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ORIGINAL ARTICLE

Ultrasound assessment of polycystic ovaries: Ovarian volume and morphology; which is more accurate in making the diagnosis?!

Heba Ibrahim Ali *, **Momena Essam Elsadawy**, **Nivan Hany Khater**

Department of Radiology, Ain Shams University, Ramsis Street, Cairo, Egypt

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KEYWORDS

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Abstract *Introduction and aim of the work:* Polycystic ovaries (PCO) are a common problem among females. As ultrasound examination of such cases is easy, available, cheap and less invasive than hormonal assessment, it is commonly used in patients with suspected PCO.
However, in practice, Ultrasound findings are sometimes equivocal when some patients have normal ovarian volume but with abnormal ovarian morphology. Herein, the study aimed to compare the strength of measuring ovarian volume in patients with PCO versus the ovarian morphology and whether one finding alone could make the diagnosis.
Materials and methods: Ninety patients with clinically and laboratory diagnosed PCO and 90 age matched controls were enrolled in the study. Transabdominal and transvaginal ultrasound was done for assessment of ovarian volume and morphology.
Results: In patients, 16 (8.8%) ovaries showed normal morphological appearance while the rest (91.1%) showed morphological picture of PCO in the form of detection of 10 or more cysts of 2–8 mm in diameter peripherally arranged around an echodense stroma.
Conclusion: Ovarian morphological is more reliable than ovarian volume in diagnosing patients with polycystic ovarian syndrome.

1. Introduction

The condition now known as polycystic ovarian syndrome (PCOS) was first described by Stein and Leventhal in 1935 (1). PCOS is the most common reproductive endocrinopathy of women during their childbearing years, with a reported prevalence of 5–10% (2). It is a heterogeneous disorder with variable manifestations (3).

The diagnosis of PCOS was previously based on a combination of clinical and endocrine features, including raised serum concentrations of luteinizing hormone (LH), Testosterone (T) and androstenedione and reduced levels of sex hormone binding Globulin (4,5).

* Corresponding author. Tel.: +20 1005269007.
E-mail addresses: hebaali_m@hotmail.com (H.I. Ali), momena.essam@yahoo.com (M.E. Elsadawy), nivan_khater@yahoo.com (N.H. Khater).
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The 2003 'Rotterdam criteria' allow the diagnosis to be made when two of three features are present: oligomenorrhea or anovulation, clinical or biochemical hyperandrogenism, and objectively defined polycystic ovaries on ultrasound (6).

In 1981, Swanson et al. (7) described PCO as enlarged and rounded, with a mean volume of 12 cm^3 and containing an increased number of small follicles (2–8 mm) encircling the ovarian cortex. However, the importance of ovarian size in diagnosis has lessened as various groups (8–10) have shown a considerable overlap between PCO and normal ovaries and as the upper limit of normal has decreased from greater than 10 to 5.5 cm^3 (11). In 1985, Adams et al. (12) published new criteria based on transabdominal ultrasound, which required 10 or more cysts of 2–8 mm in diameter arranged peripherally around an echodense stroma. However, these criteria have remained in widespread use even after the introduction of TVS a decade later.

The 2011 Evidence-based guideline for the assessment and management of polycystic ovary syndrome provides valuable advice to general practitioners on evidence based diagnosis and management (13).

In the current study, we tried to compare the reliability of ovarian morphology in cases of PCO versus ovarian volume. The hypothesis is that relying on morphological assessment of the ovary is more accurate than ovarian volume measurement especially when there is discrepancy between both.

2. Patients and methods

2.1. Study population

From the period of November 2012 to May 2014, ninety women already diagnosed with PCOS (by clinical and biochemical evidence) and 90 age-matched control women who have no clinical or hormonal abnormalities are also recruited into the study. Subjects' age ranges between 16 and 38, sixty-two patients had primary infertility, five had secondary infertility and twenty-three were unmarried who had clinical complaint of either: (1) Irregular menstrual cycles in the form of oligo- or anovulation (menstrual cycles <21 or >38 days), (2) Hirsutism, or (3) Obesity.

The laboratory findings included biochemical evidence of hyperandrogenism.

The inclusion criteria were clinically and laboratory evidence of PCOS and visualization of at least one ovary by transvaginal ultrasonography.

The exclusion criteria were use of hormonal contraception, fertility medications in the three months prior to enrollment, hyperprolactinemia, hypercortisolemia, and thyroid dysfunction.

2.2. Ultrasound technique

Ultrasound scans were performed between Days 3 and 7 of the menstrual cycle.

Using a Voluson E6 (GE Healthcare, Zipf, Austria), a 2–5 MHz abdominal probe and a 7.5-MHz transvaginal probe, all scans were performed in a private room after getting patient consent. Examination was done by a single ultrasonographer (with more than 10 year experience) and single senior Radiologist (with an experience of more than 8 years) separately.

Each ovary was visualized and anatomic orientation with respect to the utero-ovarian ligament was established. Ovaries were scanned from the inner to outer margins in both the transverse and sagittal planes.

The examination should include (1) ovarian volume, (2) total follicle count (3) largest follicle diameter and (4) follicle distribution pattern.

2.3. Interpretation

Ovarian volume was calculated from measurements of the largest and widest diameters of the ovaries in the transverse and sagittal planes. Total follicle count should include follicles more than 2 mm in diameter. Follicle distribution pattern is judged whether follicles were predominantly distributed in a "peripheral" pattern or heterogeneously ("Even") throughout the stroma.

This was an observational study approved by the local Ethics Committee, and each woman gave informed written consent. There are no conflict of interests to disclose.

3. Results

The study included 90 patients and 90 age-matched control women, with age range between 16 and 38 (average 27 years). 35 (38.8%) patients presented with menstrual irregularities, 29 (32%) with infertility, 15 (16.6%) with obesity and 11 (12.2%) with hirsutism.

All patients have abnormal hormonal profile in the form of elevated serum LH and testosterone levels.

Ultrasound examination was done for all patients and controls with successful visualization of both ovaries when combing transabdominal with transvaginal scan. A total number of 180 ovaries are evaluated in patients and similar number in controls.

Ovarian volume is plotted in Table 1; ovarian morphology is also evaluated based on follicle count, largest follicle diameter and follicle distribution within the ovarian parenchyma.

In all control subjects, ovarian volume was within average range (9.3 ml), and in patients, the ovarian volume ranged from 6.7 to 12.6 ml, with an average of 9.65 ml. Only 30 ovaries (16.6%) showed volume above normal.

Regarding the ovarian morphology, in all control subjects, the ovaries appeared with variable sized follicles, equally distributed within the ovarian stroma with a dominant follicle inside.

In patients, 16 (8.8%) ovaries showed normal morphological appearance while the rest (91.1%) showed morphological picture of PCO in the form of detection of 10 or more cysts of 2–8 mm in diameter peripherally arranged around an echodense stroma (Fig. 1).

4. Discussion

Polycystic ovary syndrome (PCOS) is a common endocrine disorder of unknown cause (14).

It is a highly variable condition with a wide array of presentations. The polycystic ovary syndrome should meet at least two of the following three criteria: oligo- or anovulation;