Case Report

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A 47,X,+t(X;X)(p22.3;p22.3)del(X)(p11.23q11.2),Y Klinefelter Variant with Morbid Obesity

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Klinefelter syndrome is the most common type of genetic cause of hypogonadism. This syndrome is characterized by the presence of 1 or more extra X chromosomes. Phenotype manifestations of this syndrome are small testes, fibrosis of the seminiferous tubules, inability to produce sperm, gynecomastia, tall stature, decrease of serum testosterone and increases of luteinizing hormone and follicle stimulating hormone. Most patients with Klinefelter syndrome are tall, with slender body compositions, and reports of obesity are rare. We report the case of a 35-yr-old man with hypogonadism and morbid obesity and diabetes mellitus. He had gynecomastia, small testes and penis, very sparse body hair and his body mass index was 44.85. He did not report experiencing broken voice and was able to have erections. We conducted a chromosome study. His genotype was 47,X,+t(X;X)(p22.3;p22.3)del(X)(p11.23q11.2). In this case, the patient was diagnosed as Klinefelter syndrome. He showed rare phenotypes like morbid obesity and average height and the phenotype may be caused by the karyotype and the excess number of X chromosome. Further studies of the relationship between chromosomes and phenotype are warranted.

Key Words: Klinefelter syndrome, morbid obesity, karyotype

INTRODUCTION

Klinefelter syndrome is the most common type of genetic cause of hypogonadism and occurs in approximately 1.2-1.53 per 1000 male births. This syndrome is characterized by the presence of 1 or more extra X chromosomes, and the most common karyotype is 47, XXY.[1] Phenotype manifestations of this syndrome are small testes, fibrosis of the seminiferous tubules, inability to produce sperm, gynecomastia, tall stature, decrease of serum testosterone and increases of luteinizing hormone (LH) and follicle stimulating hormone (FSH). The deficiency of sex hormone influences the development of metabolic syndrome, obesity, and diabetes mellitus.[2] Most patients with Klinefelter syndrome are tall, with slender body compositions, and reports of obesity are rare.[3,4] Herein, we report a case of Klinefelter syndrome with diabetes mellitus and morbid obesity.

CASE REPORT

A 35-year-old man who visited the Department of Family Medicine due to obesity, was referred to the Department of Endocrinology for the evaluation of hormonal abnormalities. The patient's height was 174 cm, his body weight was 135.8 kg, his waist circumference was 137 cm, his hip circumference was 146 cm, and his body mass index was 44.85. He was morbidly obese and had gynecomastia, small testes and penis, and very sparse body hair. He did not report experiencing broken voice and was able to have erections.

The level of complete blood cell count were in normal range, white blood cell count 9270/mcL (Neutrophil/Lymphocyte/Monocyte/Eosinophil/Basophil 62.9/20.6/6.1/8.3/0.8%), hemoglobin 12.6 g/dL and platelet 333000/mcL. Routine chemistry showed no specific abnormality other than oral glucose tolerance test, at 2 hours after test glucose was 224 mg/dL. The patient showed increased levels of serum LH (19.88 mIU/mL) and FSH 29.0 (mIU/mL) and decreased levels of serum testosterone (63.0 ng/dL) upon endocrine study. Both testes were reduced in size on testis ultrasounds and there were no sperm present upon sperm analysis. Under the suspicion of primary hypogonadism, we conducted a chromosome study and the patient was diagnosed with Klinefelter syndrome. His genotype was 47,X,+t(X;X)(p22.3;p22.3)del(X)(p11.23q11.2) (Figs. 1 and 2). He started treatment with testosterone enanthate injections and was followed up in the outpatient clinic.

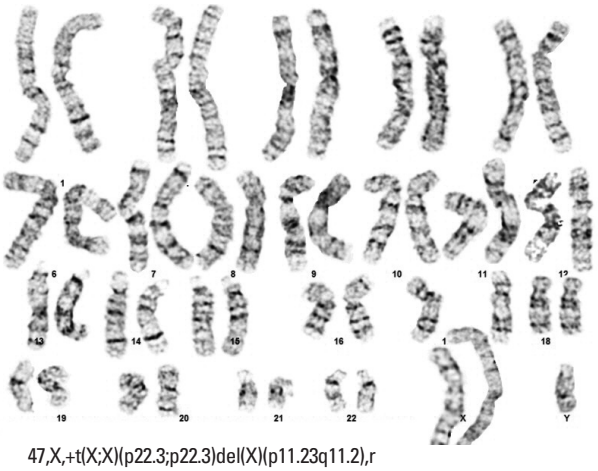

Fig. 1. Karyotype of this patient.

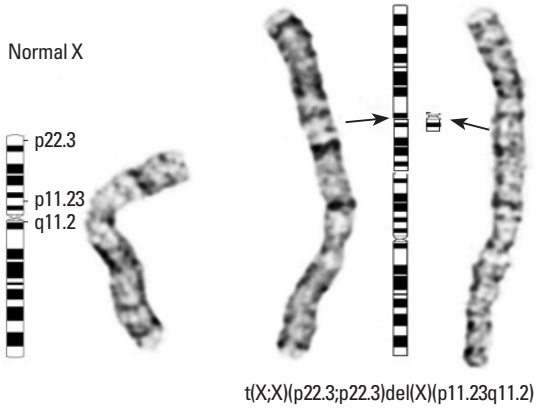

Fig. 2. Structure of X chromosome that shows translocation and deletion.

DISCUSSION

About 80-90% of patients with Klinefelter syndrome have 47,XXY karyotype, while 10% have mosaicism. Cases of X chromosome structural changes such as the patient described here make up about 1% of Klinefelter patients.[5] Morbid obesity and other characteristics in this patient are not common among Klinefelter patients, and were thought to be related to the X chromosome structural changes. In a previous study, a patient with Prader-Willi phenotype and Xq arm duplication showed Prader-Willi characteristics, even though the methylation of 15 (q11-15) was normal.[3] That patient also had chromosome duplication, and we therefore conclude that Xq arm translocations and duplications are associated with morbid obesity.

The number of X chromosomes is also related to phenotype. The phenotypes and severity of symptoms in Klinefelter syndrome patients differ according to the number of X chromosomes.[6]

Klinefelter syndrome cases with metabolic syndrome or diabetes mellitus have been described in some previous studies, but cases of morbid obesity are rare. Studies of XXY or mosaicism patient phenotypes are, in contrast, common. Patients such as the one described in this case and X chromosome studies have been limited to occasional case reports. Further study of the relationships between chromosome and phenotype are warranted.

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