

Hypertension and Hypertriglyceridemia in an Adolescent Girl Revealing Polycystic Ovary Syndrome: A Case Report

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Abstract**Case Report**

Polycystic ovary syndrome (PCOS) is a common clinical condition that manifests during adolescence with menstrual irregularities, acne and hirsutism. Patients with PCOS, especially with hyperandrogenic phenotype, are exposed to several cardiometabolic risk factors that increase their chance for developing hypertension. Little is known about the association between serum testosterone level and blood pressure in young women with PCOS but many of the symptoms associated with PCOS have been shown to be associated with increases in blood pressure, such as increases in body mass index and the presence of metabolic syndrome, with its accompanying insulin resistance and type 2 diabetes. We report the case of an 18-year-old female patient with no specific history who presented with edema of the lower limbs at the time of menstruation and in whom the clinical examination showed high blood pressure with signs of hyperandrogenism and hypertriglyceridemia in the biological work-up, leading to the search for a PCOS. After a well-adapted management the patient kept a well-balanced blood pressure with a lipidic balance which was normalized only by hygienic and dietetic rules.

Keywords: Polycystic ovary syndrome, Hypertension, Hyperandrogenism, Insulin, Obesity.

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INTRODUCTION

PCOS is the most common endocrine disease affecting the women of reproductive age. It is characterized by ovulatory dysfunction, hyperandrogenism, and polycystic ovarian morphology when other causes are excluded according to the Rotterdam criteria [1]. More than 50% of PCOS patients have the metabolic syndrome including obesity, insulin resistance, and dyslipidemia [2], moreover, each of these features of the syndrome is responsible for the promotion of hypertension in this population.

CASE REPORT

In September 2021, a 18-year-old girl presented for evaluation of edema of the lower limbs contemporary to the menstrual period. The patient is from a non-consanguineous marriage, the eldest of three siblings. Her parents were of normal weight, they did not suffer from hypertension, hypercholesterolemia or diabetes. The patient started a marked weight gain from 8 years of age. Menarche occurred at the age of 14. 3 years later the patient noticed swelling of both lower

limbs contemporary to the menstrual period which disappeared spontaneously 3 to 5 days later with an irregular cycle without other associated signs, what motivated the patient to see an internist. The examination by the referring internist noted blood pressure figures that varied between 140/60mmHg and 150/90mmHg, the rest of the examination being without particularity with a biological assessment of hypertriglyceridemia at 3, 74mmol/l. The patient was then referred to the cardiology consultation for exploration and further management.

On examination, the patient was conscious with a blood pressure of 151/67mmHg, heart rate at 76 bpm, respiratory rate at 16 bpm, SaO₂ at 97%, weight of 86kg with a BMI of 31, negative urine dipstick. The general examination noted a hirsutism. The cardiovascular examination was unremarkable, as were the pleuropulmonary and abdominal examinations.

The electrocardiogram was in regular sinus rhythm with a normal axis and hooked QRS in AVF

without ventricular hypertrophy or repolarization disorder (Figure 1).

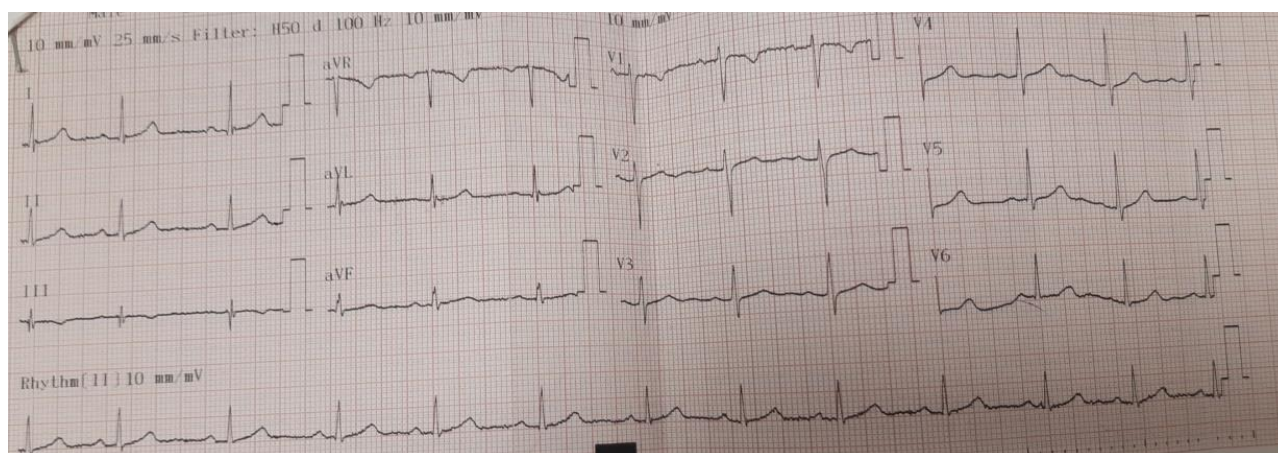


Figure 1: Electrocardiogram showing a regular sinus rhythm with a normal axis and hooked QRS in AVF

The echocardiography objectifies cardiac cavities of preserved size and function without any other detectable abnormality.

