

Case Report Article

Primary Amenorrhea in a 19-Year-Old Woman with Polycystic Ovary Syndrome and Grade II Obesity: A Case Report

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ABSTRACT

Primary amenorrhea requires systematic evaluation to identify abnormalities involving the reproductive tract, ovaries, hypothalamus, pituitary gland, or other endocrine conditions. Polycystic ovary syndrome (PCOS) is associated with ovulatory dysfunction, hyperandrogenism, hyperinsulinemia, insulin resistance, and obesity. Case Presentation: A 19-year-old woman presented to the Fertility, Endocrinology and Reproduction clinic of Dr. Mohammad Hoesin General Hospital, Palembang, with primary amenorrhea. She had never experienced menarche and reported increased fine hair growth on the face, abdomen, back, and lower extremities. Her weight was 81 kg, height 155 cm, and body mass index was 33.7 kg/m². Physical examination revealed hirsutism with a Ferriman–Gallwey score of 12. Laboratory evaluation showed elevated fasting insulin (34.2), testosterone (4.44 ng/mL), and increased LH relative to FSH, while prolactin, thyroid function, fasting glucose, and HbA1c were within the reported reference ranges. Pelvic ultrasonography showed a normal-sized anteverted uterus and ovaries without abnormalities of the internal genital organs. Management included a progestin challenge and lifestyle intervention with gradual weight reduction, physical activity, and a low-carbohydrate, low-fat diet. The clinical and laboratory findings demonstrated hyperandrogenism associated with amenorrhea and obesity. The case highlights the importance of systematic evaluation through history, physical examination, hormonal assessment, and pelvic imaging. The findings were consistent with PCOS based on the Rotterdam criteria discussed in the source case. Comprehensive evaluation identified hyperandrogenism and metabolic abnormalities. Management focused on lifestyle modification and medical therapy, with attention to menstrual regulation, hyperandrogenic manifestations, metabolic risk, and future reproductive goals.

Keywords: Primary Amenorrhea; Polycystic Ovary Syndrome; Hyperandrogenism; Hirsutism; Obesity; Hyperinsulinemia

1. INTRODUCTION

Menstruation is a physiological process characterized by periodic shedding of blood, mucus, and cellular remnants from the uterine mucosa (Sherwood, 2021). The menstrual cycle involves coordinated ovarian and endometrial changes regulated by the hypothalamic–pituitary–ovarian axis (Tortora, 2014). Gonadotropin-releasing hormone (GnRH) is secreted pulsatilely from the hypothalamus and stimulates the anterior pituitary to release follicle-stimulating hormone (FSH) and luteinizing hormone (LH), which regulate ovarian steroidogenesis and follicular development (Guyton, 2016).

Amenorrhea refers to the absence of menstrual bleeding. Primary amenorrhea describes lifelong absence of menstruation and should be evaluated when menarche has not occurred by the expected age or when pubertal development is delayed. The causes may involve the uterus and outflow tract, ovaries, pituitary gland, hypothalamus, or systemic and endocrine disorders (NICE, 2013; Klein et al., 2013; Tudhur et al., 2021). A systematic assessment includes menstrual and pubertal history, physical examination, laboratory evaluation, and pelvic imaging (ACOG, 2015).

Polycystic ovary syndrome (PCOS), also described in the source case as hyperandrogenic anovulation, is an endocrine disorder associated with reproductive dysfunction. Its pathogenesis is multifactorial and involves genetic and environmental influences, androgen and estrogen abnormalities, hyperinsulinemia, insulin resistance, and obesity (Abhishek, 2018; Londonkar, 2023). Hyperinsulinemia may enhance ovarian androgen production, reduce sex hormone-binding globulin (SHBG), and increase circulating free testosterone, thereby contributing to hyperandrogenism and impaired folliculogenesis (Sneha, 2023). This case report describes a 19-year-old woman with primary amenorrhea, clinical and biochemical hyperandrogenism, and grade II obesity, highlighting the diagnostic assessment and management discussed in the source case.

2. CASE REPORT

A 19-year-old unmarried university student presented to the Fertility, Endocrinology, and Reproduction clinic with a chief complaint of primary amenorrhea, having never experienced menarche. She reported a progressive growth of fine, excess hair across her face, abdomen, back, and lower extremities. She denied associated abdominal pain, bowel disturbances, or urinary symptoms, with no prior history of chronic illnesses such as hypertension or diabetes mellitus, and no family history of similar endocrine or menstrual disorders. On physical examination, she was alert and hemodynamically stable (blood pressure 110/70 mmHg, pulse 88 bpm, respiratory rate 18 breaths/min, temperature 36.6°C). Her body weight was 81 kg and height was 155 cm, corresponding to a body mass index of 33.7 kg/m² (grade II obesity). Clinical hyperandrogenism was evident with a Ferriman–Gallwey score of 12. Abdominal examination was unremarkable, and rectal examination revealed no pelvic masses, while speculum and vaginal examinations were omitted.

