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

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Abstract
Introduction : *Polycystic ovarian syndrome (PCOS) is chronic anovulation condition with increased androgen level (Hyperandogenic anovulation).It is most common endocrine abnormality seen among young and middle age women. Prevalence in this age group is 5-25 %. The main triad of PCOS is – Hirsutism , obesity and oiligomennorrhea. Ultrasound is mainly used modality for evaluation of PCOS , because it is cost effective , readily available and noninvasive than hormonal assessment.*
Aims of study : *Importance of ultrasound assessment in making diagnosis of PCOS with special reference to ovarian volume & ovarian morphology.*
Material and Methods: *It is a prospective study , took duration of 9 months (April 2019 – December 2019). 50 patients with clinically and biochemically diagnosed PCOS were taken as subject and another same age group 50 females were taken as control in this study. In this study women were examined by transvaginal and transabdominal ultrasound for ovarian volume and ovarian morphology for making diagnosis of PCOS.*
Results: *In this study , 9 patients have normal morphologic appearance of ovaries , while rest of 41 patient shows typical appearances of PCOS – more than 10 follicles with average size of follicle 2-8 mm , peripheral distribution , central echogenic ovarian stroma. 16 patient shows ovarian volume more than normal limits – more than 10 cc.*
Conclusion: *In diagnosis of patient of PCOD ovarian morphology is found to be more sensitive criteria than ovarian volume according to this study.*
Key words: *Ovarian morphology & Volume , Hyperandrogen , Anovulation , Multiple small follicles with peripheral distribution.*

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I. Introduction

Polycystic ovarian syndrome (PCOS) is chronic anovulation condition with increased androgen level (Hyperandogenic anovulation).It is most common endocrine abnormality seen among women of young and middle age group. Prevalence in this age group is 5-25%. The main triad of PCOS is – Oiligomennorrhea , obesity and hirsutism. Ultrasound is mainly used investigation tool for evaluation of PCOS , because it is cheap , easily available and noninvasive than hormonal assessment.

Polycystic ovarian syndrome (PCOS) condition first described by stein and leventhal in 1935. In 1981 , PCOS as enlarged & rounded ovary with mean volume 12 cc , increased number of follicles (average diameter 2-8 mm) & peripheral distribution. However importance of ovarian volume has decreased with various age group because there is overlapping of findings of ovarian volume in normal females and patients of PCOS. In 1985 , a new criteria of PCOS by using transabdominal ultrasound – 10 or more cysts of average diameter 2-8 mm with preipherally arrange follicles and central echogenic stroma.

According to the 2003 ‘Rotterdam criteria’ , the diagnosis is made when two of three following features are present:

1 Oligomenorrhea or anovulation
2.Clinical or biochemical hyperandrogenism .
3.Multicystic ovaries on ultrasound.

In this study we tried to compare and show the reliability of ovarian morphology versus ovarian volume in assessment of patients of PCOS. My hypothesis in this study was ovarian morphology is more reliable & accurate than ovarian volume in making diagnosis of patients of PCOS.

II. Patients And Methods

- **Study Population :** It is a prospective study of duration 9 months (April 2019 – December 2019). 50 patients with clinically and biochemically diagnosed PCOS were taken as subject and another same age group 50 females were taken as controller in this study. Patient age ranges from 15 to 40 years. Among them 25 patients have infertility , 10 patients have secondary infertility and 15 pateints are unmarried with chief complain of – (1) Irregular menstrual cycle in form of oilgo/anovulation (2) Hirsutism (3) Obesity.

Inclusion Criteria : Clinically & Biochemically proven patient of PCOS- Hyperandrogenism.
Exclusion crieteria : Use of hormonal contraception , Fertility medications in the 4 months prior to USG , Hyperprolactinemia, Hypercortisolemia, and Thyroid dysfunction.

- **Ultrasound Technique** : All patient were examined in a private room after written consent. All patients were examined by transabdominal and transvaginal ultrasound (Logiq P5 , GE Healthcare). Tranabdominal probe frequency was 3-5 HZ & transvaginal probe frequency was 9-11 HZ. Examiner should be experienced (At least more than 10 years).

Every ovaries were examined in both axial and sagittal planes. Criteria of examinations were – Ovarian volume , Ovarian morphology , Numbers of follicles , Diameter of largest follicle , Distribution pattern.

- **Interpretation :** Ovarian volume was measured by largest , widest and highest diameter in both axial and sagittal plane. Total follicle was counted by follicles more than 2 mm in size. Distribution pattern was done by either peripheral or haphazard distribution.

III. Results

Our study included 50 patients and 50 same age group controller females with age ranged from 15 to 40 years. From them 25 patient had infertility , 15 patients had menstrual irregularity , 7 had obesity and 7 had hirsutism. All patients were clinically and biochemically proven case of PCOS prior to ultrasound examination.Ultrasound examination were done in both patients and controller and 100 ovaries were examined by tranabdominal and tranvaginal probe in both axial and sagittal plane.

Ovarian volume was measured by its highest , widest and longest diameter of ovaries. The graph of ovarian volume of patients and control was in fig (2). Ovarian morphology were considered by follicles count , diameter of largest follicles , distribution of follicles and ovarian parenchyma.). Ovarian morphology seen in fig (1).

Ovarian volume average in control measured 9.3 ml , where in patients of PCOS average measured 9.7 ml.Only 16 ovaries shows increased ovarian volume in our studies.

