PRINT: ISSN 0972-3757 ONLINE: 2456-6360
Int J Hum Genet, 9(2): 105-107 (2009)
DOI: 10.31901/24566330.2009/09.02.03

Trisomy - T(21;21) with Mosaicisim in a Down Syndrome Girl Child Case Report

Minakshi Vashist*, Neelkamal*, Ritu Yadav* and Meena Lal**

****Department of Biochemistry & Genetics, M.D. University, Rohtak 124 001, Haryana, India*
*****Sir Ganga Ram Hospital, New Delhi, India*

KEYWORDS Chromosomal Aberration. Cytogenetics. Mental Retardation. Nondisjunction. Translocation

ABSTRACT Mosaicisim with a derivative of 21 translocation and normal cell line is one of rare cases of Down syndrome patients. In the present case dysmorphic features and developmental delay were compatible with clinical diagnosis of Down syndrome. Cytogenetic analysis demonstrated a mosaic pattern of normal cell line and a cell line with translocation 21;21[(46,xx/46,xx,T(21;21),+21]. Presence of normal cell line as well as translocated 21 indicates the mitotic nondisjunction (NDJ) of an euploid zygote and mosaicism may be due to loss of the supernumerary chromosome of a trisomic zygote or some complex mechanism may be involved in chromosomal aberration. Present case shows the mosaicisim in a girl child with features of Down syndrome and atypical karyotype.

INTRODUCTION

Trisomy-21 is the most common viable aneuoploidy in humans causing Down syndrome with a frequency of about 1 in 700 live births (Van Buggenhout et al. 1999). Syndrome is characterized by mental retardation, reduced life expectancy and complex phenotype with characteristic facial and skeletal appearance. Approximately 95% of Down syndrome cases are due to free trisomy (Hamerton et al. 1975). Another 2% to 4% cases are caused by chromosomal translocation (Pangalos et al. 1994). The remaining 2% to 4% of Down syndrome patients show mosaicism for trisomy 21 and normal cell lines (Mikkelsen et al. 1997). Present report confirms the rare case of mosaicism of translocation 21 and normal cell line in a clinically diagnosed Down syndrome girl child.

CASE REPORT

The proposita is a clinically diagnosed Down syndrome patient. She is a third child, born to middle aged parents (mother 33 years, father 38 years). In prenatal period,there is history of more than normal foetal movements . Delivery was full term and normal. Birth weight was average (2900gm) but birth cry was delayed. Convulsions were present in neonatal and postnatal period alongwith typical Down syndrome features. There were multiple associated problems like epilepsy, hypothyroidism and myopia. Dysmorphic features like brachycephaly, flat occipital region, slanting palpebral fissure, short nose from root to tip, protruded and creased tongue, lip with perpendicular furrow, epicanthal fold, brushfield spots, constantly open mouth, short stature, short stubby hand, skin scaliness with reddish rims and dry peeling were present.

The present case showed remarkably noticeable dysmorphic features as compared to other Down syndrome patients but surprisingly two key characters i.e. simian crease in hands and wide gap between 1st and 2nd toes were absent (Table 1). Dermatoglyphics showed ulnar loop pattern on thumb and 1st and 2nd finger. Whorls were present on ring finger and little finger of both right and left hands. Atd angle was more than 60° in both the hands (Table 2). First four toes of both feet showed fibial loop pattern while arch pattern was found on little toe. Hallucal area showed loop distal pattern in both right and left feet.

Cytogenetic and FISH Analysis

Chromosomal analysis was performed from 72 hrs cultured blood lymphocytes using GTG banding according to standard procedures (Seabright 1971). Fluorescent *in situ* hybridiza-

Correspondence Address:
Dr. Minakshi Vashist,
33/9J, Medical Campus, Rohtak 124001, Haryana, India
Telephone: 091-01262-212830
E-mail: mvashist@rediffmail.com

Table 1: Dysmorphic features of 50 Down syndrome patients and present case.

Features	*Down syndrome cases (%)*	*Present case*
Brachycephaly	75	+
Upslanting palpebral fissuere	78	+
Epicanthal fold	76	+
Brushfield spot	52	+
Small square ear	80	+
Simian crease at least one hand	72	-
Flat occipital region	70	+
Short stature	100	+
Mental retardation	100	+
Nose short from root to tip	70	+
Wide gap between 1st and 2nd toes	60	-

tion was done according to manufacturer's instructions, using LSI-21 probe (vysis (R) Downer Grove IL USA).

Out of 50 metaphase analysed ,10 contained normal female karyotype 46xx, 40 contained 46xx+T(21;21) (Fig. 1). Fluorescent in situ hybridisation confirmed the mosaicism. Cytogenetic analysis as well as FISH analysis revealed mosaicism for trisomy-21 cell line and normal cell line. These chromosomal findings indicated an atypical presentation in a mosaic line Down's syndrome patient.

DISCUSSION

Mosaic Down syndrome involving different cell lines is a rare event and has only been reported in small number of cases (Clarke et al. 1989; Leal Garza et al. 1996). Mosaicism with one normal cell line or second with structural chromosomal aberration is generally assumed by postzygotic mechanism (Antonarakis et al. 1990).

