Short Stature in a Patient with Complex Rearrangement of Chromosome 1,4,11 and Growth Hormone Deficiency

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Introduction

Only a few chromosomal abnormalities with growth hormone (GH) deficiency such as abnormalities of chromosome 18, 20, 21, have been reported (1, 2, 3). We report a case with a complex chromosomal rearrangement of 1, 4, 11 with GH deficiency.

Case Report

The boy was first seen at 5.9 years of age because of proportional short stature. He was the product of a full-term uncomplicated pregnancy; birth weight was 2,680 g. His parents were non-consanguineous. In the neonatal period, the patient received phototherapy. At the age of 3 months, he had Ramstedt's pyloromyotomy. His development was normal.

His height, weight and his bone age were 100.8 cm (-2.85 SD), 17.8 kg ($+22.8$ %), 3.7 years old (BA/CA:55.5 %) by TWII method (Japanese standard), respectively. His penis and pubic hair were prepubertal and his testis

volumes were 1 ml. He had bilateral constricted ears, short neck and simian lines (Fig. 1).

Endocrinological investigations revealed that his GH was deficient (Table 1). Peak GH values after stimulation with insulin, clonidine and GRH were 6.8 ng/mL, 2.4 ng/mL, 13.4 ng/mL, respectively. The mean value of spontaneous GH secretion during nocturnal sleep was 2.27 ng/mL. Other pituitary functions and thyroid function were normal.

Chromosomal studies of his peripheral blood lymphocytes were performed (Fig. 2). He had reciprocal translocation of chromosomes 1, 4, 11. The karyotype was 46, XY, t(1, 4, 11)

Fig. 1 The patient at the age of 6

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Table 1 Endocrinological findings

Insulin-TRH-LHRH test						
minutes	0	15	30	60	90	120
BS (mg/dl)	87	26	49	67	72	79
GH (ng/ml)	0.2	0.2	4.4	6.2	6.8	1.5
ACTH (pg/ml)	22.9	22.4	151.4	65.4	46.1	42.6
TSH (μ U/ml)	1.8	13.0	10.1	7.8	6.1	4.0
PRL (ng/ml)	7.5	26.6	31.6	25.0	24.6	13.3
LH (mIU/ml)	<0.6	0.6	1.1	0.9	0.8	0.6
FSH (mIU/ml)	0.8	2.9	4.6	4.8	5.4	4.8
Clonidine tolerance test						
minutes	0	30	60	90	120	
GH (ng/ml)	0.3	0.2	2.4	1.9	0.6	
GRF test						
minutes	0	15	30	60	90	120
GH (ng/ml)	0.3	10.6	13.6	11.4	18.6	6.2
Nocturnal GH secretion						
minutes	0	20	40	60	80	100
GH (ng/ml)	0.35	4.60	5.21	3.97	1.89	0.78
minutes	120	140	160	180	mean	
GH (ng/ml)	0.40	0.26	1.00	4.19	2.27	
IGF-I	0.43	U/ml				
T3	1.8	ng/ml				
T4	11.6	μ g/dl				
free T4	1.6	ng/dl				

(11qter→11q24.2::1p36.11→1q24.2::1p36.11→1pter;4pter→4p23::4q27→4qter;11pter→11q24.2::4q27→4p23::1q24.3→1qter).

At the age of 6.6 years, GH therapy was started. The height velocity before GH therapy was 4.4cm/year, and 9.7 cm/year after the first year. No adverse events have been observed.

Fig. 2 Reciprocal translocation of chromosome 1,4 and 11. The karyotype is 46, XY, t(1, 4, 11) (11qter→11q24.2::1p36.11→1q24.2::1p36.11→1pter; 4pter→4p23::4q27→4qter; 11pter→11q24.2::4q27→4p23::1q24.3→1qter).

Discussion

Chromosome 18, 20, 21 abnormalities associated with GH deficiency (1, 2, 3) have been reported. However, this is the first case with abnormalities of chromosome 1, 4, 11 associated GH deficiency. A causal association between GH deficiency and reciprocal translocation of chromosomes 1, 4, 11 is difficult to justify in this case, because the gene for GH production lies on chromosome 17 and the degree of GH deficiency was partial. This case suggests that chromosomal abnormality may be associated with GH deficiency. Therefore GH deficiency should be sought for in cases of short stature with chromosomal abnormalities.

References

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