CASE REPORT

Postmenopausal Alopecia due to Ovarian Hyperandrogenemia Treated with Bilateral Salpingo-oophorectomy

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Abstract

Introduction: Increased ovarian production of androgens due to the stimulation of luteinizing hormone (LH) on theca cells can cause hyperandrogenism that may present with signs of alopecia in postmenopausal women.

Case description: A 65-year-old postmenopausal woman presented to the gynecology clinic with male-pattern baldness. Serum testosterone was high that was suppressed with gonadotropin-releasing hormone analog (GnRH agonist). This confirmed ovarian source of androgens. Laparoscopic salpingo-oophorectomy helped reduce androgen levels over a period of an year therefore reversing at least partially the hair loss.

Conclusion: Gonadotropin-releasing hormone analogs can be useful to diagnose the source of increased androgen levels to be of ovarian origin. Once confirmed, laparoscopic bilateral salpingo-oophorectomy can reverse hair loss in these cases.

Keywords: Bilateral salpingo-oophorectomy, Gonadotropin analogs, Male-pattern baldness, Ovarian hyperandrogenemia, Postmenopausal alopecia.

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Introduction

Hyperandrogenism may present with acne, hirsutism, and signs of virilization characterized by male-pattern baldness, deepening of voice, and clitoromegaly. With reduction of ovarian follicles in menopause, there is diminished estrogen and progesterone secretion. This increases the impact of androgens on sebaceous glands and hair follicles, resulting in the transformation of vellus hair follicles to terminal hair follicles.[1] The postmenopausal ovary remains hormonally active, secreting lower but significant amounts of androgens and estrogens.[2] The very high gonadotropin levels of menopause can maintain androgen production by luteinizing hormone (LH) stimulation on theca cells.[3,4]

Case Description

Medical History and Clinical Features

A 65-year-old woman presented with progressive male pattern of frontal baldness of 2 years duration. She had menopause aged 50 years and has never used hormone replacement therapy (HRT). She had slightly increased facial hair but denied deepening of voice, increased muscle mass, or increased libido. She had hypothyroidism and hypercholesterolemia controlled on thyroxin and statins. Her family history was unremarkable. Her hair appeared to be stubbly and brittle. Her body mass index (BMI) was 27 kg/m^2.

Investigations

She was initially seen by the endocrinologists. Investigations demonstrated an elevated testosterone 5.2 nmol/L (normal <3.4 nmol/L), androstenedione 8.9 nmol/L (normal range 0.9–6.8 nmol/L), sex hormone binding globulin (SHBG) 35 nmol/L, and free androgen index (FAI) 16.6 nmol/L (normal <7 nmol/L). Dehydroepiandrosterone (DHEA) (a marker of adrenal androgens) — 3.2 µmol/L was normal. Follicle stimulating hormone (FSH) — 52 IU/L, LH — 28 IU/L confirmed menopausal status.

Urinary 24-hour cortisol and steroid profile were normal. She suppressed to both low and high doses on dexamethasone suppression test. Short synacthen test confirmed normal response. Ultrasound examination of the ovaries and the adrenal glands and magnetic resonance imaging (MRI) scan of the pituitary gland were normal.

Differential Diagnosis

Common differential diagnoses of female alopecia include polycystic ovary syndrome (PCOS), obesity-induced hyperandrogenemia, androgen-secreting ovarian or adrenal tumors, Cushing's syndrome, congenital adrenal hyperplasia (CAH), and iatrogenic causes, such as drugs or surgery.

Treatment

A second free testosterone level was raised at 5.9 nmol/L and androstenedione of 9.7 nmol/L. To prove our hypothesis of suspected ovarian source of androgens, she was given a trial of single 3.75 mg intramuscular dose of leuprorelin acetate, a gonadotropin-releasing hormone (GnRH) analog, to suppress ovarian function. This significantly reduced her testosterone levels to 1.9 nmol/L. The options of long-term treatment with GnRH analogs or surgical removal of her ovaries were discussed.

