Chung Shan Med J 8 : 53~58, 1997

Transvaginal Utrasound Imaging And Endocrinology Finding In Patients With Polycystic Ovarian Syndrome

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To clarify the endocrinologic characteristics of multifollicular ovaries (MFO) diagnosed by ultrasound and the comparative study of endocrine among ovulatory patients with MFO and anovulatory patients with polycystic ovarian syndrome (PCOS) were examined. LH and LH/FSH ration in PCOS were significantly higher than those in patients with MFO. However, there was no significant difference in FSH levels between the two groups. In the endocrine criteria of PCOS, we found LH/FSH value at 2.4 cut-off point has significantly difference in our MFO and PCOS patients. However, we suggest that ultrasound is useful to rule-out the probability than to diagnose PCOS.

Key word: polycystic ovary syndrome (PCOS), LH, FSH.

Introduction

Polycystic ovarian syndrome (pcos) is a complex disease characterized by abnormalities in gonadotropin secretion, acyclic estrogen production, and hyperandrogenism.[1-4] It has been suggested that the condition represents a nonspecific response of the ovary to a variety of causes of chronic anovulation.[5,6] As a polycystic reaction due to the growth of multiple follicles during the early follicular phase, PCOS is one of the most frequently seen anatomic and physiologic abnormalities of the ovary. It can be ultrasonically detected in many physiologic cycles,[7] and in premenarcheal[8] and postmenarcheal girls.[9] Furthermore, PCOS are found in more than 20% of normal women who are not taking oral contraceptives.[10]

Although conceptual confusion still remains unsolved because of heterogeneity existing in symptomatology, endocrine pathophysiology, as well as ovarian morphological abnormalities. The interchangeable use of the term polycystic ovarian syndrome only on the basis of morphological changes of the ovarian has broadened the original concept[1] with the result of much confusion in defining this syndrome as a clinical entity.

The aim of this investigation was to estimate the accuracy of diagnosis of PCOS by

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transvaginal ultrasound and to establish endocrinologic criteria for diagnosis of PCOS by our data.

Materials and Methods

Patients

Total of 252 patients between 19-42 years of age who presented to the gynecological infertility/endocrine clinic at Chung Shan medical & dental college were studied. 77 patients were diagnosed as PCOS by transvaginal sonography with there criteria of chronic anovulation, luteinizing hormone (LH) hypersecretion and euprolactinemia and 175 patients in whom bilateral multifollicular ovaries were detected by ultrasound. None of these patients had received hormonal treatment for at least 6 months before this study. Hyperandrogenmia and/or 3ndrogenic manifestations were found in some of the selected patients, but there were not regarded as essential criteria. all PCOS patients were anovulatory as evidenced by persistent monophasic low basal body temperature and low serum progesterone (P) levels. In addition the patients did not manifest diabetic patterns in oral glucose tolerance test and overweight was defined as BMI> 25.[11] Patients having increased hair growth of the masculine pattern on any of the face, chest, abdomen, pubic region, or legs were recorded as hirsute.

Hormone Measurements

Luteinizing hormone (LH), follicle-stimulating hormone (FSH) and prolactinemia were measured by RIA using the double antibody method. The Second International Reference Preparation of human menopausal gonadotropin was used as a reference preparation. Blood was drawn on the same days at the initial ultrasound examination.

Pelvic ultrasound examination

Pelvic ultrasound examination was carried out in each patient by the same investigators using a Aloka 680 with a 7.5/5 MHz transvaginal transducer. Examination was performed either between cycle days 3-7 in women with regular menstrual cycles and on the 3rd to 7th day after initiation of spontaneous menstrual bleeding in patients with anovulatory regular cycles or P-induced withdrawal bleeding in amenorrhea patients. The criteria to defined PCO were those of Adams et al,[12] namely the presence of multiple (>10), small (2-8 mm) peripheral cysts around a dense core of stroma in each ovary. The number of small cysts in both ovaries was carefully calculated.

Statistical analysis

The data were analysis using X^2 test and Student t-test. When P value was<0.05, difference was regarded as significant.