The two most common acrocentric arrangements in Down syndrome are rob 14q;21q and (21q;21q) and these occur at approximately equal frequencies. In the present case (21q; 21q) is confirmed cytogenetically. To explain the karyotype of this patient, a minimum of two events may be theoretically possible. The first, must have occurred during paternal or maternal meiosis (either nondisjunction or formation of T (21;21).

Table 2: Dermatoglyphics of the present case.

	Hand			*Feet*	
Digits	*Right*	*Left*	*Digits*	*Right*	*Left*
1	Ulnar Loop	Ulnar Loop	1	Fibular Loop	Fibular Loop
2	Ulnar Loop	Ulnar Loop	2	Fibular Loop	Fibular Loop
3	Ulnar Loop	Ulnar Loop	3	Fibular Loop	Fibular Loop
4	Whorl	Whorl	4	Fibular Loop	Fibular Loop
5	Whorl	Whorl	5	Arch	Arch
Atd angle	62°	70°	Hallucal pattern	Loop distal	Loop distal

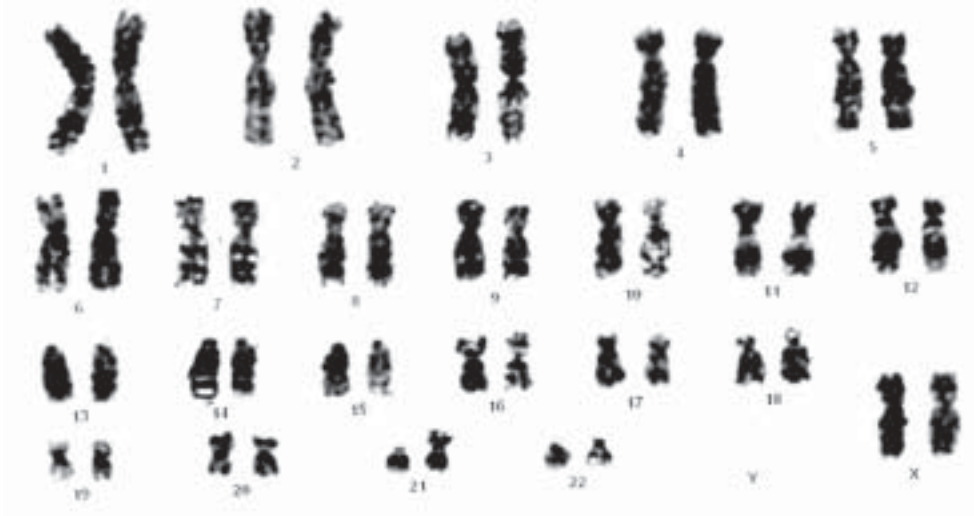

Fig.1. Karyotype showing 21;21 translocation trisomy

Subsequent errors must have occurred by other mechanism postzygotically resulting in a mosaic karyotype. To conclude we can say some complex meiotic and mitotic errors are responsible for mosaicism. However presence of remarakable dysmorphic features and distinct dermato-glyphics can be a help to identify mosaic Down syndrome cases for further analysis. The further investigation of mosaic karyotype will be of great significance to estimate the risk of recurrence as well as to establish new genotype- phenotype correlation.

ACKNOWLEDGEMENT

The authors are thankful to Arpan Institute, Parents and guardians for providing kind co-operation and information. Genetic laboratory of Sir Ganga Ram Hospital is gratefully acknowledged for allowing FISH analysis. The work supported in parts by UGC, SRF (Senior Research Fellowship), New Delhi and University Research Fellowship to the research scholars.

REFERENCES

Antonarkis SE, Adelsberger PA, Petersen MB, Binkert F, Schinzel AA 1990. Analysis of DNA Polymorphism suggests that most de novo dup (21q) chromosome in patients with Down syndrome are isochromosome & not translocations. *Am J Hum Genet*, 47: 968-972.

Clarke MJ, Thomson DAG, Grifllths MJ, Bissenden JG, Aukett A, Watt JR 1989. An unusual case of mosaic Down syndrome involving two different Robertsonian translocation. *J. Med Genet*, 26: 198-201

Hamerton JL, Canning N, Ray M, Smith J 1975. A cytogenetic survey of 14,069 newborn infants: Incidence of chromosomal abnormalities. *Clin Genet*, 8: 223-242.

Leal Garza CH, Corter-gutierrez E1, Ortiz-Jalemo R, Garcia- Cavazos R 1996. A case of mosaic Down syndrome with Robertsonian translocation. *Re Invest Clin*, 48: 385-388

Mikkelsen M, Hassold, TJ, Sherman S L 1997. Susceptible chiasmate configuration of chr. 21 Predispose to non-disjunction in both maternal meiosis I & meiosis II. *Nat Genet*, 14: 400-405

Pangalos C, Dimitrios Avramopoulas, Blouin J L, Odile Raoul, Deblois M C, Marguerite Prieur et al. 1994. Understanding the mechanism of trisomy 21 by using DNA polymorphism analysis. *Am J Hum Genet*, 54:473-481

Seabright MA 1971. Rapid banding technique for human chromosome. *Lancet*, 11: 971-972.

Van Buggenhout GJCM, Trommelen JCM, Schoenmaker A, Debal C, Verbeek JJMC, Smeets DFGM et al. 1999. Down Syndrome in population of elderly mentally retarded patients.American. *J Medical Genetics*, 85: 376-384.