Hemoglobin, platelet count and white blood cell count were normal. Renal and liver function tests as well as the complete ionogram were unremarkable. The serum lipid profile was abnormal with elevated triglycerides levels, and low high density lipoprotein (HDL) cholesterol levels. Total cholesterol and low density lipoprotein (LDL)-cholesterol were normal (Table 1). Uric acid level was 363mmol/l. Ferritinemia was correct at 30ng/ml. The glycemic balance was normal.

Therefore, in front of this metabolic syndrome associated with hypertension and clinical signs of hormonal disorder, the patient was referred for gynecological consultation for suspicion of PCOS.

Pelvic ultrasound showed bilateral polycystic ovaries bilateral with a high level of testosterone and luteinizing hormone on the balance sheet.

Irregular cycle with hirsutism and an elevated testosterone level, together with the appearance of polycystic ovaries on ultrasound established the diagnosis of PCOS.

She was evaluated by a nutritional therapist and given lifestyle advice to reduce weight and increase physical activity and was put on antiandrogen and estrogen therapy by her gynecologist.

Within 2 months, there was a 11 kg weight reduction with as result a normalization of the blood pressure only under hygienic and dietary measures and there was some improvement in the lipid profile only under diet and sport (Table 1).

Table 1: Lipid profiles before and after therapy

Lipid profile	Pre-treatment	Post-treatment
Total-Ch (mmol/l)	4,65	3,8
HDL-Ch (mmol/l)	0,93	1,16
LDL-Ch (mmol/l)	2,4	2,2
TG (mmol/l)	3,74	1,5

DISCUSSION

PCOS is a condition of ovarian dysfunction that affects 6% to 10% of women of reproductive age. The pathophysiology of PCOS is still uncertain, although there is evidence that both genetic and environmental factors may play a role, resulting in ovarian hyperandrogenism and impaired insulin sensitivity [3]. The Rotterdam 2004 Consensus Workshop [1] proposed that PCOS is a syndrome of ovarian dysfunction, and recommended that two of the following criteria should be present to establish a diagnosis: chronic oligo- or anovulation for more than 6 months, clinical and/or biochemical evidence of hyperandrogenism, and polycystic ovaries on

ultrasound. Other disorders that mimic the PCOS phenotype should be excluded. The criteria for PCOS were fulfilled in this patient.

PCOS is characterized by multiple metabolic derangements, which may contribute to the development of hypertension and cardiovascular disease seen in this condition. Metabolic syndrome has been variably defined by several international organizations [4]. However, all of the definitions include measures of central obesity, glucose intolerance, dyslipidemia, and high blood pressure. The prevalence of the metabolic syndrome in PCOS has been reported to be 43% to 47%, which is twice as high as the prevalence in the general population of

comparable age, even after adjusting for body mass index (BMI) [5]. The dyslipidemia in PCOS is similar to that seen in metabolic syndrome, characterized by low levels of HDL, small particle size of low-density lipoprotein cholesterol (LDL), and high triglyceride cholesterol levels [6].

Despite the list of characteristics that typically accompany PCOS, the exact mechanism(s) responsible for hypertension in women with PCOS is controversial. Many of the symptoms associated with PCOS have been shown to be associated with increases in blood pressure, such as increases in BMI and the presence of metabolic syndrome, with its accompanying insulin resistance and type 2 diabetes [7]. Chen *et al.*, [8] attempt to dissect the role that androgens may play in mediating the hypertension in young women with PCOS. Their studies were performed in a cohort of Taiwanese women, with an average age of 24 years. In multiple linear regression models, they found that the serum free androgen index or total testosterone levels were strongly correlated with both systolic and diastolic blood pressure, independent of age, body mass index, insulin resistance, or dyslipidemia. In fact, they found that the odds ratio for free androgen index to predict an increased risk of hypertension was 3.817. These data strongly support a role for androgens in mediating the hypertension in young women with PCOS. Also, a recent study using *in vivo* microperfusion reported that androgen may directly upregulate the proximal tubule renin-angiotensin system and increase the volume reabsorptive rate, thereby increasing extracellular volume and blood pressure [9]. In addition to BMI, hypertension among women with PCOS may be affected by other background characteristics of the individual, such as race and ethnicity [10].

Lifestyle modifications, including diet and physical activity, are critical in preventing hypertension for women with PCOS who are overweight or obese. In addition, other methods of weight loss have shown promise for improving hypertension in the PCOS population [11].

CONCLUSION

The increased prevalence of hypertension in women with PCOS may contribute to the increased risk of cardiovascular disease in women with PCOS. Thus, the Androgen Excess and Polycystic Ovarian Societies recommend that blood pressure be obtained in women with PCOS at every visit and that prehypertension be detected and treated, given the potential benefit of lowering blood pressure for the prevention of cardiovascular disease.

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