

CAN ULTRASOUND SUBSTITUTE LAPAROSCOPY IN DIAGNOSIS OF POLYCYSTIC OVARIAN SYNDROME?

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ABSTRACT

Objective : To determine the diagnostic threshold of ultrasound in detecting PCO and to correlate it with clinical, hormonal and laparoscopic findings of polycystic ovarian disease. **Study design:** Cross sectional study. **Setting:** Aga Khan University Hospital, Karachi. **Duration:** From 2004 to 2006 for two years. **Outcome measure :** Presence of polycystic ovaries on ultrasound. Presence of polycystic ovaries on laparoscopy. **Results:** The sensitivity of ultrasound in diagnosing PCO is 87.7% and specificity is 99%. The sensitivity and specificity of S. LH S. Prolactin and S. Insulin are 38% and 100%, 13% and 90%, and 68% and 50% respectively **Conclusion :** This study showed that regarding morphology, ultrasound studies are nearly as informative as laparoscopy. The noninvasive nature of ultrasound makes repeat scans and follow up of ovarian response to therapeutic measure possible. **KEY WORDS:** Polycystic ovaries, Ultrasound, Laparoscopy.

Introduction

Polycystic ovarian syndrome (PCOS) is characterized by hyperandrogenism, chronic anovulation and/or polycystic ovaries after exclusion of other secondary causes.^{1,2} This syndrome affects 7-10% of women of reproductive age.³

In 2003 Rotterdam criteria by European society of Human reproduction and Embryology was introduced for the diagnosis of polycystic ovarian syndrome.⁴ It included ultrasound evidence of polycystic ovaries and clinical and hormonal evidence of hyperandrogenism.⁵ ultrasound have demonstrated that approximately 20% women have polycystic ovaries.^{6,7}

In 1985 Adam et al described the diagnostic criteria of polycystic ovaries (PCO) as presence of 10 or more follicle measuring 2-8 mm in diameter, arranged peripherally or scattered throughout an increased amount of stroma.⁸ Later in 1990, other studies described the use of ovarian volume as a marker for the diagnosis of PCO, and volume of $>10 \text{ cm}^3$ was included in Rotterdam criteria as a marker for diagnosis of PCOS.^{9,10,11}

LH hypersecretion is a well established finding in

women with polycystic ovarian syndrome.¹² The measurement of serum LH concentration and LH/FSH ratio is commonly used in the assessment of these women. Elevated level of LH or LH/FSH ratio has been associated with increased risk of infertility and menstrual cycle disturbances.¹³

A role of insulin resistance has been proposed in pathophysiology of PCOS. It has been seen that insulin sensitizer help in lowering the insulin levels and thus alleviates the symptoms of PCOS. Therefore they are now routinely being used in the management of PCOS.^{14,15}

Specifically many women with PCOS are at increased risk of developing metabolic syndrome, a CHD-associated clustering within the same individual of hyperinsulinemia, glucose intolerance, dyslipidemia, and hypertension. These women are also at increased risk of developing endometrial cancer due to chronic anovulation leading to unopposed estrogen. Therefore it is of prime importance to diagnose and treat PCOS, so as to prevent the development of late complications in such women.¹⁶

Ultrasound has sensitivity of 70% and specificity of 96-99% in detecting polycystic ovaries.¹⁷ However the range vary considerably due to different techniques of performing ultrasound, different operators as well as different ultrasound machines. This study was conducted to determine the diagnostic threshold of

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ultrasound in detecting PCO and also to correlate it with clinical, hormonal and laparoscopic findings of polycystic ovarian disease.

Material and Methods

This study was conducted in Aga Khan University hospital from 2004-2006. The study design was cross-sectional study and study population included the women who came to AKUH for the treatment and investigation of infertility. Hundred and fourteen medical records were reviewed for clinical findings, biochemical abnormalities, ultrasound findings and laparoscopic findings. The main clinical findings were oligo/amenorrhea, hirsutism, infertility and acne. Seventy percent of patient had primary infertility (n=54) while thirty percent (n=23) of women had secondary infertility.