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Operative Findings

She underwent laparoscopic bilateral salpingo-oophorectomy. Laparoscopy confirmed bilateral atrophic ovaries macroscopically and histology confirmed normal ovarian tissue in keeping with her menopausal status.

Outcome and Follow-up

Four months following surgical treatment, testosterone levels dropped to 1.1 nmol/L and 1-year follow-up demonstrated cessation and partial reversal of her hair loss.

Discussion

Polycystic ovary syndrome typically presents in early reproductive age but do not disappear after menopause and may get worse because of imbalance between estrogen and androgens. Hyperthecosis is a severe form of PCOS and results from overproduction of androgens in the ovarian stromal cells. Peripheral estrogens and androgen production are increased and these women are often at risk for endometrial hyperplasia and carcinoma.[5] She had no history of hirsutism, infertility, or irregular menses premenopause and her ultrasound scan (USS) showed small ovaries ruling out PCOS.

Women with obesity-induced hyperandrogenism have normal menarche and irregular menstruation, typically developing hirsutism associated with sudden weight gain. This is thought to be due to excess aromatase and 5-alpha reductase in adipose tissue leading to increased local estrogen and androgens. In this case, her BMI was normal.

Congenital adrenal hyperplasia was ruled out with the absence of clitoromegaly, presence of normal genital organs along with normal short synacthen test.

Ovarian or adrenal tumors usually present with a rapid and progressive course. After menopause, ovarian causes of hirsutism and virilization are more common compared with adrenal disorder.[6,7] Ovarian tumors that present with hyperandrogenism include Sertoli cell tumors, Leydig cell tumors, and ovarian thecomas. These tumors are rare representing only 10% of all ovarian tumors. Adrenal androgen-secreting tumors present in young children and between 40 years and 50 years. They usually secrete DHEA, dehydroepiandrosterone sulfate (DHEAS), glucocorticoids, estrogen, and rarely testosterone.[8,9]

Cushing's syndrome is caused by adrenal hyperplasia due to excess adrenocorticotropic hormone (ACTH). This present with tissue bruising, abdominal striae, myopathy, buffalo hump, hirsutism, and amenorrhea commonly around 30 to 50 years of age. Urinary 24-hour cortisol was normal and a dexamethasone suppression test was negative. Dehydroepiandrosterone levels, adrenal imaging, and MRI of pituitary gland were normal along with the absence of symptoms, ruling out the possibility of Cushing's syndrome and adrenal tumor.

Once ovarian origin of hyperandrogenism was established, surgical removal of the ovaries led to reduction of testosterone to normal postmenopausal range and therefore symptom control. This case illustrates the diagnostic challenges and successful treatment of hyperandrogenism in a postmenopausal woman.

Conclusion

Alopecia in postmenopausal women could be a very distressing problem and in some cases could be because of a serious underlying condition. The diagnosis of the etiology could be a challenging process. However, in this case, the use of GnRH analogs confirmed the ovarian source of increased androgens that was treated successfully with laparoscopic bilateral salpingo-oophorectomy. Her alopecia was reversed slowly but surely during the 1-year follow-up.

Learning Outcomes

- Hyperandrogenemia may lead to male-pattern baldness in postmenopausal women that could be a very distressing condition and may even signify a potential serious underlying pathology.
- Gonadotropin-releasing hormone analogs can help diagnose ovarian source of androgens by suppressing the stimulation of thecal cells by LH that is usually high in postmenopausal women.
- Once confirmed, laparoscopic removal of the ovaries may reverse the alopecia in many cases.

Author Contributions

Santanu Acharya and Srirupa Chakravorty contributed in concept and design. Santanu Acharya, Srirupa Chakravorty, and David Rae drafted the article. Santanu Acharya, Srirupa Chakravorty, and David Rae helped in approval of the version to be published.

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