Diagnostic workup confirmed intact internal genital anatomy. Serial pelvic ultrasonography revealed an anteverted uterus measuring 4.79 × 2.09 cm with an endometrial thickness of 0.32 cm, progressing on repeat examination to 5.38 × 2.22 cm with an endometrial thickness of 0.48 cm, along with bilateral normal-appearing ovaries. Laboratory investigations demonstrated elevated serum testosterone (4.44 ng/mL) and fasting insulin (34.2 µIU/mL), accompanied by mixed dyslipidemia (total cholesterol 227 mg/dL, LDL 174 mg/dL, triglycerides 176 mg/dL). Fasting glucose (74 mg/dL), HbA1c (5.0%), prolactin (14.29 ng/mL), 17-hydroxyprogesterone (1.14 ng/mL), morning cortisol (10.2 µg/dL), thyroid panel, and gonadotropin levels (FSH 4.36 mIU/mL, LH 5.31 mIU/mL) were all within normal limits.

Based on clinical hyperandrogenism, severe hyperinsulinemia, and class II obesity, the working diagnosis was polycystic ovary syndrome (PCOS) presenting atypically as primary amenorrhea, with differential diagnoses including androgen-secreting tumors, congenital adrenal hyperplasia, and Cushing syndrome. Management commenced with a progestin withdrawal challenge using oral medroxyprogesterone acetate (10 mg daily for 10 days) to assess endometrial responsiveness. A multidisciplinary plan involving endocrinology-metabolic medicine, dermatology, and clinical nutrition was instituted, centered on structured lifestyle interventions, specifically a low-carbohydrate, low-fat diet and increased physical activity, aimed at gradual weight loss, metabolic optimization, and ovulatory restoration.

3. DISCUSSION

3.1 Evaluation of Primary Amenorrhea

Primary amenorrhea is characterized by the absence of menstruation throughout life. The source case emphasizes that evaluation should be initiated when menarche has not occurred by the expected age or when pubertal development is delayed (ACOG, 2015; Gordon et al., 2017; Klein et al., 2019). The diagnostic approach includes detailed menstrual and pubertal history, assessment of weight and body mass index, physical examination for pubertal development and signs of hyperandrogenism, hormonal testing, and pelvic imaging (Klein et al., 2019).

The etiologic approach can be organized according to four anatomical and functional compartments: the uterus and outflow tract, the ovary, the pituitary gland, and the hypothalamus or central nervous system (Klein et al., 2013; Tudhur et al., 2015). The differential diagnosis includes congenital outflow tract abnormalities, ovarian insufficiency, hypothalamic or pituitary disorders, hyperprolactinemia, thyroid disease, Cushing syndrome, androgen-secreting tumors, congenital adrenal hyperplasia, PCOS, chronic disease, and physiological conditions (Tudhur et al., 2021; Abhishek et al., 2018).

In this patient, pelvic ultrasonography demonstrated a normal uterus and ovaries without abnormalities of the internal genital organs. Prolactin and thyroid function were not elevated, and the patient did not have clinical findings suggesting an outflow tract obstruction. In contrast, the presence of hirsutism and elevated testosterone directed the evaluation toward hyperandrogenism and PCOS (Tudhur et al., 2021; Londonkar et al., 2023).

3.2 PCOS and the Clinical Findings

PCOS is described in the source material as an endocrine disorder associated with reproductive dysfunction. It is characterized by abnormalities in androgen and estrogen metabolism and is closely associated with hyperinsulinemia, peripheral insulin resistance, and obesity. Increased androgen concentrations, particularly testosterone, androstenedione, and DHEAS, may coexist with increased LH secretion and normal or low FSH concentrations, contributing to impaired follicular development and ovulatory dysfunction (Soni et al., 2018).

The patient demonstrated several features compatible with this pathophysiological framework. She had amenorrhea, clinical hirsutism with a Ferriman–Gallwey score of 12, elevated serum testosterone, elevated fasting insulin, obesity with a body mass index of 33.7 kg/m², and an increased LH relative to FSH. The source material explains that hyperinsulinemia can enhance androgen production by ovarian theca cells, decrease hepatic SHBG, and increase free testosterone. It may also interact with LH and IGF-1, promote androgen production, and interfere with folliculogenesis (Klein et al., 2013; Sneha et al., 2023).

Obesity may further contribute to the metabolic and endocrine abnormalities associated with PCOS. The source case describes visceral adipose accumulation as a contributor to chronic low-grade inflammation, hyperinsulinemia, insulin resistance, and hyperandrogenism (Sneha et al., 2023). In this patient, the combination of obesity, elevated insulin, and biochemical hyperandrogenism therefore provided an important clinical context for the diagnosis and management.