Ovarian volume in patients , only 9 patient showed normal morphology rest 41 patients showed abnormal morphology - PCOS – 10 or more cyst of avg diameter 2-8 mm with peripheral distribution & central echogenic stroma.

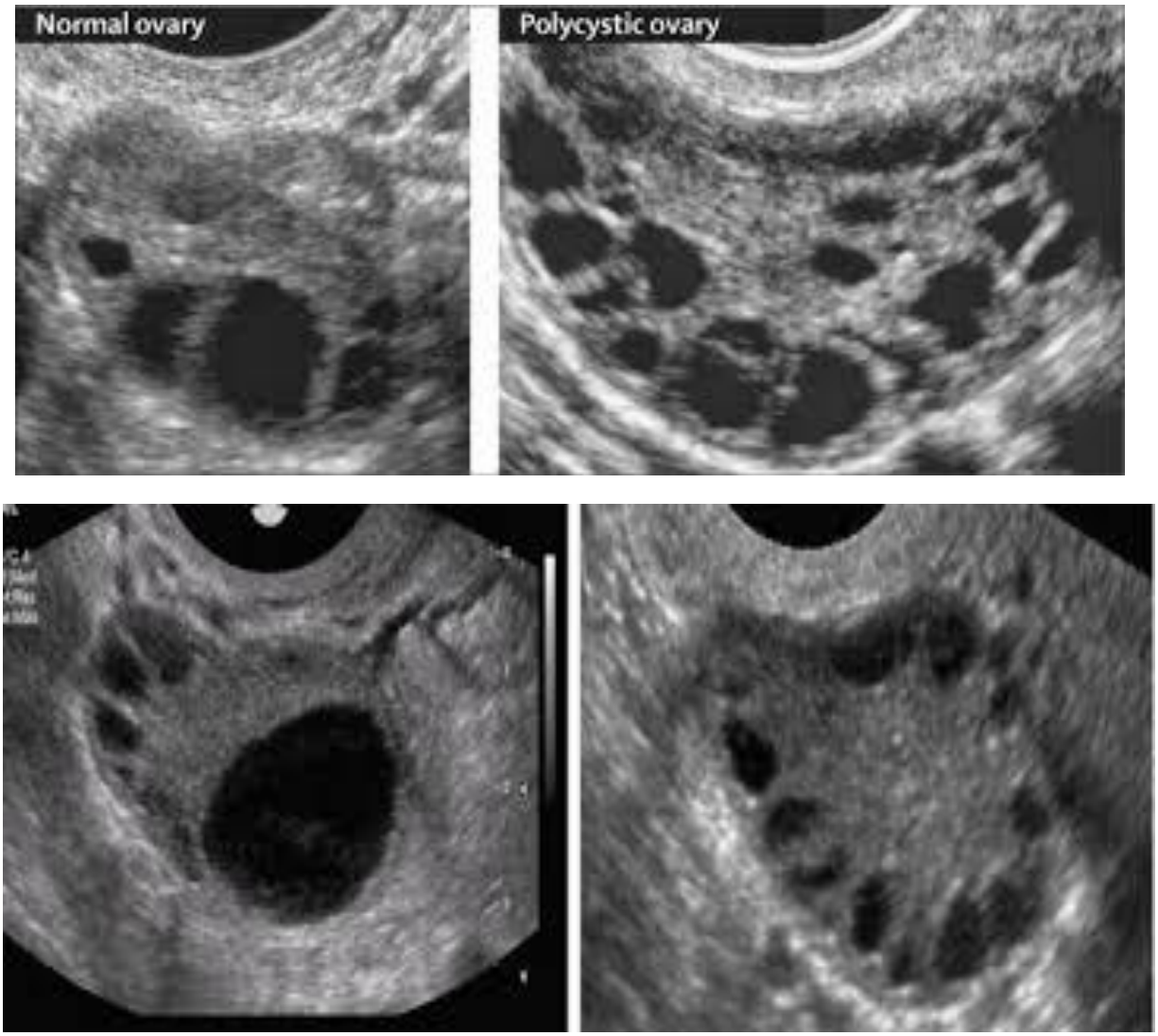

FIGURE - Ovarian morphology - Peripheral distribution of multiple follicles (more than 10 cysts and average size 2-8 mm) with central echogenic stroma in patients of PCOS.

IV. Discussion

PCOS is common endocrine problem which is seen among reproductive age group females. It has variable presentation with variable symptoms. For PCOS patients have atleast 2 criteria from three following criteria - oligomenorrhea or anovulation , clinical or biochemical hyperandrogenism , objectively defined polycystic ovaries on ultrasound.

In our study , 91 % cases showed peripheral distribution of follicles. 17 % cases shows increased ovarian volume (more than 12 cc).

Significant debate is going on sensitivity of increased ovarian volume as a crieteria for PCOS. Currentely accepted cut off for ovarian volume is more than 10 cc which have 98 % sensitivity and 45 % specificity. Since 2003 , lower and higher cutt off value for ovarian volume are 7cc and 13 cc respectively were accepted for PCOS.Ovarian morphology (Multiple follicles with peripheral distribution) was more helpful to set the diagnosis in patients of PCOS in our studies.

V. Conclusion

Summary: Ovarian morphology -Peripheral distribution of multiple follicles (more than 10 and average size 2-8 mm) with central echogenic stroma were seen more than increased ovarian volume in patients of PCOS in our study. So , our study concluded with - ovarian morphology is more reliable , sensitive , specific and accurate criteria for making diagnosis of PCOS and more helpful for radiologist in assessment of patients of PCOS.

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