Case Report

Fine-needle aspiration cytology of ovarian steroid cell tumor: A rare case report

ABSTRACT
Steroid cell tumors (SCTs) of the ovary are a rare subgroup of sex cord tumors that account for less than 0.1% of all ovarian tumors. These tumors can produce steroids, especially testosterone, which produces symptoms such as hirsutism, amenorrhea/oligomenorrhea, and male patterned voice. For evaluation of the androgen excess, testosterone and dehydroepiandrosterone sulfate (DHEA-S) are the first laboratory tests to be measured. Abdominal ultrasound and magnetic resonance imaging (MRI) are useful radiologic imaging techniques. Although SCTs are generally benign, the risk of malignant transformation is always present. Surgical excision of tumor is the most important and hallmark treatment. The present case signifies the early preoperative diagnosis of a virilizing SCT, based on cytological features and its careful correlation with clinicopathological and radiological findings.

Key words: Androgen; cytology; ovary; sex cord; steroid cell tumor (SCT)

Introduction
Steroid cell tumors (SCTs) of the ovary are a rare subgroup of sex cord tumors that account for less than 0.1% of all ovarian tumors, which can present at any age. These tumors can produce steroids, especially testosterone, giving symptoms such as hirsutism, hair loss, and amenorrhea/oligomenorrhea. The origin of SCTs has long been a matter of controversy and debate. Their nomenclature as such arises from their resemblance to steroid hormone secreting cells (lutein/leydig/adrenal cortical rest cells), they have been basically subclassified as stromal luteomas, leydig cell tumors, and SCTs not otherwise specified. In the present case, early preoperative diagnosis of a SCT (not otherwise specified) was made cytologically by correlating with clinicopathological and radiological findings. To the best of our knowledge, no such correlation has been published yet.

Case Report
An 18-year-old adolescent virgin female visited the hospital with the complaint of amenorrhea of 6 months, male patterned voice, and hirsutism. Physical examination revealed bilateral retracted nipple, clitoral hypertrophy, and abnormal hair growth on the face, chest, abdomen, legs, and arms. Abdomen ultrasound scan identified well-circumscribed, solid left ovarian mass lesion [Figure 1]. The images of magnetic resonance imaging (MRI) revealed a left ovarian mass (about 6.2 × 5.6 × 5.5 cm) with spoke wheels pattern having fat clefts. Contrast images showed avid enhancement with few nonenhancing acellular areas favoring fine-needle aspiration cytology (FNAC)-induced...
changes] [Figure 1]. Her laboratory findings showed normal hemogram, electrolyte, creatinine, and liver enzyme levels. Her Ca-125, Ca-19-9, and alpha-fetoprotein (AFP) levels were within normal limits. Thyroid-stimulating hormone (TSH), cortisol, prolactin, and estradiol were normal but testosterone and lactate dehydrogenase (LDH) levels were elevated and were 926 ng/dL and 466 U/L, respectively (normal reference level of testosterone in females = 6.0-82 ng/dL and LDH in nonpregnant females = 115-211 U/L). Ultrasound (US)-guided FNAC was performed and cytosmears revealed large polygonal to round cells arranged in sheets as well as attached with vascular stromal tissue fragments. The cells showed small central round nuclei with conspicuous nucleoli, and abundant granular to pale multivacuolated (foamy) cytoplasm [Figures 2a and b]. The differential diagnoses, which were kept in mind were SCT (NOS), Leydig cell tumor, lipid rich sertoli cell tumor, stromal luteoma, oxyphilic variants of other ovarian tumors, and other metastatic tumors. We had excluded most of the above diagnoses keeping in mind the MRI findings, testosterone level, age, size of tumor, and androgenic symptoms. A cytodiagnosis of SCT (NOS)/Leydig cell tumor was given. Excision biopsy was advised for confirmation.

The patient underwent an exploratory laparotomy and left salpingo-oophorectomy was performed. Grossly, the cut surface was vaguely solid, multilobulated, and bright yellow without areas of necrosis and hemorrhage [Figure 2c]. Microscopically, the tumor consisted of nests and columns of large round to polygonal cells separated by a rich network of capillaries. The tumor cells had a moderate to abundant amount of cytoplasm, varied from clear multivacuolated to granular and eosinophilic with small centrally located uniform nuclei having prominent nucleoli [Figure 2d]. There were no Reinke’s crystals, cellular atypia and mitotic figures. The tumor was diagnosed as “steroid cell tumor, NOS.”

**Discussion**

When a young woman comes with a rapid and sudden history of menstrual irregularity with virilizing symptoms and androgen excess situation, a suspicion of a masculinizing ovarian tumor must come to mind immediately. SCTs show generally androgenic symptoms such as amenorrhea, abnormal hair growth on the face and legs, and hair loss with a range of 12-50% and that takes a long time to become evident.[1] Signs and symptoms of these tumors occur in the following order: At the early stage, oligomenorrhea and minimal abnormal hair growth on the body and after that amenorrhea and other female external genitalia, hirsutism, acne, clitoral hypertrophy, and hair loss.[5] This patient had amenorrhea, excessive hair growth, male patterned voice, bilateral retracted nipple, and clitoral hypertrophy since the last 6-8 months.

For the evaluation of androgen excess, testosterone and dehydroepiandrosterone-sulfate (DHEA-S) are the first laboratory tests to be measured.[6] Elevation of testosterone levels above 200 ng/dL is an important diagnostic threshold level for the discriminating androgen-secreting tumors and nonneoplastic lesions.[7] This patient
had testosterone levels of 926 ng/dL and this elevated level directed us toward the screening of the pelvic structures. For elevated levels of testosterone, a pelvic ultrasound and a MRI are other useful radiologic imaging techniques for the assessment of ovary and adrenal glands.\[^8\] They are usually unilateral, solid, slightly hyper or hypoechoic lesions as compared to the ovary and not associated with ascites.\[^9\] We performed ultrasound and MRI for assessment of the ovaries. Adrenal scanning was performed since the test for DHEA-S level was not available at our institute. We noted normal adrenals and a unilateral (left-sided), solid, hyperechoic ovarian tumor without ascites as described in the literature. A careful correlation between clinical findings and histopathology is always essential, as demonstrated by this particular case.

SCTs are generally unilateral and benign; malignancy is generally associated with identification of the histopathologic findings: Two or more mitotic figures per 10 high-power fields — 92% malignant, necrosis — 86% malignant, size of 7 cm or larger — 78% were malignant, hemorrhage — 77% malignant, and grade 2/3 nuclear atypia — 64% malignant.\[^10\] For our patient, the histopathology result revealed a 6-cm size of unilateral mass without atypia, necrosis, and mitosis and hence, the diagnosis of SCT (NOS) was made.

**Conclusion**

With the early diagnosis of ovarian SCT by FNAC, management of patients can be planned and ultimately virilizing symptoms can be neutralized with time.

SCT is very rare and cytomorphological features may be mistaken for nonneoplastic elements such as cyst macrophages and luteinized thecal cells. Androgenic symptoms with increased testosterone levels are important additional supporting signs of a functional ovarian tumor, and cytological features, i.e., bimodal cells with characteristic cytoplasm, prominent nucleoli, and attachment of tumor cells to vascularized stromal tissue are quite sufficient to raise the suspicion of SCT.

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**Conflicts of interest**

There are no conflicts of interest.

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