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CASE REPORT

Monosomy 22 : A Case Report

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ABSTRACT

A new case of monosomy 22 is described in a female newborn. The child had dysmorphic face, bilateral corneal opacity, elongated, disproportional toes and muscular hypotony, and systolic heart murmur was detected. Chromosome analysis identified karyotype 45, XX, -22, inv (9). The newborn died shortly after birth. Postmortem examination showed persistent truncus arteriosus type III, atrial septal defect and persistent left superior vena cava. This is the fifth case of monosomy 22 which is incompatible with life.

Key words : Monosomy 22

Monosomies of autosomal chromosomes in human generally lead to early embryo death. However, several cases of liveborn with monosomy of G group chromosomes have been reported, which were always associated with multiple congenital malformations. Medline Search of the literature showed that up to December 1994 there were four cases of monosomy 22 : two without mosaicism[1,2] and two in the mosaic form.[3, 4]

Here we report a new case of monosomy 22 in a liveborn child.

Case Report

A female proband was born at term after an uncomplicated pregnancy and syntocinon induced delivery. The 24-year-old mother and a 33-year-old father were healthy, as well as their first child, a 3-year-old girl. There was no consanguinity, no history of miscarriage, and no family history of birth defects.

Birthweight of the proband was 2,950 gm (percentile 10-25 for gestational age (GA)), length 46 cm (below the percentile 3 for GA), head circumference 34.5 cm (percentile 10 for GA). She had slanting palpebral fissures, bilateral corneal opacification, flat nasal ridge, low-set and poorly formed, soft ears and short neck. The toes were elongated and disproportional. The genitalia was female, with prominent labia minora. Muscular hypotony was dominant. Shortly after birth, a systolic heart murmur was detected.

Screening echocardiography showed double output of right ventricle (DORV) and atrial septal defect (ASD).

Blood count examinations showed thrombocytopenia. Routine biochemical studies were consistent with respiratory acidosis. Microbiological evaluations were normal.

She died of cardiac failure on the 14th day after birth.

Autopsy findings : The heart defect was a persistent truncus arteriosus type III (TAP III). Atrial septal defect (ASD) in the region of fossa ovalis was noted. There was persistent left superior vena cava. The right lung had two lobes. Other autopsy findings were unremarkable.

Cytogenetic analysis : Chromosome analysis was performed on trypsin G-banded and Q-banded chromosome preparations from peripheral lymphocyte cultures ; 100 metaphases were scored. In all cells, a 45, xx, -22, inv(9) (p12q13) karyotype was present (Fig. 1). The pericentric inversion was inherited from the mother, whose karyotype was 46, xx, inv (9). The father had normal male karyotype. A study of the chromosome 22 short arm polymorphism indicated that the proband's single chromosome 22 had maternal origin (data was not shown).

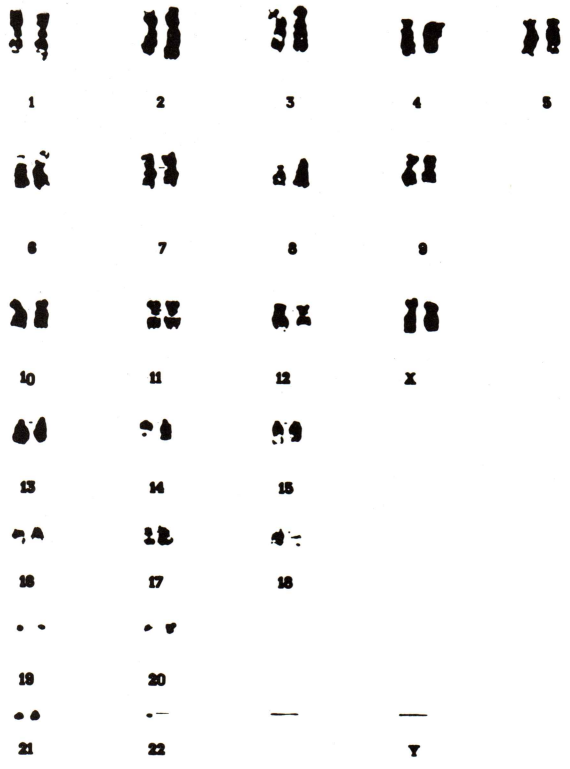


Fig. 1. Karyotype 45, XX, -22, inv(9), tripsin-Giemsa banding. (magnification 100x)

Discussion

Monosomy 22 is an extremely rare chromosomal abnormality. Up to now there were only two cases without mosaicism have been reported.[1,2] The cited probands died shortly

Table 1. Cases of monosomy 22 with or without mosaicism

	Rosenthal et al	De Cicco et al	Moghe et al	Verloes et al	Our case
Karyotype	45, XY, -22	45, XY, -22	46, XY/45, XY, -22	46, XY/45, XY, -22	45, XY, -22, inv(9)
Facial dismorphy	+	+	+	+	+
Eye anomalies	+	-	-	-	bilateral CO
Microcephaly	-	+	+	+	-
Anomalies of extremities	"lobster claw" appearance of the hands and feet	minor	cutaneous syndactyly between all the fingers	minor	minor
Cardiovascular anomalies	PDA	POF, bilat.VCSA	-	-	TAP III. pers.LSVC,ASD
Muscular hypotonia	-	-	+	+	+
Others	agenesis of the thymus	agenesis of the olfactory bulbs and tracts, 5 accessory spleens	moderate PMR, short stature	moderate PMR, short stature	right lung consisted of two lobes

Abbreviations : CO = corneal opacity ; PDA = patent ductus arteriosus ; POF = pentalogy of Fallot ; bilat.VCSA = bilateral vena cava superior arteries ; TAP III = persistent truncus arteriosus type III ; pers.LSVC = persistent left superior vena cava ; ASD = atrial septal defect ; PMR = psychomotor retardation

after birth. Moghue et al[3] and Verloes et al[4] reported cases of mosaic monosomy 22 with 24% and 9.4% monosomic cells respectively. Although we carried out chromosome study of a single tissue, the clinical and cytogenetic features of our patient seem to be consistent with true monosomy 22 (Table 1).

The patient described by Rosenthal et al had agenesis of the thymus and PDA, anomalies consistent with DiGeorge syndrome (DGS).[1] DGS is a developmental defect of the 3rd and 4th pharyngeal pouches, resulting in maldevelopment of the great vessels, thymus and parathyroids. DGS is heterogenous with genetic and nongenetic causes.[5] Several chromosome abnormalities may lead to this syndrome.[6] The association of DGS and partial monosomy 22 was proved for the first time by de La Chappele et al.[7] The region critical for DGS lies within 22q11.[6,8,9] The patient with monosomy 22 described by De Cicco et al,[2] and our own patient had unusual cardiovascular anomalies which are common in DGS.[10] De Cicco et al did not note signs of cellular immune deficiency and hypoparathyroidism, nor the absence of the thymus and parathyroids on autopsy. Our patient had normal serum calcium level without hypocalcemic seizures. Postmortem examination for the presence of parathyroid tissue was not requested. The thymus gland proper was present.

Future cases of monosomy 22 would be of great value in order to delineate the clinical syndrome associated with this chromosome aberration.

The very commonly found pericentric

inversion of chromosome 9 should be regarded as a normal variant. Some investigators suggested significant relationship between the chromosome 9 pericentromeric heterochromatin polymorphism and nondisjunction of the acrocentric chromosomes.[11] Our proband did not meet these features as it had single chromosome 22 and pericentric inversion of chromosome 9 both inherited from the same parent.

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