Thirty seven patients were excluded due to inadequate medical records. The inclusion criteria were women aged 20-41 who came to AKUH for investigation and treatment of infertility. The exclusion criteria was age >41, women on ovulation induction therapy at the time of ultrasound and women with the history of ovarian surgery. Women had serum fasting insulin levels, leutinizing hormone, follicle stimulating hormone and prolactin levels on Day-2 of menstrual cycle.

All women underwent ultrasound pelvis and size and morphology of ovaries were recorded. Laparoscopy was performed as part of an infertility workup and the ovarian size, shape, capsule and surface were recorded. Ovarian drilling was also performed if needed. The main outcome measured were presence of polycystic ovaries on ultrasound, presence of polycystic ovaries on laparoscopy and the ability of biochemical markers to predict the presence of PCOS when compared to the laparoscopic findings.

Results

We had a total of 77 records for analysis. The mean age of our population was 27.68 years and the mean weight was 66.19kg. The mean hormonal levels with their standard deviations are described in (Table 1). We analyzed all the 77 records for evaluating the sensitivity and specificity of ultrasound. We found that the sensitivity of ultrasound was 87.7% while the specificity was 95%. We also tried to see the sensitivity and specificity of different hormonal levels with the diagnosis of PCOS. However, due to missing data, the

total records analyzed were less than 77 and were different for different hormones. The sensitivity and specificity of these hormones is shown in table 2. Among these hormones, we found the highest sensitivity of S. Insulin (68%) and highest specificity of S. LH (100%).

Table 1: Means (SD) of study variables

Variables	Mean	SD
Age (in years)	27.68	4.95
Weight (in KG)	66.19	12.4
S. Insulin ()	13.79	7.55
S.FSH ()	7.95	12.6
S. Prolactin ()	17.31	11.64
S. LH ()	9.11	5.65

Table 2: Sensitivity and Specificity of study variables

Variables	Mean	SD
Ultrasound*	87.7	99
S. LH**	38	100
S. Prolactin***	13	90
S. Insulin****	68	50

Records analyzed

*77
**55
***55
****50

Discussion

The condition known as polycystic ovarian syndrome was first described by Stein and Leventhal in 1935 as comprising amenorrhea, hirsutism, obesity and sclerotic ovaries. It is one of the most common endocrinopathies affecting 5-10 % of women of reproductive age. Ultrasound studies have demonstrated that approximately 20% of women have polycystic ovaries, of who around 27-70% have symptoms of infertility, menstrual cycle abnormalities or hirsutism consistent with the diagnosis of polycystic ovaries. However the finding of PCO on ultrasound does not per se warrant such a diagnosis.

This study was conducted in view that pelvic ultrasound have assumed an increasing importance in the

diagnosis and the management of ovulatory disorder and assessment of ovarian morphology by use of ultrasound has become a substitute for surgical examination in diagnosis of PCOS.


This study showed that regarding morphology, ultrasound studies were nearly as informative as laparoscopic findings of PCO. The noninvasive nature of ultrasound makes repeat scans and follow up of ovarian response to therapeutic measure possible. Our study shows that the sensitivity of ultrasound in diagnosing PCOS is almost 88% and specificity is 99%. This result is better than the result observed by Michael C. Allemand et al¹⁸ according to whom sensitivity was 70% and specificity was 100%. Our results are comparable to the results of Anna Maria Flugesu et al¹⁹ according to whom sensitivity and specificity of ultrasound in diagnosing PCO were both 100%.

Our study has certain limitations; foremost among them is the inability to analyze the hormonal data for all the cases. Despite this limitation, we were able to achieve a reasonable percent of sensitivity. This suggests that if adequate sample size is used than the hormonal levels can better predict the polycystic ovarian syndrome.

Another important limitation is that the data collected included both trans abdominal as well as trans vaginal ultrasounds. Also, the person performing the ultrasound as well as the machines used for ultrasound varied from time to time. This tends to introduce inter observer bias. Therefore even better results can be achieved by maintaining uniformity in the form of a single radiologist and single operating machine. In conclusion, ultrasound can predict the presence or absence of polycystic ovaries almost as accurately as laparoscopy. Hormonal levels also help in the diagnosis as well as management of PCOS.

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