Results

Clinical Profiles and Ovarian Size

Figure 1 revealed the picture of PCOS examined by vaginal ultrasound, the ultrasound criteria of PCOS was based on the report of Adams et al. Although the mean age in MFO patients (30.1 ± 2.7) was older than that in PCOS patients (28.5 ± 3.5), with no significant difference between the different groups. BMI in MFO patients and PCOS patients were 21.3 ± 1.5 and 22.5 ± 3.5, respectively (Table 1), BMI in ovulatory patients with MFO were not significantly different from anovulatory patients with PCOS. Mean value of ovarian size in PCOS group (4.5 ± 1.1) was significantly ($P < 0.05$) larger than that in MFO group. (3.1 ± 0.8) (Table 1)

Endocrine Profiles

Table 2 shows the endocrine measurements in anovulatory patients with PCOS and

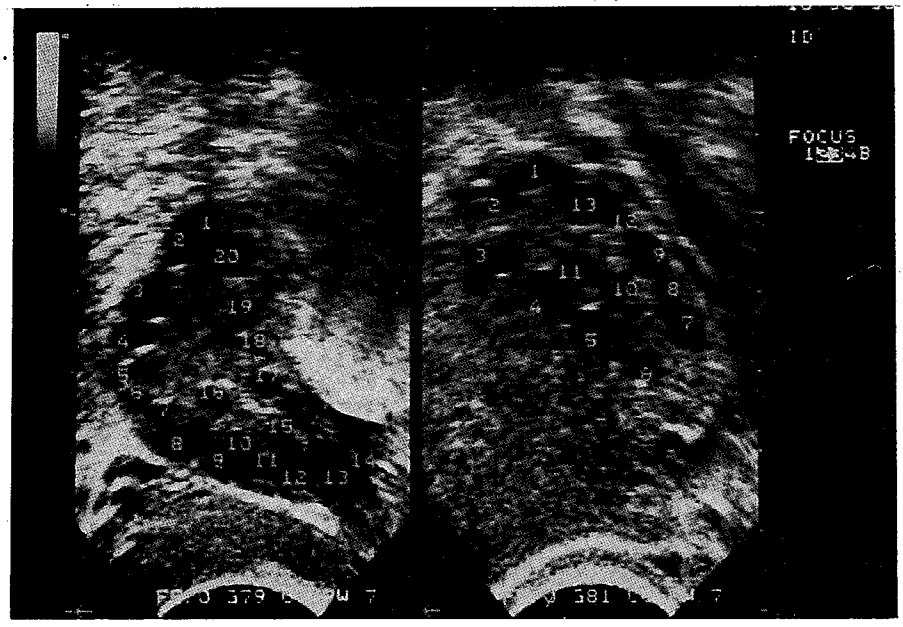

Fig. Picture PCOS diagnosed by ultrasound. Small, multiple and arranged cysts under the capsule of the ovary.

Table 1. Demographic distribution of MFO and PCOS patients

	number	age	parity	ovarian size
Ovulatory patients with MFO	175	30.1±2.7	0.6±0.3	3.1±0.8[a]
Anovulatory patients with PCOS	77	28.5+3.5	0.7±0.5	4.5±1.1[a]

Student t-test.
[a]P<0.05

Table 2. Comparative study of clinical profiles and endocrine measurements between MFO and PCOS patients.

	BMI	LH	FSH	LH/FSH	prolactin
Ovulatory patients with MFO	21.3±1.5	11.7±3.3[a]	8.6±2.1	1.4±0.3[b]	9.6±2.1[c]
Anovulatory patients with PCOS	22.5±3.5	19.0±4.7[a]	9.0±2.7	2.1±0.4[b]	12.4±3.2[c]

Student t-test.
[a,b,c]P<0.05

Table 3. Comparative study of LH/FSH value at 2.4 between MFO and PCOS patients.

