture, chromosome 15 is frequently associated with rearrangements and the formation of sSMCs. Recently, several different CNVs have been described at 16p11.2, suggesting that this region is prone to rearrangements.

Results: We detected the concomitant occurrence of partial trisomy 15q and 16p, due to a complex sSMC, in a 6-year-old girl with clinical phenotypic. The karyotype was analyzed by G and C banding, NOR staining, FISH and SNP array and defined as 47,XX,+der(15)t(15;16)(q13;p13.2)mat. The array assay revealed an unexpected complex sSMC containing material from chromosomes 15 and 16, due to an inherited maternal translocation (passed along over several generations). The patient's phenotype included microsomia, intellectual disability, speech delay, hearing impairment, dysphagia and other minor alterations.

Discussion: This is the first report on the concomitant occurrence of partial trisomy 15q and 16p. The wide range of phenotypes associated with complex sSMCs represents a challenge for genotype-phenotype correlation studies, accurate clinical assessment of patients and genetic counseling.

Keywords: Complex sSMC, 15q duplication, 16p duplication, Familial inheritance

Background

Small supernumerary marker chromosomes (sSMC) are structurally abnormal chromosomes that cannot be identified by banding cytogenetics, and therefore molecular cytogenetic techniques are necessary for their characterization. Part of an sSMC is derived from more than one chromosome. sSMCs have been observed to be derived from translocations [1], and about 64% of complex marker formations are due to parental balanced translocations, while 36% are formed *de novo*. Most of them are of maternal origin (http://ssmc-tl.com/Start.html).

There are balanced translocations in which exchanges of material occur, with no genetic information added or missing, and imbalanced translocations, in which the exchange of chromosome material is unequal, resulting in extra or missing genes [2,3]. The estimated incidence rates of balanced translocation range from about 1 in 500 to 1 in 625 newborns [2]. These translocations are usually harmless, not having any phenotypic effect in most carriers. Later in life, however, they can lead to reproductive problems such as recurrent pregnancy loss, chromosomally imbalanced offspring (including the formation of small chromosome markers), and in some cases infertility, due to the increased risk of generating gametes with unbalanced chromosome translocations [2] and with high levels of DNA fragmentation [4]. Here we report a set of clinical findings from a patient who presents a complex

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