3.3 Diagnostic for PCOS

The source material discusses the Rotterdam criteria, which require two of three features: oligo-ovulation or anovulation, clinical or biochemical evidence of androgen excess, and polycystic ovarian morphology on ultrasonography. Hyperandrogenism may be manifested clinically by hirsutism, acne, or androgenic alopecia and may also be demonstrated biochemically. The source material further describes four Rotterdam phenotypes based on combinations of androgen excess, ovulatory dysfunction, and polycystic ovarian morphology (Sneha et al., 2023).

In this case, the patient clearly demonstrated amenorrhea and clinical and biochemical hyperandrogenism. However, pelvic ultrasonography did not show abnormal internal genital organs and both ovaries were described as within normal limits on the repeat examination. The diagnosis was nevertheless concluded in the source case as PCOS based on the overall clinical and laboratory assessment and the Rotterdam framework. Because the patient was an adolescent/young adult, the source material also notes that PCOS diagnosis in younger patients may be challenging because menstrual anovulation and polycystic ovarian morphology can overlap with normal developmental findings (Sneha et al., 2023).

The differential diagnosis was appropriately considered in the clinical evaluation. The source case included idiopathic hirsutism, androgen-secreting neoplasms, and Cushing syndrome. The recommended investigations included DHEA-S, morning cortisol, and IGF-1, in addition to assessment of the lipid profile. The source material also describes 17-hydroxyprogesterone for evaluation of late-onset congenital adrenal hyperplasia and hormonal and imaging investigations for other causes of amenorrhea (Klein et al., 2013; ACOG, 2015; Sneha et al., 2023).

3.4 Management of PCOS in Adolescents and Young Women

Management of PCOS should be individualized according to the patient's clinical goals. The source material identifies weight reduction, reduction of hirsutism, menstrual regulation, fertility, metabolic risk reduction, prevention of endometrial hyperplasia, and mental health as important treatment objectives (Sneha et al., 2023). Lifestyle intervention is recommended as first-line therapy for all patients, including weight management, dietary modification, and increased physical activity (Guang et al., 2018).

For patients with obesity, the source material recommends caloric reduction, increased dietary fiber, and individualized energy restriction. It also describes potential benefits of high-protein and low-carbohydrate dietary approaches and regular physical activity. Moderate-intensity activity of at least 250 minutes per week or vigorous activity of 150 minutes per week, together with muscle-strengthening activity on two nonconsecutive days per week, is described in the source material (Klein et al., 2019). The management provided to this patient was consistent with the emphasis on lifestyle intervention. She received counseling for gradual weight reduction, increased physical activity, and a low-carbohydrate, low-fat diet. This approach was particularly relevant because her obesity and elevated fasting insulin were important components of her clinical presentation.

For menstrual abnormalities, the source material discusses hormonal contraception, progestin-only therapy, cyclic progesterone, and other progestin-containing methods as options that can provide endometrial protection. In this case, a medroxyprogesterone acetate challenge was used during the diagnostic evaluation. For hyperandrogenic manifestations, the source material describes mechanical hair removal, eflornithine, antiandrogens such as spironolactone, and combined estrogen/progestin contraceptive therapy as potential options (Sneha et al., 2023).

For patients seeking pregnancy, lifestyle modification is emphasized, particularly in women with obesity. The source material identifies letrozole as first-line ovulation induction therapy, with clomiphene as an alternative and gonadotropins or assisted reproductive technology considered when initial treatment is unsuccessful. Metformin may provide moderate improvement in pregnancy rates through improvement of insulin resistance. These options were not the immediate focus in the present case because the patient was unmarried and the initial management emphasized diagnostic evaluation, metabolic risk reduction, and menstrual management (Sneha et al., 2023).

4. CONCLUSION

This case describes a 19-year-old woman with primary amenorrhea, clinical and biochemical hyperandrogenism, hyperinsulinemia, and grade II obesity. The diagnostic evaluation included history taking, physical examination, hormonal laboratory assessment, pelvic ultrasonography, and consideration of differential diagnoses for hyperandrogenism. The source case concluded that the overall findings were consistent with PCOS based on the Rotterdam framework.

Management consisted of a progestin challenge, follow-up of withdrawal bleeding, multidisciplinary assessment, and lifestyle modification including gradual weight reduction, physical activity, and a low-carbohydrate, low-fat diet. The case emphasizes the importance of a structured evaluation of primary amenorrhea and individualized management of PCOS with attention to reproductive, metabolic, and hyperandrogenic manifestations.

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AUTHOR'S CONTRIBUTIONS

All authors discussed the results and contributed to from the start to final manuscript.

CONFLICT OF INTEREST

The authors declare that they have no competing interests.

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