	LH/FSH≧2.4 N	LH/FSH<2.4 N	Total N
Ovulatory patients with MFO	31	144	175
Anovulatory patients with PCOS	47	30	77
Total	78	174	252

X^2 test.
sensitivity: 60.3% specificity: 82.8%
positive predict value: 61.0%
negative predict value: 82.3%

ovulatory patients with MFO. There was no significant difference in the FSH between the different subjects. Although prolactinemia was higher in the PCOS groups, two groups were also within normal ranges. The LH and LH/FSH ratios in anovulatory patients with PCOS were significantly ($P<0.05$) higher than those in ovulatory patients with MFO. Although the upper limits of normal range for LH/FSH ratio was defined as 1.3,[10] we found the cut-off point at 2.4 of LH/FSH which has significantly difference in our PCOS patients than MFO patients.

In the table 3, we found there was low positive predict value (61.0%) of PCOS was diagnosed by ultrasound only, however, there was higher negative predict value for ultrasound to rule-out the probability of PCOS. (82.3%)

Discussion

PCOS may produce a spectrum of clinical and hormonal findings. Approximately two-thirds of patients with PCOS will have enlarged ovaries with multiple follicular cysts. One-thirds of patients with biochemically documented PCOS will have normal appearing ovaries.[13] Polycystic changes in ovaries are common in normal women. Polaon reported 23% of the 158 volunteers who were not on oral contraceptives and considered themselves to be normal had PCOS determined by pelvic ultrasound.[10] Patients were not hirsute or obese and had regular menstrual cycles in 26% of PCOS were verified by laparoscopically.[14] There are some cases with more than 10 small cysts in each ovary but menstrual disturbance was absent.[15] At least one endocrine marker of PCOS was observed in 55% of patients with MFO detected by transvaginal ultrasound and without ovulatory disturbance.[16] The interchangeable use of the term PCOS has broadened the original concept with the results of much confusion in defining this syndrome. In the present study, to determine the accuracy of diagnosis of PCOS were detected by transvaginal ultrasound despite of menstrual character and endocrinologic disturbance.

The ultrasound criteria for the diagnosis of PCOS have been defined as the presence of more than 10 multiple cysts (2-8mm in diameter) arranged peripherally around a dense core of stroma.[12] However, the number of follicles necessary to establish the diagnosis of PCOS by ultrasound has been reported to vary between 'more than 5',[17] 'more than 10'[18] and 'at least 15'.[19] Other results illustrate that less than 5 small cysts in each ovary

might have little influence on endocrine but more than 10 cysts in each ovary might have a great influence on endocrine.[16]

In our results, the endocrine character did not positive correlate with the numbers of small cysts of ovary but correlate with ovulatory disturbance. It was also suggested that the increase in the number of small cysts in ovaries might not influence the LH and LH/FSH ratio in ovulatory patients, however, as the number of cysts in ovaries increase, androgen levels rise and the levels tend to be higher than when ovulatory disturbance occur.[16]

The LH and LH/FSH ratios in anovulatory patients with PCOS were significant ($P < 0.05$) higher than those in controls and ovulatory patients with MFO. In 55% of ovulatory patients with MFO the ultrasound diagnosis of PCOS was supported by at least one biochemical marker of PCOS, (i.e. increase LH, LH/FSH ratio, E1 and/or androgen) FSH levels are normal or slight lower and typical in many patients is an increased LH/FSH ratios. However, there may be patients with typical PCOS features who have normal LH levels and LH/FSH ratios[20] On the other hand, the frequency of LH/FSH>1.3 in anovulatory patients with PCOS was significantly ($P<0.5$) higher than ovulatory patients with MFO.[16] We found that when LH/FSH>2.4, the anovulatory patients with PCOS was significantly ($P<0.05$) higher than ovulatory patients with MFO in our patients.

But even we describe the cutoff point at LH/FSH>2.4, there are still low predict value of PCOS was diagnosed by ultrasound. However, we can rule-out the probability of PCOS by ultrasound with the higher predict value. (82.3%)

In summary, it was suggested that Ultrasound is useful to rule-out the probability than to diagnose PCOS. In the criteria of LH/FSH of PCOS, it is significant at cutoff of 2.4 in our anovulatory patients. It also suggested that MFO is a progress disease in ovulatory patients and may be latent PCOS.

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